

WETLAND RESTORATION PLAN
for the
Yachats Commons Park
Yachats, Lincoln County, Oregon



Prepared for
The Yachats Commons Park Task Force
City of Yachats
Yachats, Oregon 97498

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1.0 GENERAL INFORMATION

1.1 Project Location

The restoration site (site) is approximately 2.42 acres in size and is located west of Highway 101 in downtown Yachats between Fourth and Sixth Streets. The site is part of the larger Yachats Commons Park, and consists of the central portion of the park. A ball field, parking lot, picnic shelter, and playground are in the east portion of the park. A second-growth spruce forest is in the west portion of the park. The site is in the Agency Creek watershed, approximately 1200 feet north of where the Yachats River enters the Pacific Ocean. The legal description for the site is T14S, R12W, section 27.

1.2 Applicant/Owner Contact Information

Susanne Smith (Mayor) and David Schlesinger (Wetlands Coordinator)
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2.0 BACKGROUND AND PURPOSE

The City of Yachats would like to enhance the site to increase wetland acreage, restoring areas that have been historically degraded by ditching and placement of fill, and increasing native plant community diversity with the expansion of native emergent communities. The purpose of this plan is to design restoration and enhancement activities that increase the physical and biological wetland functions of the site. This Restoration Plan identifies goals and includes a Grading Plan, a Planting Plan, and a discussion of maintenance requirements and contingency measures. A field survey was conducted by Nancy Holzhauser of Environmental Solutions LLC

and Paul Adamus of Adamus Resource Assessment Inc. (ARA) on November 18, 2005, and the site was revisited on January 16, 2006. Observations from the field visits, as well as the wetland delineation completed by Loverna Wilson (Wilson 2005) and other reference material, were used to prepare this Restoration Plan (refer to Section 11.0 References).

3.0 RESTORATION PLAN

The main objective of the restoration is to increase the site's functions to a level more comparable to that of other wetlands of its class in western Oregon. In particular, the restoration seeks to increase the capacity of the site as habitat for amphibians and native wetland plants, and as a purifier of runoff from adjoining developed areas. The target wetland type is a seasonally or semipermanently inundated Palustrine Emergent Slope/Flats wetland with small pools of open water. The target plant communities include the Slough Sedge-Pacific Silverweed Marsh in the open depressional areas and Spirea Swamp bordering the Slough Sedge communities as defined in Kagan (1996), Christy et al. (1998), and Christy (2004).

Functions performed by the existing wetlands were evaluated using the Hydrogeomorphic (HGM)-based Assessment Method of Oregon Wetland and Riparian Sites for the Willamette Valley Ecoregion (Adamus and Field 2001). Strictly speaking, that method is not applicable because Yachats is outside of the method's geographic reference domain. However, no other suitable method is available.

The onsite wetlands are in the Slope/Flats HGM class. Ditching has occurred in the previous 50 years, based on information from the historic aerial photos. The historic sources of water were likely precipitation, surface runoff, and groundwater discharge, with ground water at a shallow level being held on the site by a basalt rim to the west of the site (D. Schlesinger, pers. comm.). The present sources of water appear to be the same, with perhaps greater surface runoff inputs now from adjacent streets, parking lots, and subsurface tile drains.

The primary problems identified in the restoration site include:

1. Historic ditching has altered the water regime. The effects of ditching include a lower saturation zone, which results in reduced subsurface water storage. As such, the water storage and delay function of the onsite wetlands is reduced because water is rapidly carried off the site via the main ditch that crosses the site from south to north. This potentially has a negative effect on other physical functions the wetlands may perform, including nitrogen removal, sediment stabilization, and phosphorus retention, partly because of the reduced opportunity for settling and plant uptake of contaminants. The value of these physical functions is especially important in developed settings such as this, as urban stormwater typically contains a relatively high sediment load, as well as contaminants such as petroleum products and fertilizers that are high in phosphorus and nitrogen.
2. The east portion of the site has been used as a disposal area for fill, including soil and plant material. This band of fill extends along most of the north-south length of the east portion of the site and appears to be 2-6 inches deep. Nonnative ornamental plant species observed in this portion of the site include crocosmia, ivy, holly, and Armenian (Himalayan) blackberry.

3. Succession has occurred across the site such that areas that historically were meadow/emergent wetland areas have been converted to densely vegetated shrubby areas.

Opportunities identified on the site include:

1. Removal of fill along with the associated invasive species and dense shrubby stands, with the conversion of these areas to open emergent wetlands. This will increase the habitat diversity and enhance the environmental education experience partly by providing opportunities to learn native plant species and assemblages..

2. Removal of sections of the ditches will restore more of the site's water regime to a slope/flats HGM wetland complex similar to historic conditions, and increase wetland functions such as water storage and delay and removal of stormwater contaminants.

Information from two reference sites was used in the design of the restoration project. Reference sites are areas with fairly undisturbed wetland habitats, preferably located near the restoration project. Reference sites were selected for their intact and high quality functions. Information from a slough sedge/Hooker's willow wetland located approximately 5 miles south of the site and an Oregon Department of Fish and Wildlife (ODFW) enhancement project in the Yachats River valley approximately six miles east of the site were used in the grading and planting plans for the proposed restoration project. Both of these reference sites are dominated by native emergent species and have areas of seasonal ponding, similar to what is proposed with this restoration plan.

4.0 EXISTING CONDITIONS OF RESTORATION SITE

The restoration site is approximately 2.42 acres in size. It is oriented south to north, with a gentle north-northwest aspect. The elevation ranges from 57 feet above sea level in the southeast corner down to a low of 50.4 feet above sea level at the northwest corner. The site is located in the central portion of the Yachats Commons Park. The site is approximately 430 feet long and 260 feet wide at the south half and 225 feet wide at the north half. A recently constructed boardwalk crosses the north portion of the site; it enters the east site boundary from near the playground and exits in the northwest corner of the site at Sixth Street.

Based on review of the historic photos (Figures 11-16), the site appears to have been vacant land in 1939. Streets and homes appear in the 1952 and later photos. The 1961 and 1968 photos indicate disturbance in the southeast corner of the site and an area adjacent to the east/northeast, where vegetation clearing and perhaps placement of fill is apparent. A ditch across the site from south to north is most visible in the 1984 photo; this photo also shows the ditch across the southeast portion of the site.

The restoration site is entirely surrounded by city property. To the north are Sixth Street and a maintenance yard; the park recreation area and city administration buildings are to the east; a forested section of the park lies to the west; and Fourth Street borders to the south. The site is approximately 500 feet west of Highway 101.

No rainfall or temperature records were found for the near vicinity; however, the following is a

summary of information from Astoria to the north and North Bend to the south (Wiedermann 1969).

Astoria: Average rainfall is 77 inches with 5 inches falling June-August and 34 inches falling December-February. Normal annual temperature is 51 degrees F, with July average at 61 degrees F and January average at 40 degrees average.

