

**Table 5. Soil Amendments**

|  | Components        | Percent | Rate of Application |
|--|-------------------|---------|---------------------|
|  | Ammoniacal N      | 0.40%   | 2000 lbs/acre       |
|  | Water Soluble N   | 0.40%   |                     |
|  | Water Insoluble N | 3.20%   |                     |
|  | Manganese         | 0.05%   |                     |
|  | Zinc              | 0.04%   |                     |
|  | Sulphur           | 1.00%   |                     |
|  | Magnesium         | 0.80%   |                     |
|  | Calcium           | 4.00%   |                     |

**Rice Straw Wattles (Sediment Logs).** Rolls shall be manufactured from clean rice straw. They shall be 12 inches in diameter and 10 feet in length, 25 lbs. in weight, and wrapped in UV degradable plastic.

**Pine Needle Mulch.** Clean pine needles shall be no more than 6 months old, have an acceptable moisture content, and be collected on site or imported from local sources as approved by the RS. Needles shall be free of rock, garbage, pinecones, and other debris. Pine needles collected on site shall not be in such quantity as to remove protective mulch cover, as per the direction of the RS. Needle length shall be at minimum 4 inches. A representative sample shall be submitted to the RS for approval and reference. Stockpile on site as needed, in a location approved by the RS.

**Wood Chips.** Wood chips shall be obtained from timber removed on site. The particle size of the chips shall be between 0.5 inch and 3 inches in length and not less than 0.5 inch in width and 0.125 inch in thickness. Wood chips shall be at minimum equal to Caltrans specification 20-2.08. At least 95 percent by volume of wood chips shall conform to the sizes specified. The RS shall approve material prior to application.

**Wood Fiber Mulch.** Wood fiber mulch shall consist of 100%-recycled long-fiber pulp, and shall be produced from newsprint, chipboard, corrugated cardboard, or a combination of these materials, and shall be free from weeds or other foreign matter toxic to seed germination.

**Tackifier.** Material shall be of an organic, plant-derived substance containing psyllium, guar gum, or starch, such as PT-TAC, Reclamare, M-Binder, Eco-tak, or an approved equal. Material shall form a transparent 3-dimensional film-like crust permeable to water and air and containing no agents toxic to seed germination.

**Erosion Control Blankets and Stakes.** Blankets shall consist of the following:

Type 1: 70% straw and 30% coconut fiber, 6.5 ft in width, 83.5 ft in length, approximately 30 lbs. sewn between 2 natural fiber nets, North American Green SC150 BN or equivalent as approved by the Revegetation Specialist.

Type 2: 100% coir fiber twine .30 inches thick, 6.6 ft in width, 164 ft in length, and 50% open area of weave.

Stakes shall be both 6 and 12 inches in length, manufactured from a hardwood (North American Green Eco-STAKE or equivalent), or as approved by the Revegetation Specialist. Stakes may also be willowing stakes.

## **INSTALLATION OF TREATMENTS**

**Planting Salvaged Pants.** All planting holes shall be hand dug a minimum of 6 inches deeper than the root length, measured from the bottom of the root mass to the plant crown, and 4 inches wider than the crown.

Excavated holes shall be planted immediately to avoid drying of soils. Soils shall be loosened in the bottom and along the sides of the hole. Set plant materials plumb and in the center of the planting hole with the crown lowered approximately ½" below grade so that a planting 'pocket' is formed. Place one 'teabag' of slow-release fertilizer on either side of the root mass. Place the native back fill around the ball in layers, tamping to settle back fill and eliminate voids and air pockets. After back filling the pits, saturate the back fill material with water to the full depth of the hole and until the basin ponds. Dish and tamp the top of backfill to form a 2-inch high berm to hold water, or as shown in planting details. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

**Preparing Seed Beds.** All compacted soils shall be thoroughly loosened to a depth of up to 6 inches with an agricultural disc or other equipment approved by the RS. Compacted trails may require deeper de-compaction.

**Application of Salvaged Organic Matter and Topsoil.** Areas designated for this treatment shall be graded approximately four inches below the final plan grade. Organic matter shall be spread on pre-wetted slopes to a depth of approximately four inches and incorporated to match finish grade.

**Application of Soil Inoculant.** Hand broadcast at 60 lbs/acre. Incorporate to a depth of 3 inches by raking or other approved method, prior to amendment applications. A dust mask must be used when handling this material.

**Soil Amending.** Amendments shall be evenly applied following application of soil inoculants and incorporated by raking or other approved method. Incorporate to a depth of one-half inch to one inch.

**Seeding.** All seeding shall be conducted in the Fall, prior to snow accumulation and ground freeze unless otherwise approved by the RS. Seed shall be uniformly broadcast with hand-held seeders or other method approved by the RS over prepared areas and lightly raked to incorporate to a depth of one-quarter to one-half inch. Seed shall not be left uncovered more than 24 hours unless otherwise approved by the RS. Seeding shall not occur under conditions that would allow the seed to become windborne (i.e., winds greater than 5 mph).

