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Water Environment Services Buffer Standards

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CLACKAMAS
WATER
ENVIRONMENT
SERVICES

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Appendices

SECTION 1. PURPOSE

The purpose of this section is to assist applicants, developers, and property owners with planning and design of their projects in compliance with District Water Quality Resource Area (WQRA) requirements. The WQRA requirements shall be incorporated into the preliminary site plan.

The District requires WQRA Vegetated Buffers to protect the water quality of water quality resources, which include perennial and intermittent streams and wetlands.

1.1 Area of Application

Buffer Standards apply to all parcels containing a Water Quality Resource Area (WQRA) or within 200 feet of a WQRA located on an adjacent parcel, provided that the development parcel(s) are inside the District boundary, excluding those that are governed by another municipality or county planning agency with authority to govern WQRAs. WQRAs are protected water resources and adjacent vegetated corridors as established by Buffer Standards. Protected water resources are classified as primary or secondary.

A wetland shall be a primary protected water resource if the wetland meets any one of the following criteria and is not a constructed wetland:

1. The wetland is fed by surface flows, sheet flows, or precipitation, has evidence of flooding during the growing season, has 60 percent or greater vegetative cover, and is over one-half acre in size;
2. The wetland qualifies as having “intact water quality function” under the 1996 Oregon Freshwater Wetland Assessment Methodology;
3. The wetland is in the Flood Management District, has evidence of flooding during the growing season, is five acres or more in size, and has a restricted outlet or no outlet;
4. The wetland qualifies as having “intact hydrologic control function” under the 1996 Oregon Freshwater Wetland Assessment Methodology; or
5. The wetland or a portion of it is within a horizontal distance of less than one-fourth mile from a water body that meets the Oregon Department of Environmental Quality’s definition of a “water quality limited water body.”

Rivers, perennial streams, intermittent streams draining more than 100 acres, natural lakes, and springs that feed streams and wetlands and have year-round flow during a year with wet to average precipitation patterns are primary protected water resources.

Intermittent streams draining 100 acres or less are secondary protected water resources.

Methodology for Documenting Intermittent Status of Streams

1. A stream shall be determined to be intermittent through one of the following methods:
    a. Method 1: The stream channel is dry (without visible flow or standing water) for a period of 30 consecutive days during a year with wet to average precipitation patterns (see **Table 1** as an example of representative precipitation patterns from nearby Hillsboro, OR). This method requires a minimum of two samples per 100 feet

of stream length, collected at the beginning and end of the 30 day period, with supporting data (including maps with photos keyed to each sample location), indicating that the stream is dry. During a year with a dry precipitation pattern, all sampling must be completed prior to August 15. If standing water is present at the first site visit, Method 2 shall be used, or the applicant must wait until the project reach is completely dry to start the 30-day sampling period. For the purposes of this section, the District shall have the discretion to accept data taken up to 37 consecutive days apart.

b. Method 2: The channel must not have saturated soil in the upper 12 inches, during a year with wet to average precipitation patterns. This method requires representative samples (one per 100 feet of stream length) on only one date. Samples shall include supporting data (including soil texture, level of saturation, and maps with photos keyed to each sample location). During a year with a dry precipitation pattern, all sampling must be completed prior to August 15.

2. If the applicant attempts to make a determination of intermittence during the wet season (November 1 – June 30), the applicant should consider all other available data (historic photos, data, reports, eyewitness accounts, etc.). The District shall review the available data and, if approved, the intermittent determination shall be considered preliminary until status can be definitively confirmed through one of the field methodologies described in Method 2 (Subsection 1.b.).

Table 1. Precipitation for Use in Determining Perennial and Intermittent Flow Status

Month	Average Monthly	Less Than (Dry Year)	More Than (Wet Year)
January	5.76	3.70	6.93
February	4.72	3.17	5.65
March	3.93	2.96	4.59
April	2.46	1.65	2.94
May	1.90	1.13	2.30
June	1.46	0.87	1.78
July	0.61	0.22	0.76
August	0.93	0.25	1.12
September	1.61	0.72	2.03
October	2.68	1.45	3.27
November	6.03	4.07	7.21
December	6.44	4.44	7.62
Annual		**32.50**	**42.01**

- Precipitation data and calculations from the Hillsboro, OR3908 WETS Table available at https://www.wcc.nrcs.usda.gov/legacy/ftp/support/climate/taps/or/41067.txt
- If other long-term precipitation data is used, provide location and statistical analysis with submittal.
- To determine status of the precipitation levels, review the previous Water Year (October 1 – September 30) to date. For determinations conducted during the month of October, use the previous complete Water year to determine precipitation levels. Daily and monthly data are available at http://www.weather.gov/climate/

The width of the vegetated corridor included within a WQRA is specified in **Table 2**. However, if an improved, public road right-of-way runs parallel to and, based on **Table 2**, would be included within a WQRA, the WQRA shall not extend beyond the improved, public road right-of-way.