North Bend: Average rainfall is 65 inches with 3 inches falling June-August and 30 inches falling December-February. Normal annual temperature is 52 degrees F, with July average at 58 degrees F and January average at 44 degrees.

Overall summer evaporation rates on the central Oregon coast are low due to the effect of cool summer temperatures and occasional fog.

4.1 Vegetation

The dominant vegetation on the site is native shrubs including Hooker's willow (*Salix hookeriana*), salmonberry (*Rubus spectabilis*), and twinberry honeysuckle (*Lonicera involucrata*). A more open area in the middle of the site is dominated by nonnative grasses and shrubs including colonial bentgrass (*Agrostis capillaris*) and Armenian blackberry (*Rubus armeniacus*). A forested area dominated with younger Sitka spruce (*Picea sitchensis*) is west of the restoration site, still within the park property. A few mature Sitka spruce are present in the east and north portions of the restoration site. Common native emergent species included water parsley and slough sedge, which were observed primarily in the ditches. Corn lily, a relatively unusual plant at this location, was observed primarily in the wetland areas in the southeast corner of the site and the northeast corner of the site, east of the main ditch. Appendix A contains a list of plant species found at the site.

4.2 Soils

All but the very southwest corner of the site is mapped as #22C Gleneden silty clay loam in the Lincoln County Natural Resources Conservation Service (NRCS) Soil Survey. The southwest corner of the site is mapped with #42C Nelscott loam (Wilson 2005). Gleneden silty clay loam is a somewhat poorly drained soil and Nelscott loam is a moderately well drained soil. Neither is classified as a hydric soil in the Lincoln County Hydric Soil List, although they are both described as having the potential for inclusions of hydric Depoe loam in depressions.

Based on information from the wetland delineation completed by Loverna Wilson in 2005, soils observed on the site were a silt loam and silty clay loam in the southeast portion of the site, with a clay layer at 10-14 inches in the wetland area. The northeast portion of the site, east of the ditch, was observed to be primarily silt loam with a clay layer in the wetland area at 9 inches. Soils observed in the shrubby area in the northwest corner of the site were a silt loam or silty clay loam over silty clay, with a clay layer at 19 inches in the wetland area. Soils observed in the middle of the site near where the boardwalk crosses a small wetland area, were silt clay loam over silty clay at 7 inches. Soils observed in the shrubby area in the southwest corner of the site were a silt loam or silty clay loam over silty clay at 10 inches.

4.3 Hydrology

A culvert discharges into the south boundary of the site, from under Fourth Street. Water from this culvert flows north via a ditch that begins at the culvert outfall and continues the length of

the site where it exits at the northwest corner of the site. This ditch is 1-3 feet wide and ranges in depth from 1-2 feet. A second ditch joins the main ditch in the south portion of the site; this ditch originates from near the southeast boundary, apparently from a culvert that carries stormwater from the parking lot east of the site. This second ditch is approximately 100 feet long and 1-2 feet wide with banks 1-2 feet high. A shallow intermittent stream begins in the southwest corner of the site and runs north along the edge of the spruce forest/willow shrub habitat to the north end of the site, where it joins the main ditch at the northwest corner of the site. Water continues off the site and, based on review of the later aerial photos, appears to enter the Pacific Ocean approximately 500 feet to the northwest. The primary sources of water for the site include direct precipitation, subsurface seepage, and surface runoff provided primarily by the two culverts that outfall into the south and southeast portions of the site.

During both the wetland delineation study (Wilson 2005) and the November site visit, inundation in the ditches to a depth of 6 inches was noted, as were indicators of saturation in the top 12 inches in the wetland areas in the southeast and northeast corners of the site, and saturation at or near the surface in the wetland areas in the northwest and southwest corners of the site. At times portions of the ditches fill with as much as 2 feet of water (D. Schlesinger, personal communication).

4.4 Hydrogeomorphic Classification

Wetlands on the site meet the description of the Slope/Flats HGM class, with the ditches that occupy less than 1 percent of the site's area representing the Riverine Flow-through HGM subclass. No evidence of ditching is visible in the historic aerial photos until the 1980s.

4.5 Wetland Functions and Values

The Hydrogeomorphic (HGM) Assessment Method (Adamus and Field 2001) was used to evaluate the site's functions. The results are presented in Table 1 (refer to specific Data Sheets, Supplemental Information). This assessment method evaluates 13 functions that wetlands provide, as follows:

PHYSICAL FUNCTIONS:

1. Water storage and delay: Capacity to store or delay downslope movement of surface water for long or short periods.
2. Sediment stabilization & phosphorus retention: Capacity to intercept suspended inorganic sediments, reduce current velocity, resist erosion, and/or retain any forms.
3. Nitrogen removal: Capacity to remove nitrogen by supporting temporary uptake of nitrogen by plants and microbial conversion.
4. Thermoregulation: Capacity to maintain or reduce water temperature.

BIOLOGICAL FUNCTIONS:

5. Primary production: Capacity to use sunlight to create organic matter through photosynthesis.
6. Resident fish habitat support: Capacity to support most life requirements of non-anadromous species native to area.
7. Anadromous fish support: Capacity to support some life requirements of anadromous species native to area.
8. Invertebrate habitat support: Capacity to support life requirements of many invertebrate species characteristic of such habitats in this area.

9. Amphibian & turtle habitat: Capacity to support some life requirements of several species of amphibians & turtles native to this area.

10. Breeding waterbird support: Capacity to support requirements of many waterbird species during their reproductive period in this area.

11. Wintering & migrating waterbird support: Capacity to support some life requirements of several waterbird species that spend fall, winter, and/or spring in this area.

12. Songbird habitat support: Capacity to support the life requirements of many native non-waterbird species that are either seasonal or breeders in this area.

13. Support of characteristic vegetation: Capacity to support life requirements of many plants and plant communities native to this area.

Concerning the physical functions, the onsite wetlands may be functioning at low to moderate levels relative to other Slope/Flats wetlands in western Oregon. Overall, based on the HGM assessment, the onsite wetlands may be functioning at a relatively low level for water storage and delay because of the limited area of seasonal inundation, the lack of depressional formations that can hold water, and the presence of ditches that transport water rapidly off the site. The onsite wetlands may be functioning at a relatively moderate level for nitrogen removal, sediment stabilization, and phosphorus retention primarily because they are entirely vegetated including woody species, have a silty clay loam soil, and seasonal inundation. However, the onsite wetlands are limited in these functions because seasonal inundation is not more extensive, as well as by a lack of pools and a history of soil disturbance (primarily in the east portion, including ditch excavation and disposal of spoils, as well as some fill activities).

