WETLAND BUFFER ENHANCEMENT/RESTORATION YEAR 3 FINAL MONITORING REPORT

SLAG DISPOSAL, BECKWITH PROPERTY SITE

SOUTH 218TH STREET AND 90TH AVENUE SOUTH

KENT, WASHINGTON

Prepared for

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1 INTRODUCTION

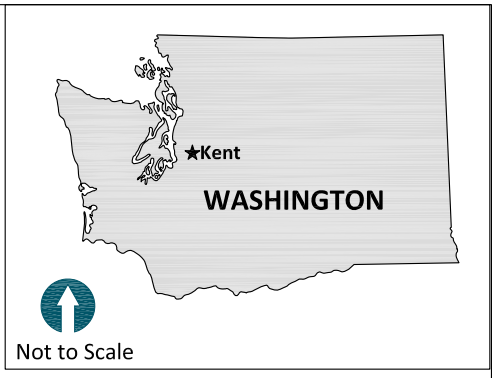
This *Wetland Buffer Enhancement/Restoration Year 3 Monitoring Report* presents the 2014 Year 3 monitoring results for the Slag Disposal Project (Project) wetland buffer enhancement/restoration. Wetland buffer restoration was implemented in accordance with the approved *Wetland Buffer Enhancement/Restoration Plan* (Anchor QEA 2010a) for wetland buffer impacts associated with the Project. The *Wetland Buffer Enhancement/ Restoration Plan* provided information necessary for code compliance and grading permit approval by the City of Kent (City). The wetland buffer enhancement/restoration planting area for the Project is located on an approximately 4.7-acre parcel of land located in the City of Kent, King County, Washington (Township 22 North, Range 5 East, Section 7). The Project site is located on the east side of Highway 167 at the intersection of South 218th Street and 88th Avenue South (Figure 1).

Documentation of Year 3 monitoring conditions contained in this report includes a narrative of monitoring observations, data collected during the site visit, and site photographs. Information from the approved *Wetland Buffer Enhancement/Restoration Plan* (Anchor QEA 2010a) and *Wetland Buffer Enhancement/Restoration As-Built Report* (Anchor QEA 2011a) is summarized or included by reference in this report. With the submittal of this report, reporting requirements will be complete for the Year 3 monitoring of the wetland buffer enhancement/restoration area. In accordance with the specifications and commitments outlined in the plan (Anchor QEA 2010a), the 3-year monitoring effort is the final monitoring activity required of the wetland buffer enhancement/restoration and the Project is now considered complete.

Supplemental planting within the Wetland I buffer area was performed in March 2014 due to the plant mortality documented during the Year 1 and Year 2 monitoring (Anchor QEA 2012, 2013). Overall, the March 2014 supplemental planting included the planting of 79 shrubs and removal of non-native invasive species. The supplemental planting was performed in three separate clusters within the Wetland I buffer area. To protect the new plantings from deer browsing, 6-foot-high chicken wire fencing was also installed around the three clusters of new plantings. The status of this supplemental planting effort was evaluated during this Year 3 monitoring effort.

The wetland buffer enhancement/restoration drawings from the *Wetland Buffer Enhancement/ Restoration Plan* (Anchor QEA 2010a) are included in Appendix A. Year 3 monitoring site photographs are provided in Appendix B. The March 2014 supplemental planting technical memorandum (Farallon Consulting, LLC 2014) is provided in Appendix C.

SOURCE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Kent, WA.