Table 2. Width of WQRA Vegetated Corridor

Protected Water Resource Type	Slope Adjacent to Protected Water Resource[1]	Starting Point for Measurement from Water Resource	Width of Vegetated Corridor[2]
Primary Protected Water Resource	<25 percent	▪ Edge of bankfull stage ▪ Delineated edge of protected wetland	50 feet
Primary Protected Water Resource	≥25 percent for 150 feet or more	▪ Edge of bankfull stage ▪ Delineated edge of protected wetland	200 feet[3]
Primary Protected Water Resource	≥25 percent for less than 150 feet	▪ Edge of bankfull stage ▪ Delineated edge of protected wetland	Distance from starting point of measurement to break in 25 percent slope plus 50 feet[3,4]
Secondary Protected Water Resource	<25 percent	▪ Edge of bankfull stage	25 feet
Secondary Protected Water Resource	≥25 percent	▪ Edge of bankfull stage	50 feet[3]

Notes:

1. *At least three slope measurements along the water resource, at no more than 100-foot increments, shall be made for each property for which development is proposed. Depending on the slope measurements, the width of the vegetated corridor may vary. Slope shall be measured in 25-foot increments away from the water resource until slope is less than 25 percent or a point 150 feet from the starting point of measurement is reached, whichever occurs first. The 25-foot increments shall be measured horizontally. Where the protected water resource is confined by a ravine or gully, the top of ravine is the break in the greater-than-25-percent slope.*
2. *The width of the vegetated corridor shall be measured horizontally.*
3. *Vegetated corridors in excess of 50' for primary protected resources, or in excess of 25 feet for secondary protected resources, apply on steep slopes only in the uphill direction from the protected water resource.*
4. *A maximum reduction of 25 feet may be permitted in the width of the vegetated corridor beyond the slope break if a geotechnical report demonstrates that the slope is stable.*

SECTION 2. DEFINITIONS

Section 2 provides the definitions and abbreviations used in these Buffer Standards.

2.1 Words and Terms

Unless the context specifically indicates otherwise, the following words and terms, as used in these Buffer Standards, shall have the meanings hereinafter designated:

Term	Definition
Bankfull Stage	The stage or elevation at which water overflows the natural banks of streams or other waters of the state and begins to inundate the upland. The bankfull stage may be approximated using either the two-year recurrence interval flood elevation or one foot measured vertically above the ordinary mean high-water line.
Created Wetlands	Wetlands developed in an area previously identified as a non-wetland to replace, or mitigate, wetland destruction or displacement. A created wetland shall be regulated and managed the same as an existing wetland
Constructed Wetlands	Wetlands developed as a water quality or quantity facility, subject to change and maintenance as such. These areas must be clearly defined and separated from naturally occurring or created wetlands.
Debris	Discarded human made objects that would not exist in an undeveloped stream corridor or wetland. Debris includes, but is not limited to, tires, vehicles, litter, scrap metal, construction waste, lumber, plastic, yard debris, or Styrofoam. Debris does not include objects necessary to a use allowed by Section 709, or ornamental and recreational structures. Debris does not include existing natural plant materials or natural plant materials that are left after flooding, downed, or standing dead trees, or trees that have fallen into protected water resources.
Development	Any anthropogenic change to improved or unimproved real estate, including but not limited to buildings or other structures, utility infrastructure, impervious surfaces, other structures or facilities, mining, dredging, paving, filling, or excavation or any surface type that changes or impedes the natural flow of stormwater runoff. Development also includes partitions, subdivisions and land divisions redevelopment or modifications to the existing impervious surface footprint on a property. Development does not include the following: 1) Stream enhancement or restoration projects approved by the District. 2) Farm structures and private roads outside of the Urban Growth Boundary. 3) Lot Line adjustments. 4) Measures to replace within the existing footprint, a structure(s) lost due to a catastrophic event such as fire, provided that such measures are consistent with District/City/County regulations.
Disturb	Anthropogenic changes to the existing physical status of the land, which are made in connection with development.
Drip Line	The outermost edge of a tree's canopy; when delineating the drip line on the ground, it will appear as an irregularly shaped circle defining the canopy's perimeter.

Term	Definition
Emergency	Any anthropogenic or natural event or circumstance causing or threatening loss of life, injury to person or property, and includes, but is not limited to, fire, explosion, flood, severe weather, drought, earthquake, volcanic activity, spills or releases of oil or hazardous material, contamination, utility or transportation disruptions, and disease.
Enhancement	The process of improving upon the natural functions and/or values of an area or resource that has been degraded by human activity. Enhancement activities may or may not return the site to a pre-disturbance condition but create/recreate beneficial processes and resources that occur naturally.
Erosion	The visual or measurable movement of soil particles resulting from the flow of, or pressure from, water, wind or earth movement.
Fill	Placement of any soil, sand, gravel, clay, mud, debris, refuse, or any other material, organic or inorganic which as the effect of raising the level of the ground surface, whether such surface is above, at, or below the water table, or to replace surface waters with dry land.
Invasive Non-Native or Noxious Vegetation	~~Plant species that are listed in the Oregon Department of Agriculture's Noxious Weed Policy and Classification System.~~ Plant species that are listed in the Clackamas Weed List (https://weedwise.conservationdistrict.org/weeds), maintained by the Clackamas Soil and Water Conservation District on behalf of Clackamas County
Maintenance	Routine, recurring, and usual work for the preservation, protection and keeping of any facility for its intended purpose.
Mitigation	The reduction of adverse effects of a proposed project by considering, in the following order: 1. Avoiding the impact altogether by not taking a certain action or parts of an action; 2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation; 3. Compensating for the impact by replacing or providing comparable substitute Water Quality Resource Areas. 4. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
Native Vegetation	Vegetation native to the Portland metropolitan area provided that it is not invasive non-native or noxious vegetation. See Portland Plant List.
Ordinary Mean High-Water Line	The line on the bank or shore to which water ordinarily rises in season.
Practicable	Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose.
Restoration	The process of returning a disturbed or altered area or water resource to a previously existing natural condition. Restoration activities reestablish the structure, function, or diversity to that which existed prior to impacts caused by human activity.
Riparian	Those areas associated with streams, lakes, and wetlands where vegetation communities are predominately influenced by their association with water.
Stormwater	Waters on the surface of the ground resulting from precipitation.
Stormwater Pretreatment Facility	Any structure or drainage way that is designed, constructed, and maintained to collect and filter, retain, or detain surface water runoff during and after a storm event for the purpose of water quality improvement.