Concerning the biological functions, the onsite wetlands may be functioning at low to moderate levels relative to other Slope/Flats wetlands in western Oregon, for primary production, invertebrate habitat support, amphibian habitat support, wintering and migratory waterbird support, songbird habitat support, and support of characteristic vegetation. Positive features that support these biological functions include herbaceous and shrubby communities that provide food, nesting substrates, and cover; some downed woody material that provides invertebrate and amphibian habitat; a dominance of native species within the shrub component; and a seasonal source of water in the ditches. The biological functions of the onsite wetlands are limited by the lack of permanent water and history of soil disturbance primarily in the east portion; the presence of nonnative and invasive species and the potential for continued influx of nonnatives as seed in stormwater runoff that is transported to the site from culverts; and the surrounding developed environment, including the adjacent recreation areas, which limit use by wildlife because of the associated human disturbance.

The onsite wetlands do not provide anadromous fish habitat support, resident fish habitat support, breeding waterbird support, nor thermoregulation functions because of the lack of permanent water through July.

4.6 Buffers

Upland buffers around the existing wetland areas are a young Sitka spruce forest to the west and the grassy recreation area to the east, including the ball field and playground. Of these two buffer areas, the spruce forest provides that greatest potential wildlife feeding, nesting, and cover habitat.

Table 1. Assessment of Existing Functions of the Yachats Site Using the Slope/Flats HGM Method

Functions are scored relative to other wetlands of this class in western Oregon, on a scale ranging from 0 (relatively lowest capacity) to 1.00 (relatively highest capacity).

Function	Existing Site Conditions
Water storage and delay	0.00
Sediment stabilization and phosphorus retention	0.51
Nitrogen removal	0.31
Thermoregulation	Not applicable
Primary production	0.36
Resident fish habitat support	Not applicable
Anadromous fish habitat support	Not applicable
Invertebrate habitat support	0.33
Amphibian and turtle habitat	0.38
Breeding waterbird support	Not applicable
Wintering and migratory waterbird support	0.49
Songbird habitat support	0.68
Support of characteristic vegetation	0.61

5.0 PROPOSED RESTORATION AND ENHANCEMENT ACTIVITIES

5.1 Existing Conditions and Potential for Wetland Restoration and Enhancement

The greatest potential for restoration and enhancement is in the east half of the site, where site degradation activities including ditching, fill, and the presence of nonnative plant species have reduced wetland functions. The west half of the site, oriented along the intermittent stream and shrubby wetland adjacent to the spruce forest, has fewer opportunities for restoration or enhancement because it is relatively undisturbed, lacking ditching or fill, and the plant community is dominated by native species.

As noted earlier, soils in the eastern half of the site are predominantly silty loam or silty clay loam with a clay layer below 10-18 inches, and therefore have a capacity to slow down percolation. Grading can bring the subsurface groundwater closer to the surface and create growing conditions favorable to wetland plant species, which typically require soils that are at least seasonally saturated in the top 12 inches. Additionally, water is readily available to the site from two culverts that deposit stormwater runoff to the south portion of the site. The site can easily be accessed by heavy equipment, as access can be from 4th Street to the south, 6th Street to the north, and the ball field to the east.

5.2 Site Limitations

Limitations include the presence of the boardwalk, which limits maneuverability by heavy equipment (e.g., grader or backhoe) on either side of the boardwalk. This also limits the possible designs for the site because too much excavation in the vicinity of the boardwalk could compromise its integrity. One section of the boardwalk is, however, removable. An additional

limitation is the surrounding developed environment and its contributions, including the stormwater runoff. Runoff from managed areas, including the ball field and landscaped areas, typically includes fertilizers and herbicides. Fertilization sometimes favors establishment of nonnative weedy species over native species because native species tend to be adapted to poorer soils.

5.3 Reference Sites

Two reference sites were evaluated in the course of the field study for the restoration plan. Both reference sites have seasonally inundated emergent wetland areas dominated with native slough sedge that are surrounded by native willows including Hooker's willow and Pacific red willow (*Salix lasiandra*). Both sites are relatively flat, and were determined to be in the Slope/Flats HGM class with their primary water sources being precipitation and shallow groundwater, as is also true of the proposed restoration site. The slough sedge ponded areas in both sites are 1 foot on average shallower than the surrounding landscape. This information was used to assist in designing the open emergent habitats on the site, including the grading and planting plans.

5.4 Proposed Restoration and Enhancement Activities

The restoration and enhancement activities will involve (1) increasing the retention time of water on the site by restoring historic hydrologic patterns through removal of the ditches, (2) opening up selected shrubby areas, and (3) converting areas dominated by nonnative plant species to native plant species, including native emergent plants. This will be accomplished by grading to recontour the eastern half of the site with depressional features and creating shallower side slopes to the existing ditches. The goal of grading is to enlarge depressional features that will remain inundated during spring, as well as retaining soils that will stay saturated into at least early summer. Nonetheless, during periods of heavy rainfall, overflow will be allowed to move into the ditch where it exits the northwest corner of the site. The anticipated depth of the depressional features is 1-2 feet below the immediately adjoining substrate.

The newly graded depressional areas will be planted with native herbaceous species, predominantly slough sedge and Pacific silverweed. Shrub habitats will border the emergent depressional features where grading has occurred, and include shrub species that don't grow as tall as the twinberry, Hooker's willow, and salmonberry that are presently on the site. Examples of such native shrubs would be Douglas spirea (*Spirea douglasii*) and nootka rose (*Rosa nutkana*). The target plant communities as identified in the 1996 publication "Natural (Presettlement) Vegetation Classification" (Kagan 1996) for the site include the Slough sedge-Pacific silverweed marsh in the open depressional areas and Spirea Swamp bordering the slough sedge communities.

In areas where grading has the potential to destroy native individuals such as corn lily, water parsley, and slough sedge, individuals or clumps of these species will be salvaged where possible, and stockpiled in a protected area prior to site grading activities, with supplemental watering as needed until replanting in the appropriate areas can be accomplished.

Revegetation of the graded areas will be accomplished with bare root or potted individuals, as well as salvaged individuals, with overseeding of native herbaceous species.

5.5 Wetland Functions Losses and Gains

A function assessment summary of the proposed enhancement site is displayed on Table 2, following. Approximately 0.33 acres of wetlands will be restored from uplands and 0.17 acres of existing wetlands will be enhanced, including those areas impacted previously by fill or as a result of increased drainage caused by ditching. Based on information from the HGM assessment, the proposed restoration and enhancement activities may increase the site's relative capacity for water storage and delay, sediment stabilization and phosphorus retention, primary production, amphibian habitat, and support of characteristic vegetation functions. The restoration and enhancement activities should result in a greater number and wider distribution of vegetation types, greater number of pools during high water, and greater percent native species than the existing wetland site. The increase in depressional features and removal of the existing main ditch will restore much of the site to its historical duration and extent of saturation.