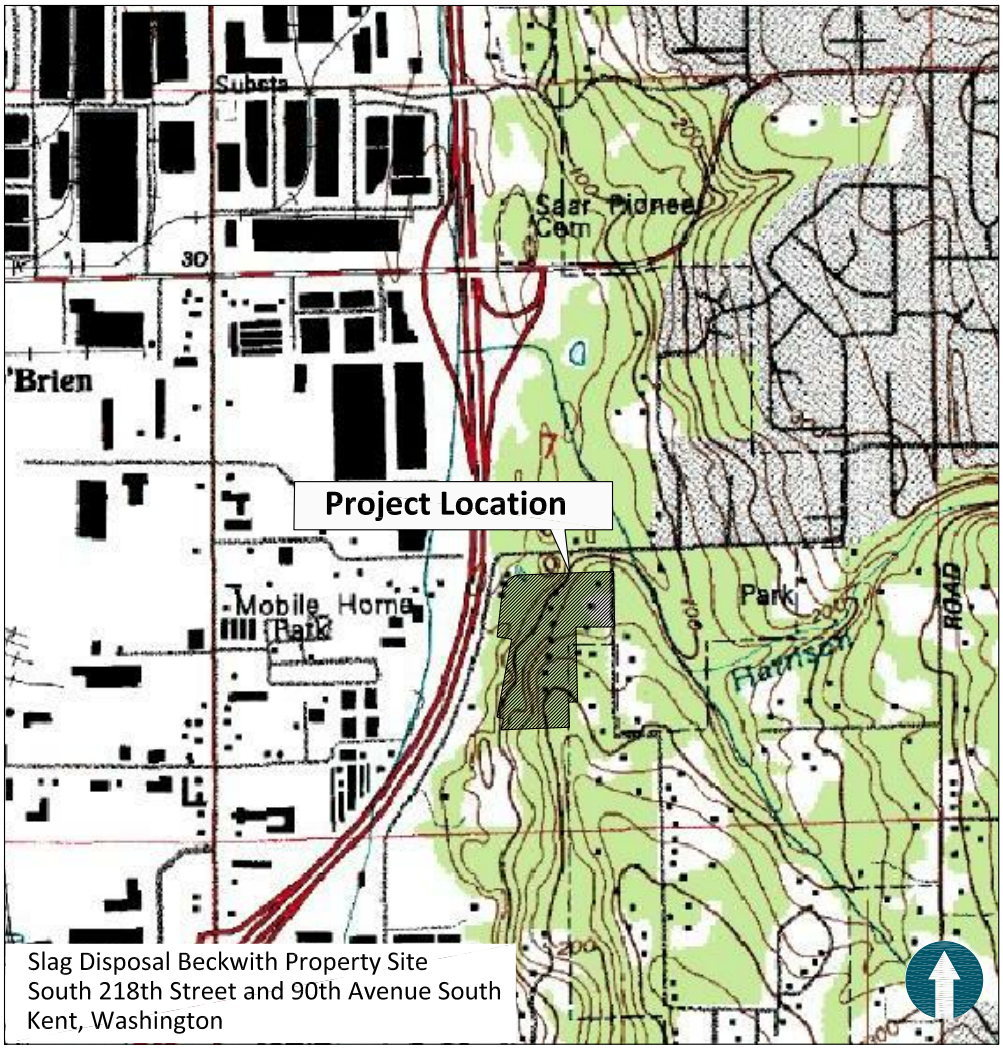


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Figure 1
Vicinity Map
Wetland Buffer Enhancement/Restoration Year 1 Monitoring Report
Kent Slag Site Excavation Project

2 PROJECT WETLAND BUFFER ENHANCEMENT/RESTORATION MONITORING BACKGROUND AND STATUS

Wetland buffer enhancement/restoration actions described in this report occur in two locations on site, identified as the Wetland I and Wetland M buffer areas. Wetland buffer enhancement/restoration implementation for the Project was completed in February 2011, the As-Built (Year 0) monitoring activities for the Project were completed in April 2011, the Year 1 monitoring activities for the Project were completed in August 2012, and the Year 2 monitoring activities for the Project were completed in August 2013. As described in Chapter 1, supplemental planting within the Wetland I buffer area was performed in March 2014 to address plant mortality documented during the Year 1 and Year 2 monitoring. The status of wetland buffer enhancement/restoration monitoring activities associated with the Project as of September 2014 is summarized in Table 1.