Term	Definition
Stream	A body of running water moving over the earth's surface in a channel or bed, such as a creek, rivulet, or river. A stream flows at least part of the year, including perennial and intermittent streams. Streams are dynamic in nature and their structure is maintained through build-up and loss of sediment.
Stream, Intermittent	A stream that flows only part of the year, or seasonally, during years of normal precipitation. See Section 1.1.
Stream, Perennial	A stream that flows year-round during years of normal precipitation.
Structure	A building or other major improvement that is built, constructed, or installed, not including minor improvements—such as fences, utility poles, flagpoles, or irrigation system components—that are not customarily regulated through zoning codes.
Utility Facilities	Buildings, structures, or any constructed portion of a system that provides for the production, transmission, conveyance, delivery, or furnishing of services including, but not limited to, heat, light, water, power, natural gas, sanitary sewer, stormwater, telephone, and cable television. Utility facilities do not include stormwater pretreatment facilities.
Vegetated Corridor	The area between bankfull stage of a protected water resource and the delineated edge of the Water Quality Resource Area as defined in **Table 2**.
Water Quality Resource Area	Water features and adjacent vegetated corridors subject to regulation in order to preserve and enhance water quality, as established in Title 3 of the Metro Urban Growth Management Functional Plan. "Water Features" means all rivers, streams (regardless of whether they carry year-round flow, i.e. including intermittent streams), spring which feed streams and wetlands and have year-round flow, Flood Management Areas, wetlands, and all other bodies of open water.
Wetlands	Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are those areas identified and delineated by a qualified wetlands specialist as set forth in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1987, or by an ODSL/USACE 404 permit. Wetlands may also consist of: 1) **Constructed Wetlands**. Wetlands developed as a water quality or quantity facility, subject to change and maintenance as such. These areas must be clearly defined and separated from naturally occurring or created wetlands. 2) **Created Wetlands**. Created wetlands are wetlands developed in an area previously identified as a non-wetland to replace, or mitigate, wetland destruction or displacement. A created wetland shall be regulated and managed the same as an existing wetland. 3) **Existing Wetlands**. Existing wetlands are those identified and delineated as set forth in the Federal Manual for Identifying the Delineating Jurisdictional Wetlands, January 1987, or as amended, by a qualified wetlands specialist.

SECTION 3. EXEMPT USES

The following uses and activities are exempt from the requirements of Buffer Standards:

General Policy

1. Uses and activities that do not constitute development, except if the use or activity is prohibited by Section 4;
2. Farming practices, as defined in Oregon Revised Statutes (ORS) 30.930, and farm uses, as defined in ORS 215.203, in zoning districts where agricultural uses are a primary use, except that this exemption does not apply to buildings associated with farm practices or farm uses;
3. Forest practices, as defined in ORS 30.930, on forestlands, as defined in ORS 30.930, outside the Portland Metropolitan Urban Growth Boundary;
4. Installation of erosion prevention and sediment control (EPSC) measures pursuant to an EPSC plan approved by the EPSC regulatory authority.
5. Projects with the sole purpose of restoring or enhancing wetlands, streams, or fish and wildlife habitat areas, provided that the project is part of an approved local, regional, state, or federal restoration or enhancement plan;
6. Maintenance of existing structures, roadways, driveways, utility facilities, septic systems, accessory uses, and other development;
7. Removal of invasive non-native or noxious vegetation and the planting or propagation of native vegetation~~, provided that:~~.

   ~~a. Handheld tools are used to remove invasive non-native or noxious vegetation; and~~

   ~~b. After such removal, all open soil areas are replanted with native vegetation.~~
8. Removal of dead or diseased trees or trees that pose an imminent hazard to persons or property, provided that a consulting arborist's report, or other credible evidence, is provided by the owner of the subject property and verifies the dead, diseased, or hazardous condition of the trees proposed for removal;
9. Repair, replacement, or improvement of existing utility ~~facilities~~ infrastructure provided that the facility footprint is not increased where the disturbed portion of the Water Quality Resource Area is restored and vegetation is replaced with native vegetation;
10. Additions, alterations, rehabilitation, or replacement of existing structures, roadways, driveways, accessory uses, and other development that do not increase existing structural footprints in the WQRA where the disturbed portion of the WQRA is restored and vegetation is replaced with native vegetation;
11. Measures to remove or abate nuisances, or any other violation of statute, administrative rule, or ordinance, where such measures are required by government order and the disturbed portion of the WQRA is restored and vegetation is replaced with native vegetation; and

12. Work necessary to protect, repair, maintain, or replace existing structures, utility facilities, roadways, driveways, accessory uses, and exterior improvements in response to emergencies, ~~provided that after the emergency has passed~~provided that such remedial or preventative action must take place within a timeframe too short to allow for compliance with the requirements of this section ~~,~~and the adverse impacts are mitigated in accordance with **Table 3**.

