

Stormwater Standards

Clackamas County Service District No. 1

APPENDIX B

Planting Guide for Buffers

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The following tables referenced in Appendix B are on the District website

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- Table 2: Buffer Restoration Plants: Upland Forest
- Table 3: Buffer Restoration Plants: Oak Woodland/Savanna
- Table 4: Buffer Restoration Plants: Ash Forested Wetland
- Table 5: Buffer Restoration Plants: Shrub/Scrub Wetland
- Table 6: Buffer Restoration Plants: Emergent Marsh

Planting Guide for Buffers

B.1 General

B.1.1 Introduction

This appendix covers information on plant selection and design guidance for vegetated buffers. Buffers require a specific range of plants based on the location of the area that is being rehabilitated. The following sections outline a range of practices related to selection of the right plant in the right place.

B.1.2 Native Plants

Only native plants are approved for Vegetated Buffers. Native plants are plants that are indigenous to our specific region. They typically require minimal care once they are planted because they have evolved and adapted to the growing conditions and climate of the region. Because of their place in the local ecology, native plants also have habitat value for birds and other local species. For these reasons, only native plants are allowed in designated stream buffers and sensitive areas, or for revegetation purposes. Alternative plant materials for stormwater facilities must be approved by the District through special review.

B.1.3 Climate and Microclimate

All native vegetation is well-adapted to the northwest regional climate. Regional climate dictates average seasonal temperatures, amount of rainfall and available daylight, therefore, site-specific microclimates can vary considerably and should be factored into the planting design. For example, sword fern is a plant native to woodlands of the Pacific Northwest that likely would not survive if placed in a south facing area with direct sun exposure most of the day. But, sword fern placed in shady area on the north would thrive.

B.1.4 Habitat Diversity and Layering of Plants

Natural environments in the Pacific Northwest are characterized by diverse, layered plant habitats. A forest typically has habitats vertically arranged one on top of the other: low-growing groundcovers, topped by shrubs, topped by arborescent shrubs (shrubs that look like small trees), and trees. These layers vary in composition and form from one habitat type to another, such as the different northwest habitats of forest, wetland, and riparian. Different organisms occupy different niches within these habitats, creating greater biodiversity. The structural variety of a diversified planting design can also be very pleasing to the eye. Landscape should reflect this natural ordering of plantings, as well as mimicking a mixture of deciduous and evergreen materials.

B.1.5 Maintenance

Temporary irrigation is recommended for vegetated buffers if plants are installed during warmer summer months. If a temporary system is installed, it must be removed by the end of the maintenance period. Recommended maintenance procedures are as follows:

- Check regularly for weeds. Remove weeds or invasive plants such as Himalayan blackberries and English ivy, and implement a weed control program as needed.
- Check mulch regularly to maintain uniform coverage to prevent erosion and moisture loss during dry periods.
- Replant bare patches as necessary to comply with the facility's coverage requirements and maintenance plan.

B.2 Planting Plan Methods

Planting plans are required for development projects which have mitigation or have to replant the vegetated buffers. Four major components should be addressed: hydrology, soils, plant materials, and maintenance. When developing planting plans, the following steps should be used:

B.2.1 Step 1: Assess Plant Community Type

- a. Identify location of vegetated buffer and its adjacent plant community type(s). Assign appropriate plant community type to design:
 - Riparian Forest (RF)
 - Upland Forest (UF)
 - Oak Woodland / Savanna (OW)
 - Ash Forested Wetland (AF)
 - Scrub / Shrub Wetland (SS)
 - Emergent Marsh (EM)

B.2.2 Step 2: Assess Soil Conditions and Assign Appropriate Preparation Specifications to Plans