**Installing Rice Straw Wattles (Sediment Logs).** Install as directed and where shown on plans. Begin installation from the top of the slope. Install rows on 15-foot centers along the slope contour. Excavate a trench the width of the log (9") as staked in the field or as directed by the revegetation inspector. Place wattles in the trench. On the downhill or outslope side(s) of the log, pound 1" x 2" x 24" wooden stakes on 3.3 foot spacing through two loops of the netting, into the trench. Additionally anchor the logs by staking at both ends (4 per 10 ft. length of log). The top of the stakes shall be level with the log. The trench shall then be backfilled and soil tamped firmly into place.

**Mulching.** Clean, native pine needles or clean wood chips shall be evenly applied to a depth of approximately one-quarter to one-half inch. On slopes 3:1 or steeper apply wood fiber mulch at 2,000 lbs/acre and tackifier at 150 lbs/acre.

For Temporary Erosion Control mix wood fiber mulch and tackifier, apply with a hydroseeder with a paddle wheel agitator. Evenly apply the mixture at the following rates under suspension unless otherwise approved. Mix in accordance with the following:

|                             |                |
|-----------------------------|----------------|
| Wood-cellulose fiber mulch: | 1,000 lbs/acre |
| Tackifier:                  | 150 lbs/acre   |
| Water:                      | As needed      |

## MAINTENANCE

Maintain for two years following treatment so that there is no evidence of erosion, such as rills or gullies. This may require re-application of seed, mulches, and tackifiers. Maintain health of transplanted plants

with supplemental watering as needed. The Contractor has the option to use a time-release watering system, but must achieve the Performance Standards listed below.

#### **PERFORMANCE STANDARD AND ACCEPTANCE**

Revegetated areas will be inspected at completion of installation and accepted subject to compliance with specified materials and installation requirements. After two full growing seasons following seeding, the Contractor shall guarantee 75% coverage by mulch or seedlings such that there is no significant evidence of rills, gullies or other evidence of erosion. Seedling density shall be a minimum of 10/ft<sup>2</sup>. If adequate coverage is not achieved, the Contractor may be required to re-seed, re-soil amend, and/or re-mulch. The Contractor shall warranty 80% survival of transplanted plants for two full growing seasons. Contractor shall monitor plant survival and shall replace dead plants as they occur, before the warranty period expires, such that 80% survival is achieved. The Contractor shall notify the RS when replacement plantings take place. The RS, upon Contractor's request, will make final inspection and acceptance at the conclusion of the maintenance period, two full years following completion of seeding and planting. Provide notification at least 10 working days before requested inspection.

# **South Tahoe Greenway Shared Use Trail Revegetation and Restoration Strategies for Trail Decommissioning (Upland and SEZs)**

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## **INTRODUCTION**

The purpose of this report is to describe approaches to revegetation and erosion control for existing trail de-commissioning and BMP retrofitting for the South Tahoe Greenway Shared Use Trail Project Area in South Lake Tahoe, CA (Greenway Project). Trails designated for restoration in the Greenway Project description are located in uplands and Stream Environment Zone (SEZ). In some cases in SEZ, trail closures may be adequate to allow for natural recruitment of vegetation. Other sites, specifically heavily used trails, may require de-compaction of soils, seeding, mulching, and planting. Planting containerized plants or cuttings is suggested for SEZs where there is a good chance of survival without permanent irrigation and where control of bicycle and foot traffic is desired. Where conditions are suitable, willows, roses, and/or other woody riparian vegetation can be planted. However, if there are particular upland sites where thorny native vegetation, such as whitethorn (*Ceanothus cordulatus*) can be used in conjunction with boulders or logs to control traffic, their use should be considered. Irrigation and/or a time-release form of water will be required for at least two years on these sites. Irrigation is in general not recommended because systems are difficult to install and maintain in inaccessible but heavily trafficked areas. All disturbed areas will be seeded. Soil amendments could be added in highly disturbed areas. Only containerized plants will receive slow-release organic fertilizers. All disturbed areas will be mulched.

Conventional best management erosion control practices (BMPs) for trails remaining open include the use of various barriers to keep hikers and cyclists on the trails (boulders, logs), application of mulches such as wood chips or gravel, installation of sediment rolls for slope checks on slopes 3:1 and steeper, and construction of water bars.

Any materials imported from outside the Lake Tahoe Basin, such as gravel, will need to come from noxious weed-free sources. As part of the Stormwater Pollutant Prevention Plan (SWPPP), all equipment from a non-Basin yard will require steam-cleaning prior to entering the Basin.

Four types of treatment areas are identified: 1) decommissioned upland trails; 2) decommissioned SEZ trails; 3) BMP retrofitted upland trails; and 4) BMP retrofitted SEZ trails. Site conditions will vary within each of these types and site-specific revegetation and erosion control specifications will be required.

## **PRELIMINARY REVEGETATION GUIDELINES**

### **GENERAL**

All revegetation work will be implemented in the fall. BMP retrofit work can be conducted when sites are free of snow. All work will be overseen by a Certified Professional Soil Erosion and Sediment Control Specialist (CPESC). All work shall be conducted by a C-27 licensed Landscape Contractor.