The capacity of physical and biological functions should generally increase as a result of the increase in habitat diversity (by converting selected areas of shrub wetland to emergent wetlands); the increase in native plant species in the herbaceous wetland areas; and the increase in depressional features that will hold water on the site longer. The site's potential for use by waterbirds is greatest during the winter, as the lack of surface water in summer limits most waterbird species. Even during winter, the potential for increasing the suitability for waterbirds through restoration is limited, due mainly to the site's small size, lack of connectivity to other wetlands of its type, frequent human use, and proximity to surrounding development. Nonetheless, use of the site by several native wildlife species, especially in winter, can be expected to increase in conjunction with increased food availability, as associated with increased extent and duration of inundation and increased daylighting of flooded areas as a result of selective removal of shrub cover. In winter these potentially increasing species include Wilson's snipe, Virginia rail, yellow-rumped warbler, Lincoln's sparrow, black phoebe, American pipit, and swamp sparrow, among others. In spring the increased open water/ emergent areas will benefit migrant aerial insectivores such as bats and swallows (concentrations of which routinely follow the Oregon Coast) as well as foliage gleaners such as common yellowthroat and yellow warbler. Amphibians including red-legged frog, Pacific tree frog, rough-skinned newt, northwestern salamander, and long-toed salamander should use the wetland if stagnant water of sufficient depth and quality can be retained long enough, but not so long that bullfrogs or non-native fish become established. The proposed restoration activities are not anticipated to increase the suitability of habitat for any non-native wildlife species at any season.

Shrub cover is important as a refuge for many coastal landbirds during windstorms, and as nesting substrate in summer for some birds. Less than 20 percent of the present shrub cover will be removed by the restoration project, and such cover is probably more extensive locally than are emergent and open water wetlands, so any adverse effects of shrub removal on regional wildlife diversity are expected to be undetectable.

The following table summarizes the scores for the 13 functions rated for the existing wetland and the restoration and enhancement activities. These scores should be compared in a range from 0 (low) to 1 (high).

Table 2: Comparison of Proposed Post-restoration Functions of the Yachats Site to the Existing Conditions, Using the Slope/Flats HGM Method

Functions are scored relative to other wetlands of this class in western Oregon, on a scale ranging from 0 (relatively lowest capacity) to 1.00 (relatively highest capacity).

Function	Pre-restoration	Post-restoration (projected)
Water storage and delay	0.00	0.00*
Sediment stabilization and phosphorus retention	0.51	0.54
Nitrogen removal	0.26	0.39
Thermoregulation	Not applicable	Not applicable
Primary production	0.36	0.38
Resident fish habitat support	Not applicable	Not applicable
Anadromous fish habitat support	Not applicable	Not applicable
Invertebrate habitat support	0.12	0.14
Amphibian and turtle habitat	0.29	0.52
Breeding waterbird support	Not applicable	Not applicable*
Wintering and migratory waterbird support	0.24	0.36
Songbird habitat support	0.47	0.47
Support of characteristic vegetation	0.66	0.69

* a small increase is expected but was unmeasurable using this rapid assessment method

5.6 Restoration and Enhancement Goals, Objectives, and Performance Standards

The over-riding goal for the restoration and enhancement project is to restore the historic water regime by converting the ditched riverine flow-through regime to the slope/flats hydrologic regime. An additional goal is to enlarge the existing wetlands in the east portion of the site. The restoration site will be dominated by native emergent species; have increased capacity for water storage and delay, nitrogen removal, and primary production; and will have increased capacity to support invertebrates, amphibians, wintering and migratory waterbirds, songbirds, and characteristic vegetation. The restoration project is designed to include the palustrine emergent (PEM) Cowardin class typical of central Oregon coastal wetlands, bordered by palustrine scrub-shrub (PSS) wetlands and small patches of palustrine forested (PFO) wetlands.

The specific goals, objectives, and performance standards for the restoration site are presented below:

Goal 1: Restore and enhance 0.5 acres of existing wetland and upland habitat to emergent wetland habitat in the slope/flats hydrogeomorphic class, dominated with native species typical of emergent wetlands in the central Oregon coast region.

Objective: Enhance 0.17 acres of existing palustrine emergent wetland with native plant species typical of native emergent wetland areas on the central Oregon coast.

Performance Standard: Emergent cover shall be 50% by Year 1 and 85% by Year 3, as measured by vegetation sampling transects and photo points indicated on Figure 10.

Objective: Restore 0.33 acres of palustrine emergent wetlands in historic wetland areas that have been drained by ditching, to emergent wetlands dominated with native plant species typical of native emergent wetland areas on the central Oregon coast.
Performance Standard: Emergent cover shall be 50% by Year 1 and 85% by Year 3, as measured by vegetation sampling transects and photo points.
Performance Standard: No more than 15% composition of non-native invasives including Armenian blackberry, evergreen blackberry, reed canary grass, and English ivy within 3 years of construction, as measured by sampling transects.

Objective: The 0.33 acre restored wetland area will exhibit wetland hydrology characteristics.
Performance Standard: Created wetland area will meet the wetland criteria for wetland hydrology as outlined in the 1997 US Army Corps of Engineers Wetland Delineation Manual within 3 years of construction.

Up to 50% of any stratum can be composed of desirable native volunteers when measuring cover.

5.7 Impacts Associated with the Proposed Restoration and Enhancement Activities

A total of 0.17 acres of existing PEM and PSS wetlands will be impacted with fill and removal activities with the restoration projects. A total of 295 feet of existing ditch will be removed or realigned, and regraded to reduce the bank steepness, in order to increase seasonally saturated areas and restore onsite hydrology to mimic historic conditions before the site was ditched.

Grading activities have the potential to increase sedimentation and erosion offsite, especially if grading occurs during the rainy season. This is not anticipated to be a significant concern because grading activities will be conducted in late summer, prior to winter rains. The adjacent protected wetland and upland to the west of the site will be protected from accidental damage from equipment operating on adjacent areas and from sediment runoff by silt fence or similar erosion and sediment control structures. The graded area will need to be stabilized with erosion control seeding after grading prior to planting if insufficient time is available for plantings to become established before winter rains. This will prevent material from eroding into the adjacent and downstream natural areas and wetlands.

The proposed restoration project is not anticipated to alter the onsite hydrology such that adjacent avoided wetlands or the spruce forest will be harmed either by excessive drainage or longer flooding. Water is anticipated to be retained in the new depressional areas through mid-summer, but these depressions will be small relative to the overall area of the site. The vegetated berms that will be installed will be very low (just a few inches above the adjoining soil surface) so will not flood adjoining properties. The site will be graded such that water during periods of heavy rainfall will be able to spill into the existing ditch and exit the northwest corner of the site, as it does currently.