- a. Every effort should be made to preserve a site's existing soils. Native soil along Sensitive Areas and Vegetated Buffers shall be retained to the maximum extent practicable. Determine the organic content and non-native, invasive seed bank likely in the soil.
- b. For upland sites with at least one foot of native topsoil, but containing a non-native, invasive seed bank or plants, add notes to the plan to remove the undesirable plants, roots, and seeds.
- c. For upland sites with either disturbed and compacted soils or less than one foot of topsoil and invasive, non-native seed bank or plants that have become established, the following notes shall be added to the plan.
 1. Remove the undesirable plants, roots, and seeds prior to adding topsoil.
 2. Till the sub-grade in these areas to a depth of at least four inches and add at least 12 inches of clean compost-amended topsoil. The compost-amended topsoil should have the following characteristics to ensure a good growing medium:
 - A) Texture: material passes through 1-inch screen
 - B) Fertility: 35% organic matter
 3. In the event of floodplain grading, over-excavate the sub grade to ensure 12 inches of topsoil can be applied without impacting surface water elevations.
- d. For wet areas in Sensitive Areas, the soil conditions should be hydric or graded to hold sufficient water to promote hydric soil formation. The addition of organic muck soil will improve plant establishment for some bulbs and tubers.
- e. Other amendments, conditioners, and bio-amendments may be added as needed to support the plants or adjust the soil pH. Traditional fertilization techniques (applying N-P-K) are not necessary for native plants.

B.2.3 Step 3: Identify Plants to be Preserved, Select Revegetation Plant Materials, Quantities, Placement, and Assign Planting Zones and Specifications to Plans

- a. *Preservation*: Every effort should be made to protect a site's existing native vegetation. Native vegetation along Sensitive Areas and Vegetated Buffers shall be retained to the maximum extent practicable.
- b. *Selection*: Plant selection will be from a native species palette and should consider site soil types, hydrologic conditions, and shade requirements. Containerized or bare root plants may be used. The updated list of common native plant community types appropriate for planting Sensitive Areas and Vegetated Buffers can be found on the

Unless approved by District staff, planting restrictions are the following:

- 1. Deep rooting trees and shrubs (e.g. willow) should not be planted on top of concrete pipes, or within 10 feet of retaining walls, inlet/outlet structures or other culverts; and
- 2. Large trees or shrubs should not be planted on berms over four feet tall that impound water. Small trees or shrubs with fibrous root systems may be installed on berms that impound water and are less than four feet tall.
- c. *Quantities*: Trees and shrubs should be planted using the following equations to achieve the specified densities on a per acre basis.
 - 1. Total number of trees per acre = area in square feet x 0.01
 - 2. Total number of shrubs per acre = area in square feet x 0.05
 - 3. Groundcover = plant and seed to achieve 100% area coverage
- d. *Size*: See Tables 1-6 for minimum rooted plant size.
- e. *Placement*: Plant placement should be consistent with naturally occurring plant communities. Trees and shrubs should be placed in singles or clusters of the same species to provide a natural planting scheme. This arrangement may follow curved rows to facilitate maintenance. Distribution and relative abundance should depend on the plant species and on the size of the revegetation area. The Vegetated Corridor revegetation area should be over seeded with native seed mixes appropriate to the plant community and hydrologic zone of the site (see *Tables 1-6*). Plant placement and seeding shall promote maximum vegetative cover to minimize weed establishment. Where feasible and applicable, planting plans should consider effective shading considerations (i.e. southern and western exposures).

B.2.4 Step 4: Determine Plant Installation Requirements and Assign Specifications to Plans

- a. *Timing*: Containerized stock should be installed only from February 1 through May 1 and October 1 through November 15. Bare root stock should be installed only from December 15 through April 15. Seeding should occur only from between March 15 to October 15. Planting or seeding outside these times may require additional measures to ensure survival which shall be specified on the plans and require District approval.
- b. *Erosion Control*: Grading, soil preparation, and seeding should be performed during optimal weather conditions and at low flow levels to minimize sediment impacts. Site disturbance should be minimized and desirable vegetation retained, where possible. Slopes should be graded to support the establishment of vegetation. Where seeding is used for erosion control, an appropriate native grass, Regreen (or its equivalent), or sterile wheat should be used to stabilize slopes until permanent vegetation is established. Biodegradable fabrics (coir, coconut or approved jute matting (minimum ¼ inch square holes) may be used to stabilize slopes and channels. Fabrics such as burlap may be used to secure plant plugs in place and to discourage floating upon inundation. No plastic mesh that can entangle wildlife is permitted.
- c. *Mulching*: Areas should be mulched a minimum of three inches in depth and 24 inches in diameter, to retain moisture and discourage weed growth around newly installed plant material. Appropriate mulches are made from composted bark or leaves that have not been chemically treated.
- d. *Plant Protection from Wildlife*: Depending on site conditions, appropriate measures should be taken to limit wildlife-related damage.
- e. *Irrigation*: Appropriate plant selection, along with adequate site preparation and maintenance, reduces the need for irrigation. However, unless site hydrology is currently adequate, an irrigation system or equivalent should be used during the warranty period. Watering shall be at a rate to maintain all plantings in a healthy thriving condition during establishment. Other irrigation techniques, such as deep watering, may be allowed with prior approval by District staff.
- f. *Access*: Maintenance access for plant maintenance will be provided for Sensitive Areas and Vegetated Corridors.