SECTION 4. PROHIBITED USES

The following uses and activities are prohibited within a Water Quality Resource Area:

1. The planting of invasive non-native or noxious vegetation; and
2. Uncontained areas of hazardous materials as defined by the Oregon Department of Environmental Quality.

SECTION 5. DEVELOPMENT REVIEW REQUIREMENTS

This section provides the development review requirements mandated by the District.

5.1 General Development Review Requirements

The following review requirements are applicable to development in the Water Quality Resource Areas unless such development is exempt pursuant to Section 3.

1. In order to confirm the location of a WQRA, WQRA Boundary Verification, consistent with Subsection 6.1, shall be required or allowed as follows:
    a. WQRA Boundary Verification shall be required for development on a parcel or parcels that contain a WQRA or have a WQRA within 200' of the parcel boundary. The verification shall be required prior to issuance of a Service Provider Letter by WES or a Preliminary Statement of Feasibility, as required by the Clackamas County Planning Division.
    b. Notwithstanding Subsection 5.1(1)(a), if credible evidence (e.g., aerial photographs, topographic maps, expert studies) indicates that the proposed development is clearly (as determined by WES/County Planning) outside a WQRA, the requirement for WQRA Boundary Verification may be waived.
    c. An application for WQRA Boundary Verification may be submitted even if one is not required pursuant to Subsection 5.1(1)(a).
2. A WQRA Development Permit, consistent with Subsection 6.3, shall be required for development in a WQRA.
3. Property that contains a WQRA and is the subject of a land use application for a partition or subdivision shall comply with Subsection 6.3,
4. Notice of approval of a WQRA Development Permit shall be mailed to all property owners of record within 300 feet of the subject property, and contiguous properties under the same ownership.
5. Appeals of a WQRA Development Permit approval shall be in accordance with District Rules.
6. Approval of WQRA Boundary Verification or a WQRA Development Permit shall be valid after the conclusion of the appeal period for four years from the date of the final written decision. If the District's final written decision is appealed, the approval period shall commence on the date of the final appellate decision. During this four-year period, if the WQRA Development Permit has not been fully satisfied, the approval will become void.
7. If the approval of WQRA Boundary Verification or a WQRA Development Permit is not implemented within the initial approval period established by Subsection 5.1(6), a two-year time extension may be approved pursuant to the following standards and criteria:
    a. A time extension application shall be submitted to the WES Director (or their designee) prior to the expiration of the initial approval period for the land use permit.

b. The proposed development as originally approved, or as modified by approval from WES, shall be consistent with the relevant provisions of this Ordinance in effect on the date the application for a time extension is submitted, provided that the application is complete when submitted or is made complete pursuant to Buffer Standards. There shall have been no changes on the subject property or in the surrounding area that would be cause for reconsideration of the original decision.

8. WQRA Boundary Verification that was valid on the date when the final plat for a subdivision or partition was recorded with the County Clerk shall remain valid for subsequent development on the lots or parcels created by the subdivision or partition.

SECTION 6. SUBMITTAL REQUIREMENTS

Applications filed pursuant to Buffer Standards shall comply with the following submittal requirements.

6.1 Application for WQRA Boundary Verification

The Buffer Standards shall be applied to an application for Water Quality Resource Area Boundary Verification and shall be used to determine the boundary of any WQRA on the subject property. An application for WQRA Boundary Verification shall include a site plan that complies with the following requirements:

1. The site plan shall be drawn at a scale of no less than one inch equaling 20 feet.
2. The site plan shall show the location of the proposed development and the lot lines of the property on which development is proposed.
3. The site plan shall show the location of the protected water resource. If the protected water resource is a wetland, the delineation shall be made by a qualified wetlands specialist pursuant to the Division of State Lands' recommended wetlands delineation process. For all other protected water resources, the location shall be established by a registered professional engineer, landscape architect, or surveyor licensed by the State of Oregon.
4. The site plan shall show the location of the WQRA, including slope and drainage information sufficient to classify the protected water resource under **Table 2**.

6.2 Application for WQRA Development Permit

An application for a WQRA Development Permit shall include the following information in a report stamped by a registered professional engineer, licensed landscape architect, or surveyor licensed by the State of Oregon:

1. A topographic map of the site at contour intervals of 2-foot intervals. Where slopes exceed 15 percent, contours may be shown at 5-foot intervals ~~of five feet or less~~ showing a delineation of the WQRA;
2. The location of all existing natural features including, but not limited to, all trees of a caliper greater than six inches diameter at a height of four feet, natural or historic drainages on the site, springs, seeps, outcroppings of rocks and boulders within the WQRA;
3. Location of wetlands that qualify as primary protected water resources. Where such wetlands are identified, a delineation shall be made by a qualified wetlands specialist pursuant to the Division of State Lands' recommended wetlands delineation process;
4. An inventory and location of existing debris, nuisance vegetation, and any noxious or hazardous materials;
5. An assessment of the existing condition of the WQRA in accordance with **Table 3**;

6. An inventory of vegetation, including percentage ground and canopy coverage;
7. An Impact Evaluation and Alternatives Analysis that addresses the requirements of Subsections 6.3(1) and (2); and
8. A mitigation plan containing the following information:
    a. A description of adverse impacts that will be caused as a result of development;
    b. An explanation of how adverse impacts to resource areas will be avoided, minimized, and/or mitigated in accordance with, but not necessarily limited to, **Table 3**;
    c. A list of all responsible parties including, but not necessarily limited to, the owner, applicant, contractor, or other persons responsible for work on the subject property;
    d. A map showing where the specific mitigation activities will occur; and
    e. An implementation schedule, including a timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting and a contingency plan. All in-stream work in fish-bearing streams shall be done in accordance with approval by the Oregon Department of Fish and Wildlife and their in-stream timing schedule.