Table 1
Wetland Buffer Enhancement/Restoration Monitoring Status – September 2014

Restoration Element	Wetland Buffer Enhancement/ Restoration Schedule
Planting Completion	February 2011
As-Built (Year 0 Report)	April 2011
Year 1 Monitoring	August 2012
Year 2 Monitoring	August 2013
Supplemental Planting	March 2014
Year 3 Monitoring	July 2014

2.1 Existing Information

Several reports and addenda have been completed relevant to wetland buffer enhancement/restoration activities for the Project. These documents provide a background summary of Project restoration activities. Information from these documents is included by reference in this report. These documents include:

- *South 224th Street Extension Wetland Technical Report* (ESA Adolfson 2006)
- *Beckwith Property Slag Disposal Site Wetland Delineation Report* (Springwood Associates, Inc. 1995)

- *Kent Slag Site Excavation Project Design Plans* (Farallon Consulting LLC 2010a)
- *Cleanup Action Work Plan* (Farallon Consulting LLC 2010b)
- *Wetland Buffer Enhancement/Restoration Plan* (Anchor QEA 2010a)
- *Wetland Buffer Planting Plan* (Anchor QEA 2010b)
- *Wetland Buffer Enhancement/Restoration Plan Addendum* (Anchor QEA 2010c)
- *Wetland Buffer Enhancement/Restoration As-Built Report* (Anchor QEA 2011a)
- *Inspection of Delivered Plants and Planting Procedures Field Report* (Anchor QEA 2011b)
- *Inspection of Planting Areas Field Report* (Anchor QEA 2011c)
- *Wetland Buffer Enhancement/Restoration Year 1 Monitoring Report* (Anchor QEA 2012)
- *Wetland Buffer Enhancement/Restoration Year 2 Monitoring Report* (Anchor QEA 2013)
- *Supplemental Landscaping – Wetland I Buffer Area Slag Disposal Beckwith Property Site Technical Memorandum* (Farallon Consulting LLC 2014)

3 WETLAND BUFFER ENHANCEMENT/RESTORATION GOALS AND OBJECTIVES

The goal of the wetland buffer restoration is to address replacement of wetland buffer functions impacted by the Project and to increase these functions at the Project site. To achieve this goal, wetland buffer enhancement/restoration included planting native vegetation to replace wetland buffer vegetation removed during construction. The impact area was dominated by grassland habitat with non-native shrub vegetation. Overall, impacted grassland habitat was replaced with native shrub and forested vegetation communities. The *Wetland Buffer Enhancement/Restoration Plan Drawings* are included in Appendix A.

Monitoring is performed to determine whether a project has met the ecological and functional goals of the design. To meet these goals, the following objectives were identified during the Project restoration planning process to compensate for loss and damage to the wetland buffer area:

- Provide demonstrable and qualitative replacements of functional elements of the natural system on the site
- Establish native wetland buffer plant communities by planting native species and removing invasive species
- Use native and naturalized plant species commonly found in wetland buffer habitats of the Pacific Northwest
- Simulate, with the plantings, Pacific Northwest native plant communities in terms of composition, cover, and structure
- Replace, at a ratio of at least 1:1, wetland buffer habitat lost due to Project impacts
- Remove any non-native invasive species, such as Scot's broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*), from the portion of Wetland I buffer bordering the portion to be enhanced/restored
- Plant 0.144 acre (6,260 square feet [sf]) of native vegetation associated with the wetland buffer of Wetland I in accordance with the *Wetland Buffer Planting Plan* (see Appendix A; this equates to slightly more than the 0.13 acre [5,440 sf] identified in the construction plans)
- Plant seven salmonberry shrubs in the approximately 0.006-acre (260-sf) area of wetland buffer for Wetland M in accordance with the plan addendum (Anchor QEA

2010c) for temporary buffer impacts that were not identified in the *Wetland Buffer Planting Plan* (see Appendix A)

- Adhere to performance standards as detailed in the Project wetland buffer enhancement/restoration plan (Anchor QEA 2010a)

4 MONITORING METHODS AND STANDARDS OF SUCCESS

The wetland buffer enhancement/restoration area was designed to function as a restored wetland buffer with plant communities similar to adjacent and existing systems that provide enhanced biological productivity and wildlife habitat. This restoration area will be evaluated on the success of the native plantings and forested and shrub native vegetation areal cover for 3 years after planting. Monitoring will also include photographic documentation of site features and the development of habitat on the site. Monitoring reports have been submitted annually to the City. The following sections provide information on the methods and standards of success for the wetland buffer enhancement/restoration area, as defined in the *Wetland Buffer Enhancement/Restoration Plan* (Anchor QEA 2010a).