B.2.5 Step 5: Determine Plant Monitoring and Maintenance Requirements

- a. *Monitoring*: Site visits are necessary throughout the growing season to assess the status of the plantings, irrigation, mulching, etc. and ensure successful plant establishment.
- b. *Weed Control*: The removal of non-native, invasive weeds should be necessary throughout the maintenance period, or until a healthy stand of desirable vegetation is established.
- c. *Plant Replacement and Preservation*: At the end of the maintenance period, all plants not in a healthy growing condition, will be noted and as soon as seasonal conditions permit, should be removed from the site and

replaced with plants of the same species and size as originally specified. Prior to replacement, the cause of loss (wildlife damage, poor plant stock, etc.) should be documented with a description of the corrective actions taken.

B.2.6 Step 6: Prepare Construction Documents and Specifications

The construction documents and specifications shall include:

- a. Sensitive Area and Vegetated Buffer boundaries as shown on the stormwater management plan, including limits of approved, temporary construction encroachment. Orange construction fencing should be used at Vegetated Buffer boundaries as well as at encroachment limits during construction. Note permanent type fencing and signage between the development and the Vegetated Corridor for project completion is required.
- b. Site preparation plan and specifications, including limits of clearing, existing plants and trees to be preserved, methods for removal and control of invasive, non-native species, and location and depth of topsoil and or compost to be added to revegetation area.
- c. Planting plan and specifications, including all of the following:
 1. Planting table that documents the common name, scientific name, distribution (zone and spacing), condition and size of plantings
 2. Installation methods for plant materials
 3. Mulching
 4. Plant tagging for identification
 5. Plant protection
 6. Seeding mix, methods, rates, and areas
- d. Irrigation plan and specifications, including identification of water source, and maintenance of the system.
- e. Maintenance schedule, including responsible party and contact information, dates of inspection (minimum three per growing season and one prior to onset of growing season) and estimated maintenance schedule (as necessary) over the warranty/monitoring period.
- f. Easement descriptions for all Vegetated Buffers and Sensitive Areas.
- g. Access points for installation and maintenance including vehicle access if available.
- h. Standard drawing details (north arrow, scale bar, property boundaries, project name, drawing date, name of designer and Property Owner).

B.3 Buffer Restoration Plant Lists

B.3.1 Plant Selection

The updated plant list for buffer remediation can be found on the District website at and are generally grouped according to the reference ecosystem that is being replicated. These include broad plant communities such as riparian forest, upland forest, oak woodland/savannah, ash forested wetland, shrub/scrub wetland, and emergent marsh.

Each community contains a guide to site specific planting (such as water and light requirements) as well as a listing of specific characteristics for each species. It also includes a minimum planting size, and recommended spacing. Each plant community also contains a minimum species composition (plants that must be included as a minimum variety) to ensure adequate biodiversity.

The buffer plant lists provided at the above link were adapted from Clean Water Services' *Design and Construction Standards for Sanitary Sewer and Surface Water Management*, June 2007.

The following tables referenced in Appendix B are on the District website

Table 1: Buffer Restoration Plants: Riparian Forest

Table 2: Buffer Restoration Plants: Upland Forest

Table 3: Buffer Restoration Plants: Oak Woodland/Savanna

Table 4: Buffer Restoration Plants: Ash Forested Wetland

Table 5: Buffer Restoration Plants: Shrub/Scrub Wetland

Table 6: Buffer Restoration Plants: Emergent Marsh