Data from sources other than a field verified delineation of the protected water resource may be used to satisfy the submittal requirements only if the protected water resource is not located on the subject property and access to the water resource is denied for the purpose of supplying the required delineation. In order to use alternate data, an applicant shall submit the following:

1. A copy of a letter addressed to the owner of the property on which the protected water resource exists requesting access to the property for the purpose of completing a delineation of the protected water resource; and
2. A copy of a return receipt from the US Postal Service verifying that the letter was mailed certified and was received or refused.

6.3 Water Quality Resource Area Development Permits

A Water Quality Resource Area (WQRA) Development Permit shall be approved if the applicant provides evidence substantiating compliance with the following criteria.

1. No practicable alternative locations exist for the requested development that will not disturb the WQRA;
2. No reasonably practicable alternative design or method of development exists that would have a lesser impact on the WQRA than the one proposed. If no such reasonably practicable alternative design or method of development exists, the development shall be conditioned to:
    a. Limit its disturbance and impact on the WQRA to the minimum extent necessary to achieve the proposed development; and
    b. Ensure that impacts to the functions and values of the water quality resource area will be mitigated or impacted areas restored to the extent practicable.
3. The WQRA impact shall be mitigated. Resulting WQRA shall be protected as per

4. Mitigation shall be performed in the following order:
    a. Area Mitigation – area mitigation is the adding of additional area onsite to offset the amount of vegetated corridor impacted.
        1) The Vegetated Corridor replacement area required for approved encroachments shall be at the ratio of 1.5 square feet of replacement to 1.0 square feet of impacted vegetated corridor.
        2) The replacement Vegetated Corridor shall be in addition to the existing Vegetated Corridor.
        3) The replacement Vegetated Corridor must be contiguous with an existing Vegetated Corridor.
        4) Replacement Vegetated Corridor areas that are in marginal or degraded condition shall be improved to Good corridor condition as described in **Table 3**.
    b. Enhancement Mitigation – where there is insufficient room for area mitigation onsite, mitigation shall consist of a combination of area mitigation and enhancement mitigation. Enhancement mitigation is removal of non-natives species and planting of natives according to an approved plan to bring the corridor into a Good Condition.
        1) The Vegetated Corridor enhancement area required for approved encroachments shall be at the ratio of 2.0 square feet of replacement to 1.0 square feet of impacted vegetated corridor.
        2) Enhancement Vegetated Corridor areas shall be improved to Good Corridor condition as described in **Table 3**. Applicant shall be responsible for annual monitoring, maintenance, and reporting on success of enhancement for 3 years after initial enhancement is completed.
    c. Offsite Mitigation – Where full or partial onsite mitigation through additional area, vegetation enhancement or a combination of the two is not possible (e.g., no additional onsite area is available and remaining vegetated corridor is insufficient to meet 2:1 ratio), the balance shall be mitigated through offsite mitigation upon approval of the District.
        1) The Vegetated Corridor replacement area required for approved encroachments shall be at the ratio of 2.0 square feet of replacement to 1.0 square feet of impacted vegetated corridor.
        2) The replacement Vegetated Corridor shall be in addition to the existing Vegetated Corridor.
        3) The replacement Vegetated Corridor must be contiguous with an existing Vegetated Corridor.
        4) Replacement Vegetated Corridor areas that are in marginal or degraded condition shall be improved to Good corridor condition as described in **Table 3**. Applicant shall be responsible for annual monitoring, maintenance, and reporting on success of enhancement for 3 years after initial enhancement is completed
        5) Replacement Vegetated Corridor areas must be protected through a tract, restrictive covenant, public dedication, or other District approved equivalent.
    d. Additional vegetated corridor planting can be found in ~~the Stormwater Standards:~~ **Appendix A – Planting Guide for Buffers.**

5. To the greatest extent practicable, existing native vegetation shall be retained and protected.
6. Walkways and bike paths shall be subject to the following standards:
    a. Where it is not practicable to maintain a setback of greater than 30 feet from a protected water resource, a maximum of 10 percent of the total area of a gravel, earthen, tree bark product or equivalent walkway or bike path may be within 30 feet of the protected water resource.
    b. For any paved walkway or bike path, the width of the water quality resource area on the subject property shall be increased by a distance equal to the width of the paved path. Where it is not practicable to maintain a setback of greater than 30 feet from a protected water resource, a maximum of 10 percent of the total area of the walkway or bike path may be within 30 feet of the protected water resource.
    c. A walkway or bike path approved under Subsection 6.3(6)(a) or (b) shall not exceed 10 feet in width, shall not be constructed closer than 10 feet from the boundary of the protected water resource, and shall be constructed so as to minimize disturbance to existing vegetation.
7. Stormwater pretreatment facilities shall be subject to the following standards:
    a. A stormwater pretreatment facility may encroach a maximum of 25 feet into the outside boundary of the WQRA of a primary protected water resource.
    b. A stormwater pretreatment facility may encroach a maximum of five feet into the outside boundary of the WQRA of a secondary protected water resource.
    c. The area of encroachment shall be replaced by adding an equal area to the WQRA on the subject property.
    d. All post-construction stormwater runoff shall be mitigated in accordance with District Standards, prior to being discharged into the WQRA.