### **TREATMENT TYPES AND AREAS**

1. Upland Decommissioned Trails. Install water bars as per USDA Forest Service Lake Tahoe Basin Management Unit (LTMBU) standards. Install other approved site-specific BMPs such as logs and rocks for slope checks and to add roughness. Evaluate soil compaction and loosen compacted soils to a depth approximately six inches, or as needed. Apply soil inoculants and incorporate, apply Revegetation Seed Mix 1, incorporate to a depth of one-quarter to one-half inch. Install sediment logs where located on plans and as directed. Apply wood chips or clean pine needles to a depth of one-half inch and 85% cover.

2. SEZ Decommissioned Trails. Evaluate soil compaction and loosen compacted spoils to a depth of approximately six inches or as needed. Apply soil inoculants and incorporate, apply Revegetation Seed Mix 2, incorporate to a depth of one-quarter to one-half inch. Apply wood chips or clean pine needles to a depth of one-half inch and 85% cover. Apply appropriate BMPs such as logs or rocks. Plant containerized wetland plants at selected sites.

3. Upland Trails, BMP Retrofit. Install water bars as per LTBMU standards. Install other approved site-specific BMPs. Revegetate disturbed shoulders with inoculants, Seed Mix 1, apply mulch.

4. SEZ BMP Retrofit. Install approved site-specific BMPs. Revegetate disturbed shoulders with inoculants, Seed Mix 2, apply mulch.

## MATERIALS

A partial list of potential materials is listed below. Detailed specifications for Containerized plans, slow-release fertilizer, Soil Inoculants, Soil Amendments, Sediment Logs, Pine Needle Mulch, and Wood Chips are provided in the *FINAL South Tahoe Greenway Shared Use Trail Revegetation and Restoration Strategies*, dated August 6, 2009.

**Seed.** Seed tags shall show the following information:

- Scientific name
- Common name
- Lot number
- Test dates
- Percent purity
- Percent germination, including hard and dormant seed
- Percent weed seed
- Percent crop seed
- Origin

**Table 1.** Revegetation Seed Mix 1 for Decommissioned and Revegetated Upland Trails

| Botanical Name                                   | Common Name/Variety   | PLS lbs/acre |
|--|-----------------------|--------------|
| <i>Achillea millefolium</i>                      | Yarrow                | 0.10         |
| <i>Achnatherum occidentale</i>                   | Western needlegrass   | 1.00         |
| <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> | Mtn. Sagebrush        | 1.00         |
| <i>Bromus carinatus</i>                          | California Brome      | 3.00         |
| <i>Cercocarpus ledifolius</i>                    | Mtn. mahogany         | 1.00         |
| <i>Chrysothamnus nauseosus</i>                   | Rabbitbrush           | 0.50         |
| <i>Elymus elymoides</i>                          | Squirreltail          | 2.00         |
| <i>Elymus trachycaulus</i>                       | Slender wheatgrass    | 4.00         |
| <i>Eriogonum nudum</i>                           | Naked buckwheat       | 0.50         |
| <i>Eriogonum umbellatum</i>                      | Sulphur buckwheat     | 0.50         |
| <i>Ipomopsis aggregata</i>                       | Scarlet trumpetflower | 0.25         |
| <i>Linum lewisii</i>                             | Lewis flax            | 0.50         |
| <i>Lupinus argenteus</i>                         | Silver lupine         | 1.00         |
| <i>Poa secunda</i>                               | Sandberg bluegrass    | 1.00         |
| <i>Purshia tridentata</i>                        | Antelope bitterbrush  | 1.00         |
| <i>Ribes cereum</i>                              | Wax currant           | 0.50         |
| Totals   |                       | 17.85        |

**Table 2.** Revegetation Seed Mix 2 for Decommissioned and Retrofitted SEZ Trails

| <b>Botanical Name</b>         | <b>Common Name/Variety</b>            | <b>PLS lbs/acre</b> |
|-------------------------------|---------------------------------------|---------------------|
| <i>Bromus carinatus</i>       | California brome                      | 4.00                |
| <i>Carex praegracilis</i>     | Slender sedge                         | 0.25                |
| <i>Deschampsia cespitosa</i>  | Hairgrass                             | 0.50                |
| <i>Elymus glaucus</i>         | Blue wildrye, high elevation          | 3.00                |
| <i>Elymus trachycaulus</i>    | Slender wheatgrass                    | 4.00                |
| <i>Hordeum brachyantherum</i> | Meadow barley, from 6,000' and higher | 2.00                |
| <i>Leymus triticoides</i>     | Creeping wildrye                      | 4.00                |
| <i>Lupinus polyphyllus</i>    | Tahoe lupine                          | 0.50                |
| <i>Festuca rubra</i>          | Red fescue                            | 2.00                |
| <i>Penstemon rhydbergii</i>   | Meadow penstemon                      | 0.25                |
| <i>Poa pratensis</i>          | Kentucky bluegrass, Tahoe source      | 2.00                |
| <i>Potentilla gracilis</i>    | Cinquefoil                            | 0.50                |
| <b>TOTAL</b>                  |                                       | <b>23.00</b>        |