5.8 Design Assumptions

- A topographic survey is not available, only point elevations. Therefore, there is potential

- for error in estimating grades and elevations;
- Protection of mature spruces in the northwest and east portions of the restoration area is important;
 - Creation of more openings will reduce enhance habitat for several wildlife species;
 - For reasons of public safety, even under 100-year runoff conditions, excavated pools will hold no more than about 2 feet of water and will have gradual side slopes (in contrast to the presently steep-sided drainage ditch);
 - Primary sources of hydrology are precipitation, subsurface seepage, and stormwater runoff (2 culverts coming into the site at the south end);
 - The slope and hydrologic gradient is from south to north/northwest;
 - A gradual transition of vegetation heights between recreation area and restored/enhanced wetland should be provided;
 - A boardwalk is already in place and damage to it should be avoided;
 - The potential for invasion by aggressive nonnative plants can be minimized partly by use of dense plantings (e.g., Douglas spirea) around emergent areas;
 - Surface water will continue to occur only seasonally but its duration and extent on the site will increase as a result of restoration activities (excavation, grading, and berms);
 - The wetland water table will continue to be flashier (fluctuate more rapidly and extremely) than in more natural settings as a result of continued stormwater runoff, but this condition will not be of sufficient magnitude to noticeably affect germination and survival of most plant species, or use by most wildlife species;
 - Sediments will continue to accumulate within the site as a result of its receiving runoff from developed adjoining lands, but this condition will not be of sufficient magnitude to rapidly fill in the small excavated depressions, or noticeably affect germination and survival of most plant species, or use by most wildlife species;
 - The restored site will attract more human visitors (including school groups) and this could adversely affect nesting species as well as accidentally facilitate the dissemination of invasive plants. Impacts can be minimized somewhat by keeping pets leashed, retaining sufficient shrub cover, and minimizing the number of walking trails;
 - No outlet structure will be installed for water control; rather, vegetated berms and small excavations will be used to hold water back seasonally;
 - Plants will be installed as bare root or potted, not rely on seeding, to increase cover success;
 - Temporary native erosion control seed mix may be used to keep nonnative seed at bay in the interim between the times of grading and the appropriate planting period;
 - Routine monitoring and treatment of nonnative weedy species will need to be conducted in order to maintain native plant communities, because of the high potential for invasives and fertilizers to enter the site in stormwater. Maintenance will include removing invasive species by handpulling, cutting, and hand spraying (in order of preference);
 - Plantings will be from local stock (within 100 miles of site);
 - Habitat suitability for most locally-occurring wildlife species can be enhanced by increasing the on-site ratio of emergent wetland vegetation to wetland shrub cover, partly because the former is more limited in its local extent;
 - Additions of dead and downed woody material will increase the suitability of the site for most amphibian and invertebrate species;
 - Removal of fill, and shallow grading including at least partially filling some of the

ditches, will enable water to spread further across the site and/or persist longer into the growing season.

5.9 Water Rights

No water rights are anticipated to be required with this project.

5.10 Data Limitations

No engineering analysis of soil stability was conducted because no major earth structures are proposed with this project. While the merits of collecting pre- and post-restoration hydrologic (water budget) and detailed topographic data are recognized, that has been impractical due to limited resources and timeframes available for project planning. Also, autecological data on hydrologic and contaminant tolerances of the principal plant species targeted for restoration on this site would have been helpful, but a search of the scientific literature and databases indicated that such data do not exist.

6.0 PRELIMINARY SITE PLAN

6.1 Methods of Implementation

The wetland restoration and enhancement actions will consist of:

- Excavation of several depressional areas on the eastern portion of the site so that surface runoff is slowed, allowed to partially infiltrate, and spread across more of the site. Slopes in the graded area will be no greater than 5:1 (20%). Finished areas will be shallowly tilled by hand (rototill) to reduce effects of compaction from grading equipment. Grading operations will be conducted during the dry months of late summer in order to minimize potential for compaction and erosion.
- Planting of bare root and potted emergents, primarily slough sedge and silverweed, in the depressional features with overseeding of native emergents. Bare root or potted native wetland shrubs will be planted around the emergent depressional areas. These areas will also be overseeded with native emergent species.
- Installation of large logs in the wetland areas to improve wildlife habitat.
- Maintenance of an upland/wetland buffer area that will be planted with native shrubs and trees necessary for screening and cover, as indicated in the Planting Plan. Plantings will follow the same schedule as described above.
- Watering the woody plantings a minimum of 1 inch per month from June 1 through October 31 for at least the first 2 years following installation.

While soil manipulation and grading activities are occurring, they will be checked periodically by a qualified biologist and adjustments recommended by the biologist will be made immediately, provided they are technically feasible.

6.2 Construction Limits and Methods

The construction limits are indicated in the Grading Plan. All areas to be graded will be staked, and any individual trees or shrubs that are important to retain within those areas will be flagged.

6.3 Implementation Schedule

Ideally, the site will be graded in fall 2006 and a native erosion control seed mix will be hydroseeded over bare areas; with hydrology monitoring and planting in 2007-2008 in order to assure hydrologic conditions are conducive for establishment of the plantings as presented in the Planting Plan. The recommended schedule includes:

Summer 2006: Grade and shallowly rototill graded areas

Fall 2006: Erosion control native seed application over graded areas by hydroseeding

Spring 2007: Monitor hydrology (including measurements of inundation and depth to saturated soils and standing water) and make adjustments to Planting Plan and/or Grading Plan as needed, to correct the hydrologic conditions if the wetland areas are not saturated in the top 12 inches or inundated during the spring 2007 monitoring period.

Summer 2007: Regrade problem areas if needed to better meet hydrologic requirements, and overseed with native erosion control seed mix.

Late Fall 2007: Plant bare root emergents, shrubs, and trees, followed by overseeding

Spring 2008: Overseed bare areas as needed

6.4 Permitting

Prior to any earthwork or activity that involves placement or removal of soil in wetland areas, a wetland restoration and enhancement permit will need to be received from DSL and the Corps.

7.0 GRADING PLAN

The primary goals for grading the restoration site are:

- excavate select areas to create depressional features that will have hydrologic conditions favorable to the slough sedge/silverweed community (shallow inundation winter-early summer), as noted in the grading plan;
- recontour the southern ditch to reduce slopes to no greater than 25 percent; and create a more meandering pattern, in order to improve the biofiltration function of the drainage feature;
- remove fill that has been placed in the restoration areas.

It is important to ensure that material used for berms around the depressional areas is not from the historic fill but is native soil that has been removed during excavation activities.

Additionally, all soil manipulation and grading activity will be supervised by a qualified biologist.

The following pollution control measures will be practiced throughout the grading operation:

- Erosion control measures will be used during the grading operations, including installation of silt fencing to protect the adjoining wetland areas.
- Operation of equipment in the adjoining wetland areas will not be allowed.
- Excavated material not for use on the site will be transported offsite. An off-site fill disposal area on city property is available.
- Precautions will be taken to prevent chemical toxicants such as gasoline, lubricants, and other fuels and oils from entering aquatic areas during grading. Designated refueling

areas will be located at least 150 feet from any wetlands or waterways.

- Grading operations will not result in the generation of waste materials that could enter surface waters. Toxic substances will not be introduced above natural background levels in waters of the state in amounts that may be harmful to aquatic life. No pollutants of any kind (petroleum products) will be discharged to waterways.
- The staging area will be checked regularly for equipment leaks, and any contaminated soils will be dug up and treated offsite.

Figure 4 is an unsurveyed sketch of the proposed topography for the restoration and enhancement site. Figure 8 illustrates cross-sections within the restoration and enhancement site.