Table 3. Water Quality Resource Area Mitigation	
Existing Condition of Water Quality Resource Area	**Mitigation Requirements**
Good Existing Corridor: Combination of native trees, shrubs and groundcover are 80 percent present, and there is more than 50 percent tree canopy coverage in the vegetated corridor.	**If area is disturbed during construction:** 1. Restore and mitigate according to approved plan using native vegetation to re-establish Good Corridor condition. 2. Remove debris. 3. Prior to construction a qualified professional shall prepare and submit a plan for mitigating water quality impacts related to the development, including: sediments, temperature nutrients, sediment control, temperature control, or any other condition that may have caused the protected water resources to be listed on DEQ's 303(d) list. 4. Re-vegetation must occur during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representation of natural conditions is established on the site. **If area is undisturbed during construction:** 1. Remove debris
Marginal Existing Corridor: Combination of native trees, shrubs and groundcover are 50-80 percent present, and there is 26 to 50 percent tree canopy coverage in the vegetated corridor.	**If area is disturbed during construction:** 1. Restore and mitigate according to approved mitigation plan using native vegetation to re-establish Good Corridor condition. 2. Remove debris. 3. Re-vegetate during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representative of natural conditions is established on the site. **If area is undisturbed during construction:** 1. Remove debris.

Table 3. Water Quality Resource Area Mitigation	
Existing Condition of Water Quality Resource Area	**Mitigation Requirements**
Degraded Existing Corridor: Combination of native trees, shrubs, and groundcover cover less than 50% of the community and less than 25% tree canopy exists (areal measure).	**If area is disturbed during construction:** 1. Restore and mitigate according to approved mitigation plan using native vegetation to re-establish Good Corridor condition. 2. Remove debris. 3. Re-vegetate during the next planting season following site disturbance. Seeding may be required prior to establishing plants for site stabilization. Annual replacement of plants that do not survive is required until vegetation representative of natural conditions is established on the site. **If area is undisturbed during construction:** 1. Vegetate bare areas with native vegetation. 2. Remove non-native vegetation and re-vegetate with native vegetation 3. Remove debris.

6.4 Partitions and Subdivisions

A partition or subdivision of property that contains a WQRA shall require that the WQRA shall be platted as a tract rather than as part of any lot. The tract shall be protected from development by restrictive covenant, public dedication or other DISTRICT approved equivalent. However, the tract may be subject to an easement conveying storm and surface water management rights to the surface water management authority. The tract shall be designated as one of the following prior to final plat approval:

1. A private natural area owned by a homeowners association or a private non-profit with the mission of land conservation; or

A public natural area where the tract has been dedicated to a public entity

APPENDIX A

Planting Guide for Buffers

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A.1 General

A.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.

A.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.

A.1.3. Climate and Microclimate

All native vegetation is well-adapted to the northwest regional climate. Although regional climate dictates average seasonal temperatures, amount of rainfall and available daylight, 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. However, sword fern placed in shady area on the north would thrive.

A.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. Plantings should reflect this natural ordering, as well as mimicking a mixture of deciduous and evergreen materials.

A.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 blackberries and ivy, and implement a weed control program as needed.
- Check 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.

A.2 Planting Plan Methods

Plantings are required for development projects with Vegetated. Four major components shall be addressed: hydrology, soils, plant materials, and maintenance. When developing planting plans, the following steps should be used:

A.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)

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

a. *Preservation:* Every effort shall be made to protect 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. The conditions in Sensitive Areas and Vegetated Buffers vary greatly.

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 (see District IVAM Guidance) prior to planting.

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 (*see District IVAM Guidance)* 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 shall have the following characteristics to ensure a good growing medium:

A) Texture – material passes through 1-inch screen

B) Fertility – 35% organic matter

d. For wet areas in Sensitive Areas, the soil conditions shall 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 specified plants or adjust the soil pH. Traditional fertilization techniques (applying N-P-K) are not necessary for native plants.

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

a. Preservation: Every effort shall 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 shall be from a native species palette and shall consider site soil types, hydrologic conditions, and shade requirements. Containerized or bare root plants may be used. A list of common native plant community types appropriate for planting Sensitive Areas and Vegetated Buffers is provided below in **Tables A-1** through **A-5**. Unless approved by District staff, planting restrictions are the following:

1. Deep rooting trees and shrubs (e.g., willow) shall 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 shall 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 shall 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 A-1** through **A-5** for minimum rooted plant size.

e. Placement: Plant placement shall be consistent with naturally occurring plant communities. Trees and shrubs shall 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 shall be dependent on the plant species and on the size of the revegetation area. The Vegetated Corridor revegetation area shall be overseeded with native seed mixes appropriate to the plant community and hydrologic zone of the site (see **Tables A-1** through **A-5**). Plant placement and seeding shall promote maximum vegetative cover to minimize weed establishment. Where feasible and applicable, planting plans shall consider effective shading considerations (i.e., southern and western exposures).

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

a. Timing: Containerized stock shall be installed only from February 1 through May 1 and October 1 through November 15. Bare root stock shall be installed only from December 15 through April 15. Seeding shall occur only from March 15 through 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 shall be performed during optimal weather conditions and at low flow levels to minimize sediment impacts. Site disturbance shall be minimized and desirable vegetation retained where possible. Slopes shall 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 shall 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 shall 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 shall be taken to limit wildlife-related damage (see IVAM Guidance).

e. Irrigation: Appropriate plant selection, along with adequate site preparation and maintenance, reduces the need for irrigation. However, unless site hydrology is currently adequate, a District approved irrigation system or equivalent shall be used during the two-year plant establishment period (unless otherwise approved by the District). 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 shall be provided for Sensitive Areas and Vegetated Corridors.

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

1. *Monitoring:* Site visits are necessary throughout the growing season to assess the status of the plantings, irrigation, mulching, etc. and ensure successful plant establishment.
2. *Weed Control:* The removal of non-native, invasive weeds shall be necessary throughout the maintenance period, or until a healthy stand of desirable vegetation is established (see District IVAM Guidance).
3. *Plant Placement 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, shall 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.) shall be documented with a description of the corrective actions taken.

A.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 Service Provider Letter, including limits of approved, temporary construction encroachment. Orange construction fencing shall be noted 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, and 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 (non-plastic)

   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 2-year monitoring period.

f. Easement descriptions for all Vegetated Buffers and Sensitive Areas that are required as part of the development.

g. Good rated corridor notes i.e., invasive species removal resulting in cleared areas exceeding 25 square feet shall be replanted with native vegetation.

h. Access points for installation and maintenance including vehicle access if available.

i. Standard drawing details (north arrow, scale bar, property boundaries, project name, drawing date, name of designer and Property Owner).

A.3 Buffer Restoration Plant Kits

I.3.1. Selecting Plants

The plant lists provided for buffer remediation 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 listing to guide 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 on the following pages were adapted from Clean Water Services' Design and Construction Standards for Sanitary Sewer and Surface Water Management, June 2007.

TABLE A-1: Buffer Restoration Plant: Riparian Forest (RF)

Species name *Botanical*, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
Adiatum aleuticum, Maidenhair fern		Herb	Moist	Shade	4" pot	n/a	Cluster
Agrostis exarata, Spike bentgrass	•	Grass	Moist	Part	Seed	n/a	Mass
Agrostis scabra, Hair bentgrass		Grass	Moist	Part	Seed	n/a	Mass
Alnus rubra, Red alder	•	Tree	Moist	Sun	1 gal.	3'	Single
Athyrium filix-femina, Lady fern		Herb	Moist	Shade	1 gal.	n/a	Cluster
Carex deweyana, Dewey's sedge		Herb	Dry	Shade	Plugs/4" pot	4"	Mass
Claytonia sibirica, Candy flower		Herb	Moist	Shade	4" pot	n/a	Cluster
Cornus stoniferia, Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
Glyceria elata, Tall manna-grass	•	Grass	Moist	Part	Seed	n/a	Mass
Lonicera involcrata, Black twinberry		Shrub	Moist	Part	1 gal.	1.5'	Single
Lysichiton americanum, Skunk cabbage		Herb	Wet	Shade	Bulbs	n/a	Cluster
Maianthemum dilatatum, False lily-of-the-valley		Herb	Moist	Shade	Bulbs/4" pot	n/a	Cluster
Montia perfoliata, Miners lettuce		Herb	Moist	Shade	4" pot	n/a	Cluster
Oemleris cerasiformis, Indian plum	•	Shrub	Moist	Shade	2 gal.	2'	Cluster
Pysocarpus capitatus, Pacific ninebark		Shrub	Moist	Shade	1 gal.	2'	Single
Rosa pisocarpa, Swamp rose		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
Rubus spectabilis, Salmonberry	•	Shrub	Moist	Shade	1 gal.	1.5'	Cluster
Sambucus racemosa, Red elderberry	•	Shrub	Moist	Part	1 gal.	1.5'	Single
Symphoricarpos albus, Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
Tolmiea menziesii, Youth-on-age		Herb	Moist	Shade	4" pot	n/a	Cluster
Thuja plicata, Western red cedar	•	Tree	Moist	Part	1 gal.	1.5'	Single
Vancouveria hexandra, Insideout flower		Herb	Moist	Shade	4" pot	n/a	Cluster
Viola glabella, Stream violet		Herb	Moist	Shade	4" pot	n/a	Cluster

TABLE A-2: Buffer Restoration Plant: Upland Forest (UF)