8.0 PLANTING PLAN

Both the remaining onsite wetland and the nearby reference wetlands were used to design a planting plan for the restored wetland. All selected plant species are listed below along with their habitat preference, per *Habitat Worksheet* by Anna Mockler, Washington State Department of Ecology. The planting design is displayed on Figure 9.. Planting specifications are also presented in this plan. Refer to Supplemental Information “Erosion Control and Planting Details” for specific planting instructions.

Where possible, native emergents that are in areas planned for grading (including corn lily in the northeast and southeast portions of the site, water parsley in the ditches planned for removal, and slough sedge in the east portion of the site) will be dug up prior to grading, stored in a protected location, and watered regularly to prevent desiccation. These individuals will be replanted as soon after grading as possible. The advantage of using onsite native individuals is that they have adapted to the site conditions, including climate. Other plant material will be purchased from a local source (within 100 miles of the site), preferably from an Oregon coastal source.

8.1 Plant Species and Habitat Preference

Site Placement: DB: Drier Buffer
 WB: Wetter Buffer
 WE: Water's Edge
 SS: Saturated Soil
 SW: Shallow Water
 Light Needs: SI: Shade Intolerant
 ST: Shade Tolerant
 SD: Shade Dependent
 HA: Highly Adaptable

Indicator Status per USFWS *National List of Plant Species that Occur in Wetlands, 1988, and 1993 Supplement to the National List of Plant Species.*

Shrubs and Trees	Common Name	Indicator Status	Light Needs	Site Placement
<i>Alnus rubra</i>	Red alder	FAC	SI-ST	WB, DB
<i>Cornus sericea</i>	Red osier dogwood	FACW+	ST	WE,SS,WB
<i>Rosa nutkana</i>	Nootka rose	FAC	ST	SS, WB
<i>Salix lasiandra</i>	Pacific willow	FACW+	HA	WE, WB, DB
<i>Spirea douglasii</i>	Douglas' spirea	FACW	SI	WE, WB, SS

Emergents	Common Name	Status	Light Needs	Site Placement
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	SI-ST	SW, WE, SS
<i>Beckmannia syzigachne</i>	American sloughgrass	OBL	SI	WE, SS
<i>Carex lenticularis</i>	Shore sedge	FACW+	SI	WE,SS
<i>Carex obnupta</i>	Slough sedge	OBL	ST	SW, WE, SS
<i>Deschampsia caespitosa</i>	Tufted hairgrass	FACW	SI	WE, SS, WB
<i>Eleocharis obtusa</i>	Ovate Spikerush	OBL	SI	SW, WE
<i>Elymus glaucus</i>	Blue wildrye	FACU	SI	DB
<i>Glyceria elata</i>	Tall mannagrass	FACW+	SD	WE,SS,WB
<i>Heracleum lanatum</i>	Cow parsnip	FAC+	ST	WE,SS,WB
<i>Hordeum brachyantherum</i>	Meadow barley	FACW	SI	WE, SS, WB
<i>Juncus articulatus</i>	Jointed rush	OBL	SI	SW, WE
<i>Juncus ensifolius</i>	Dagger leaf rush	FACW	SI	SW, WE, SS
<i>Juncus falcatus</i>	Sickleleaf rush	FACW-	SI	SW, WE, SS

Emergents	Common Name	Status	Light Needs	Site Placement
<i>Myosotis laxa</i>	Small forget-me-not	OBL	ST	WE,SS
<i>Oenanthe sarmentosa</i>	Water parsley	OBL	ST	SW, WE, SS
<i>Petasites frigidus</i>	Coltsfoot	FACW-	ST	WE, WB, SS
<i>Argentina egedii</i> (= <i>Potentilla anserina</i>)	Silverweed	OBL	SI	SW, WE, SS
<i>Schoenoplectus (Scirpus) acutus</i>	Hardstem bulrush	OBL	SI	SW, WE
<i>Schoenoplectus (Scirpus) microcapsule</i>	Small-fruited bulrush	OBL	SI-ST	SW, WE, SS
<i>Sisyrinchium californicum</i>	Yellow-eyed grass	FACW+	SI	SW, WE
<i>Veratrum californica</i>	Corn lily	FACW+	ST	SW, WE, SS

8.2 General

Emergent Wetlands (FAC, FACW, or OBL species) are to be planted to:

Emergents 1 foot on center (o.c) or one per square foot of area (this assumes 10 inch plug or 4 inch pot) or seeded at 12-15 lb/acre (specific mix follows)

Shrub Wetlands (FAC, FACW, or OBL species) are to be planted to:

Shrubs 4-6 feet o.c. (this assumes 1 gal. size). Willows can be planted from live stakes and cuttings, at a tighter spacing.

Plus overseeding with native emergents, grasses as appropriate, at 12 lbs per acre

Buffer areas (UPL, FACU, FAC) are to be planted as for shrub wetlands.

8.3 Planting Specifications

Woody Plant Specifications

- Container-grown plants: woody plants shall be container-grown except as noted below. Containers shall have a minimum size of 9 cubic inches in volume and depth of 8 inches. Maximum size shall be that of a one-quart milk carton.
- Growing medium shall be well-filled with roots so that roots and medium form a cohesive unit when removed from the container.
- Top growth shall be commensurate with root growth, free from dead wood or foliar diseases, and be a minimum of 12 inches high. Shrub species shall be pruned during production if necessary to stimulate branching and avoid legginess, i.e., bare lower stems and inability to stand upright.
- Root systems shall be in good condition and actively growing with white tips.
- Bare root plantings may be used

On-Site Care of Plants

- When plants are in transit from the nursery to the job site, they shall continue to receive regular irrigation and protection from wind. All plants shall be watered immediately before planting (the same day) so that moisture in the containers is at or near field capacity. Handling during planting shall be such that overheating or excessive drying is avoided.
- If temperatures at the nursery and the job site are significantly different, the plants shall be delivered to the job site a minimum of one week prior to planting.

Planting Specifications

- All planting must be done in the spring or fall during the “planting windows.” Dates of the suitable planting periods vary from year-to-year. The spring planting window usually begins in early March and continues for four to eight weeks. The fall planting window is usually from mid- to late-October through late November and may continue into early December, depending on the weather.
- Recommended permanent seeding dates are September 1- October 15 and February 1- April 30. Permanent seeding work done outside of the above dates, in conjunction with permanent mulching to stabilize exposed soils shall be considered temporary until 3 weeks into the next permanent seeding date. At that time, the seeding will be considered permanent if an acceptable stand of grass, providing uniform coverage at 70% density of the surrounding existing grass areas is achieved. If early germination occurred and the grass dies, or an acceptable stand of grass is not achieved, reseed and fertilize the area according to the permanent seeding requirements. In areas where both woody plants and grasses are required, planting of woody plants shall be done prior to seeding of grasses.
- Graded slopes shall be left rough. Compacted areas of less than 5:1 (20%) slope shall be scarified or lightly tilled on contour. Existing rills, gullies, or other erosion damage shall be repaired and any biotechnical erosion control measures shall be installed prior to seeding. All physical erosion control improvements, such as earth berms, shall be installed prior to grass seeding.
- No straw shall be used on the site.
- Wood fiber shall be wood cellulose fiber that contains no germination or growth-inhibiting factors. It shall be produced from non-recycled wood such as wood chips of similar material and shall have the property of even dispersion and suspension when agitated in water.
- The tackifier shall be applied with uniform coverage and shall consist of the following materials:
 - Plantago seed husks e.g. Ecology Control, M-Binder, or Sentinel: 100 lbs/acre
 - Wood fiber: 200 lbs/acre
 - Water: No more than 250 gals/acre
- The materials shall be mixed to form a slurry and applied by hydro seeder or similar equipment equipped with a continuous agitation system of sufficient operating capacity to produce a homogenous slurry. The discharge system shall be capable of applying the slurry at a continuous and uniform rate. Mixing, agitation and holding times shall be the same as specific above for hydro seeding.

Unrooted Cuttings or Live Staking

- Cuttings (live stakes) shall be prepared from live *Salix* spp. (willow) (or other species as specified in Planting Instructions, Section 5.2.3), obtained from on-site or from other sites within the lower Yachats River/Agency Creek basins and shall be free from obvious signs of canker diseases. Cuttings shall be dormant, or if collected in the fall before becoming deciduous, the leaves shall be removed (stripped) from the stems.
- Cuttings shall be cut to size and manner which does not result in frayed ends or bark. During preparation, the orientation of cuttings shall be maintained, i.e., all cuttings shall be arranged basipetal (tops up, bases down). Cuttings shall be tied in bundles of 50 and the cut tops painted with a water base paint, e.g., interior latex paint to seal the cuts and identify the tops. A highly visible color, red, orange, yellow, etc. shall be used.
- Cuttings shall be prepared no longer than one week before planting. Cuttings shall be maintained in moist conditions at all times. They may be stored out-of-doors in shade and submerged in water, either in natural streams or ponds or in containers. When stored in containers, the water shall be changed daily. They may be stored, wrapped in wet burlap, under refrigeration at 32-45 degrees F. During planting, the cuttings shall be kept moist until planted. This may be accomplished by carrying in planting bags or buckets, covered with moist vermiculite, sawdust, or similar material, or in water.

Watering

Supplemental watering shall be applied to all shrub and tree plantings at the rate of 1 inch per month from June 1 through October 31 for a minimum of 2 years following installation of plantings.

9.0 MAINTENANCE AND CONTINGENCY MEASURES

Maintenance activities may be performed as needed, including the installation of animal damage protection devices and periodic weeding and/or spot-spraying to prevent the establishment of non-native invasive plant species.

Problems and areas of failure will be identified and reported immediately. Anticipated problems include the possibility of insufficient water during establishment of new plantings, animal damage to young seedlings, less than optimal survival rates for new plantings, and invasion by non-native plant species. If survival rates fall below 80%, replacement plantings, reseeding, or other measures will be taken to insure that enhancement goals are met. Before doing so, onsite hydrologic conditions that might have contributed to the failure will be identified and remedied if possible via selective regrading.

Supplemental watering of planted trees and shrubs is encouraged at the rate of 1 inch per month for the months of June, July, August, September, and October, for at least 2 years after plantings, or until the new plantings become established. If dry conditions continue to be a problem, then the planting mix, topography, and hydrologic conditions need to be evaluated and new prescriptions may need to be prepared, including modification of the grading and planting plans.

Animal damage, including from rodents such as voles, may be a problem on young plantings. Animal damage will be noted and corrective actions will be implemented immediately. Young shrubs and trees may need to be protected until they grow thick enough to be out of damage potential.

Bare areas will be reseeded or replanted with the appropriate grass/forb mix. Necessary planting and seeding will be completed at the appropriate time of year for the species. If survival continues to be a problem, the reasons will need to be determined and corrective actions taken, including new plant species and mixes, and/or regrading. Invasive plants will be controlled through mechanical or chemical means.

10.0 MONITORING PLAN

The purpose of monitoring is to provide data that can suggest midcourse corrections that should be implemented to better realize the project's objectives. The entire site should be monitored annually for a period of at least five years after restoration. This cost is not included in the present or proposed future budget. Qualified volunteers will be recruited to monitor this site. At the end of each year, data collected as described below should be used to identify any changes in the wetland boundaries noted in Loverna Wilson's 2005 delineation report.

The methods used for monitoring include the establishment of fixed photo points and vegetation assessment plots along transects. A minimum of three photo points is recommended for this project. The suggested location for fixed photo points is shown on Figure 10. These points are located such that the majority of the wetland mitigation site can be viewed. The photo points will be marked on the ground with steel pipe or rebar. The compass direction(s) that the photos were taken, and the date, will also be recorded. The location of the photo points will be marked on the final as-built Restoration Site Plan, with directional and distance measurements noted so that they can be reinstalled if they are accidentally removed or vandalized during the monitoring period.

The suggested location for the transects is indicated on Figure 10. The location of these transects will be permanently marked in the field with rebar or a similar material, and identified on the surveyed map. Each sampling site should be photographed at the time of monitoring.

10.1 Monitoring Goals, Objectives, and Performance Standards

Goal 1: Restore and enhance 0.5 acres of existing wetland and upland habitat to primarily emergent wetland habitat in the slope/flats hydrogeomorphic class, dominated with native species typical of emergent wetlands of the central Oregon coast region.

Objective: Enhance 0.17 acres of existing palustrine emergent wetland by establishing native plant species typical of native emergent wetland areas on the central Oregon coast.

Performance Standard: Emergent cover in the restored portion of the site shall be

50% by Year 1 and 85% by Year 3, as measured by vegetation sampling transects and photo points indicated on Figure 10.

Objective: Restore 0.33 acres of palustrine emergent wetlands in areas that historically have been drained by ditching. Restore them to emergent wetlands dominated with native plant species typical of native emergent wetland areas in the central Oregon coast.

Performance Standard: Emergent cover in the restored part of the site shall be 50% by Year 1 and 85% by Year 3, as measured by vegetation sampling transects and photo points.

Performance Standard: No more than 15% percent cover of non-native invasives including Armenian blackberry, evergreen blackberry, reed canary grass, and English ivy shall be present within 3 years of construction as measured by sampling transects and photo points. When measuring cover, up to 50% of any stratum can be composed of desirable native volunteer plant species.

Objective: The 0.33 acre restored wetland area will exhibit hydrologic characteristics typical of wetlands of the slope/flats HGM class.

Performance Standard: Within 3 years of construction, the restored wetland area will meet the criteria for wetland hydrology as outlined in the 1997 US Army Corps of Engineers Wetland Delineation Manual.