Species name *Botanical*, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
Red alder (*Alnus rubra*)	•	Tree	Moist	Sun	1 gal.	3'	Single
Big leaf maple (*Acer macrophyllum*)	•	Tree	Dry	Sun	2 gal.	3'	Single
Douglas fir (*Pseudotsuga menziesii*)	•	Tree	Dry	Sun	2 gal.	3'	Single
Grand fir (*Abies grandis*)	•	Tree	Dry	Sun	2 gal.	2'	Single
Pacific yew (*Taxus brevifolia*)		Tree	Moist	Shade	2 gal.	2'	Single
Cascara (*Rhamnus purshiana*)		Tree	Dry	Part	2 gal.	2'	Single
Pacific dogwood (*Cornus nuttallii*)		Tree	Moist	Shade	1 gal.	2'	Single
Bitter cherry (*Prunus emarginata*)		Tree	Moist	Part	2 gal.	2'	Single
Vine maple (*Acer circinatum*)	•	Tree	Moist	Part	2 gal.	2'	Single
Oceanspray (*Holodiscus discolor*)	•	Shrub	Dry	Sun	1 gal.	1.5'	Single
Red elderberry (*Sambucus racemosa*)	•	Shrub	Moist	Part	1 gal.	1.5'	Single
Red flowering currant (*Ribes sanguineum*)	•	Shrub	Dry	Sun	1 gal.	1.5'	Cluster
Cascade Oregon grape (*Mahonia nervosa*)		Shrub	Moist	Part	1 gal.	4"	Cluster
Tall Oregon grape (*Mahonia aquifolium*)		Shrub	Dry	Sun	1 gal.	6"	Single
Red huckleberry (*Vaccinium parvifolium*)		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
Thimbleberry (*Rubus pariflorus*)		Shrub	Moist	Shade	1 gal.	1.5'	Cluster
Snowberry (*Symphoricarpos albus*)	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
Baldhip rose (*Rosa gymnocarpa*)	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
Serviceberry (*Almelanchier alnifolia*)		Shrub	Dry	Part	2 gal.	2'	Single
Sword fern (*Polystichum munitum*)		Shrub	Moist	Shade	2 gal.	n/a	Cluster
Deer fern (*Blechnum spicant*)		Herb	Moist	Shade	1 gal.	n/a	Cluster
Orange honeysuckle (*Lonicera ciliosa*)		Herb	Moist	Shade	2 gal.	n/a	Single
Salal (*Gaultheria shallon*)		Herb	Moist	Part	1 gal.	4"	Cluster
Wood strawberry (*Fragaria vesca*)		Herb	Moist	Shade	4" pot	n/a	Cluster
Western trillium (*Trillium ovatum*)		Herb	Moist	Shade	4" pot	n/a	Cluster
Five-stemmed mitrewort (*Mitella pentandra*)		Herb	Moist	Shade	1 gal.	n/a	Cluster
Red columbine (*Aquilegia formosa*)		Herb	Dry	Part	4" pot	n/a	Cluster
False Solomon's seal (*Smilacina racemosa*)		Herb	Moist	Shade	4" pot	n/a	Cluster
Native California brome (*Bromus carinatus*)	•	Grass	Dry	Sun	Seed	n/a	Mass
Blue wildrye (*Elymus glaucus*)	•	Grass	Dry	Part	Seed	n/a	Mass

TABLE A-3: Buffer Restoration Plant: Oak Woodland/Savanna (OW)

Species name *Botanical*, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
Almelanchier alnifolia, Serviceberry	•	Shrub	Dry	Part	1 gal.	2'	Single
Bromus carinatu, Native California brome	•	Grass	Dry	Sun	Seed	n/a	Mass
Elymus glacus, Blue wild-rye	•	Grass	Dry	Part	Seed	n/a	Mass
Holodiscus discolor, Oceanspray	•	Shrub	Dry	Sun	1 gal.	1.5'	Cluster
Mahonia nervosa, Cascade Oregon grape		Herb	Moist	Part	1 gal.	4"	Cluster
Quercus garryana, Oregon white oak	•	Tree	Dry	Sun	2 gal.	2'	Single
Rubus ursinus, Training blackberry		Shrub	Dry	Sun	1 gal.	1.5'	Cluster
Symphoricarpos albus, Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster

TABLE A-4: Buffer Restoration Plant: Ash Forested Wetland (FW)

Species name *Botanical*, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
Carex deweyana, Dewey's sedge		Herb	Dry	Shade	Plugs	4"	Mass
Carex obnupta, Slough sedge	•	Herb	Moist	Part	Plugs	6"	Mass
Claytonia sibirica, Candy flower		Herb	Moist	Shade	4"	n/a	Cluster
Cornus sericea, Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
Fraxinus latifolia, Oregon ash	•	Tree	Moist	Part	2 gal.	3'	Single
Glyceria elata, Tall mannagrass	•	Grass	Moist	Shade	Seed	n/a	Mass
Montia parvifolia, Streambank springbeauty		Herb	Moist	Shade	4"	n/a	Cluster
Physocarpus capitatus, Pacific ninebark	•	Shrub	Moist	Shade	2 gal.	2'	Single
Symphoricarpus albus, Snowberry	•	Shrub	Dry	Part	1 gal.	1.5'	Cluster
Scirpus microcarpus, Small fruited bulrush		Herb	Wet	Sun	Plugs	4"	Mass

TABLE A-5: Buffer Restoration Plant: Shrub/Scrub Wetland (SS)

Species name *Botanical*, common	Minimum Species Composition	Plant Category	Water Requirements	Light Requirements	Minimum Rooting Size	Minimum Plant Height	Spacing Format
Cornus sericea, Red-osier dogwood	•	Shrub	Wet	Part	1 gal.	2'	Cluster
Crataegus douglasii, Douglas hawthorne		Tree	Moist	Part	2 gal.	2'	Cluster
Bidens cernua, Nodding beggarstick		Herb	Wet	Sun	1 gal.	1.5'	Cluster
Glyceria occidentalis, Western manna-grass	•	Grass	Wet	Sun	Seed	n/a	Mass
Juncus patens, Spreading rush		Herb	Moist	Part	Plugs	6"	Mass
Malus fusca, Pacific crabapple	•	Tree	Moist	Part	2 gal.	2'	Cluster
Rosa pisocarpa, Clustered rose		Shrub	Wet	Part	1 gal.	1.5'	Cluster
Salix lasiandra, Pacific willow	•	Tree	Wet	Sun	1 gal.	3'	Single
Salix sitchensis, Sitka willow		Tree	Moist	Sun	1 gal.	3'	Cluster
Salix scouleriana, Scouler's willow	•	Shrub	Moist	Sun	1 gal.	3'	Cluster
Spiraea douglasii, Douglas's spiraea	•	Shrub	Wet	Sun	1 gal.	1.5'	Cluster