10.2 Vegetation Monitoring

Vegetation will be evaluated in square-meter plots located along transects that span the site. In each plot, assessments will include percent cover by plant stratum and species, species composition (note whether native or exotic, planted or colonizer), and the average height and survival of each dominant species. Data collected should be recorded on appropriate data forms (samples attached) and evaluated. Monitoring should occur in early summer, when plant diversity is anticipated to be highest.

Plants will be identified in each plot and classified according to their moisture conditions, based on the 1988 publication entitled *The National List of Plant Species that Occur in Wetlands: Oregon*, by the US Department of Interior Fish and Wildlife Service. This information will be used to determine which plots meet a wetland vegetation criterion of 80% dominance of wetland plant species (species classified as Facultative or wetter) that are native species. Suggested references for plant identification by skilled botanists are Hitchcock and Cronquist (1978) and Hitchcock et al. (1994).

10.3 Hydrology Monitoring

Wetland hydrologic characteristics will be recorded in at least one vegetation plot on each transect. The plot will be evaluated for the presence or absence of wetland hydrologic criteria as specified in the 1987 US Army Corps of Engineers Wetland Delineation Manual (COE Manual), including inundation, depth to standing water or saturated soil, drift lines, sediment deposits, oxidized rhizospheres within the top 12 inches. The hydrologic monitoring visit will be conducted in early-mid spring, such as March-May, when hydrologic conditions during the growing season can be evaluated. Ideally, hydrologic monitoring visits should also be conducted

in December-January when winter precipitation and stormwater runoff are anticipated to be highest, as well as in summer to provide information on duration of saturation or inundation.

10.4 Soil Monitoring and Sediments

Monitoring is needed to track the development of hydric soils over time. Soil profiles will be described in at least two wetland plots along each transect, preferably the one expected to be the wettest and the one expected to be the driest. Soil pits will be dug to a depth of 18 inches. Soil colors will be identified from with Munsell colors, notations, and color names. The primary indicator of hydric soil conditions will be the time and duration of saturation or ponding. The plot will also be evaluated for the presence or absence of other hydric soil indicators listed in the COE Manual, including the presence of common and distinct redoximorphic features (or mottles) in the top 10 inches of the soil pit (tested when moist), and a chroma of 1 without distinct mottles or a chroma of 2 with distinct mottles.

Because the restored site will continue to receive sediment-laden runoff from developed areas, the remnant channel and excavated areas within the site should be monitored annually for sediment accumulations. If accumulations of greater than about 1 cm/yr are noted after the first year at any location (allowing for some shifting that may occur following onsite grading), the accumulated sediments should be removed and placed offsite, provided any colonizing native plants are not unduly disturbed.

10.5 Buffers

The upland buffers will be evaluated for percent cover by plant stratum and species, species composition (note whether native or exotic, planted or colonizer), average height, and percent survival of each species. Data collected will be recorded on appropriate data forms (samples attached)..

10.6 Reporting

A report summarizing the results of the field monitoring visit will be completed each year. In addition to assessing the enhancement projects for vegetation, soil, and hydrology, the report will also discuss problem areas and failure, including inappropriate design, slopes steeper than 20%, installation flaws, and inappropriate plantings. A discussion of methods to correct identified problems and failures will also be included. Photos from the fixed photo points and completed data forms for the sample plots will be included with the report.

11.0 REFERENCES

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Appendix A. Plant Inventory

The following observations by Nancy Holzhauser and Paul Adamus are based only on visits made on November 18, 2005, and January 16, 2006, plus information in Loverna Wilson's delineation report. Those dates are far from optimal for inventorying the full plant diversity of the site. None of these species are regionally rare. OBL= obligate wetland species, FAC= facultative, FACW

Scientific Name	Wetland Status	Native?	Form	Common Name
<i>Alnus rubra</i>	FAC	yes	shrub/tree	Alder, red
<i>Agrostis stolonifera</i>	FAC	no	graminoid	Bentgrass, creeping
<i>Anthoxanthum odoratum</i>	FACU	no	graminoid	Vernalgrass, sweet
<i>Argentina egedii</i> (= <i>Potentilla anserina</i>)	OBL	yes	forb	Silverweed, Pacific
<i>Athyrium filix-femina</i>	FAC	yes	fern	lady-fern
<i>Blechnum spicant</i>	FAC+	yes	fern	Fern, deer
<i>Callitriche</i> sp.	OBL	no	forb	Water-starwort, pond
<i>Carex obnupta</i>	OBL	yes	graminoid	Sedge, slough
<i>Crocsmia</i> sp.	---	no	forb	Crocus
<i>Equisetum telmateia</i>	FACW	yes	fern	Horsetail, giant
<i>Erechtites minima</i>	---	no	forb	Burnweed, coastal
<i>Festuca arundinacea</i>	FAC-	no	graminoid	Fescue, meadow
<i>Festuca rubra</i>	FAC+	no	graminoid	Fescue, red
<i>Gaultheria shallon</i>	FACU*	yes	shrub/tree	Salal
<i>Hedera helix</i>	---	no	forb	Ivy, English
<i>Heracleum lanatum</i>	FACU	yes	forb	Parsnip, cow
<i>Holcus lanatus</i>	FAC	no	graminoid	Velvetgrass, common
<i>Ilex aquifolium</i>	---	no	shrub/tree	Holly, English
<i>Juncus effusus</i>	OBL	yes	graminoid	Rush, soft
<i>Lonicera involucrata</i>	FAC+	yes	shrub/tree	Twinberry, black
<i>Maianthemum dilatatum</i>	FAC	yes	forb	Lily-of-the-valley, false
<i>Oenanthe sarmentosa</i>	OBL	yes	forb	Parsley, water
<i>Petasites frigidus</i>	FAC	yes	forb	Coltsfoot, Arctic sweet
<i>Phalaris arundinacea</i>	FACW	no	graminoid	Canary grass, reed
<i>Picea sitchensis</i>	FAC	yes	shrub/tree	Spruce, Sitka
<i>Polystichum munitum</i>	FACU	yes	fern	Swordfern, western
<i>Rosa nutkana</i>	FAC-	yes	shrub/tree	Rose, Nootka
<i>Rubus armeniacus (discolor)</i>	FACU	no	shrub/tree	Blackberry, Himalayan
<i>Rubus laciniatus</i>	FACU+	no	shrub/tree	Blackberry, evergreen
<i>Rubus spectabilis</i>	FAC+	yes	shrub/tree	Salmonberry
<i>Rubus ursinus</i>	FACU	yes	shrub/tree	Blackberry, Pacific
<i>Salix hookeriana</i>	FACW	yes	shrub/tree	Willow, dune
<i>Salix lasiandra</i>	OBL	yes	shrub/tree	Willow, Pacific
<i>Sambucus racemosa</i>	FACU	yes	shrub/tree	Elderberry, black or red
<i>Spiraea douglasii</i>	FACW	yes	shrub/tree	Spiraea, Douglas'
<i>Urtica dioica</i>	FAC+	yes	forb	Nettle, stinging
<i>Veratrum californicum</i>	OBL	yes	forb	Hellebore, California false