4.1 Monitoring

Planting of the enhancement/restoration area was initiated and completed in February 2011 (Anchor QEA 2011b and 2011c). Species identified in the planting plan and planted in February 2011 are identified in Table 2. Species planted in March 2014 as part of the supplemental planting effort also included plant species from the list identified in Table 2 (Farallon Consulting, LLC 2014; Appendix C).

Table 2
Plant Species Identified in the Wetland Buffer Planting Plan

Scientific Name	Common Name
Trees	
Acer macrophylum	Big-leaf maple
Alnus rubra	Red alder
Pseudotsuga menziesii	Douglas fir
Thuja plicata	Western red cedar
Shrubs	
Oemleria cerasiformis	Indian plum
Rosa nutkana	Nootka rose
Rubus spectabilis	Salmonberry
Symphoricarpos albus	Snowberry
Groundcover	
Polystichum munitum	Sword fern

Due to the relatively small size of the wetland buffer enhancement/restoration area (approximately 6,260 sf for Wetland I buffer and approximately 260 sf for Wetland M buffer), annual monitoring will include the entire enhancement/restoration area instead of being limited to sample plots within these small areas. Annual monitoring will take place near the end of the growing season (summer or early fall) prior to leaf drop.

Monitoring activities will focus on the collection of vegetation and wildlife data to evaluate, describe, and quantify (to the extent possible) wetland buffer functions and compliance with the performance measures. Monitoring will also include photographic documentation of site features and the development of habitat on the site. Specific monitoring methods are described as follows.

During the monitoring, areal cover of all planted and colonizing shrub and tree species within the wetland buffer enhancement/restoration area will be estimated and the number of shrubs and trees will be counted. Shrub and tree heights will be measured and averaged for each species. Plant heights that exceeded 7 feet will be estimated. General plant conditions will be evaluated.

Total shrub, tree, and overall herbaceous vegetation areal cover percentages will be estimated. A list of all colonizing species observed at the site during the monitoring will be recorded.

Using this information, annual growth and areal cover comparisons will be made. Monitoring visits will identify and record all tree and shrub species, whether planted or introduced since planting, and will record the areal cover of each species within the vegetative layers. Plant counts will be used to identify the survival of planted species and the colonization of additional species during the monitoring period.

The wetland buffer enhancement/restoration area was originally photographed from four designated photo point locations. To allow for growth comparisons from year to year and to provide a long-term photographic record, photographs will be taken during each monitoring period. Year 3 photographs are presented in Appendix B.

Wildlife observed during the monitoring site visits will be identified and recorded. Any breeding or nesting activity in the restoration area will be documented. No trapping or systematic surveys will be conducted. A cumulative list of all wildlife species observed in the restoration area during the monitoring periods will be presented.

4.2 Performance Measures, Standards of Success, and Contingency Plans

Performance measures and success standards describe specific on-site characteristics that indicate a function is being provided. Performance measures are used to guide management of the restoration area. Success standards are thresholds to be measured during the monitoring period that demonstrate the restoration has complied with regulatory requirements and is providing intended functions. The enhancement/restoration will be monitored for 3 years to demonstrate that intended wetland buffer functions have been achieved. Specific performance measures and success standards will be the following:

- 20 percent cover of native trees, shrubs, and groundcover species after 1 year
- 50 percent cover of native trees, shrubs, and groundcover species after 2 years
- 80 percent cover of native trees, shrubs, and groundcover species after 3 years
- 80 percent survival of planted and colonizing native trees and shrubs after 3 years
- Less than 20 percent cover of invasive species

Contingency plans describe what actions can be taken to correct site deficiencies. If there is a significant problem with the enhancement/restoration area meeting its performance standards, a contingency plan will be developed. Contingency plans may include, but are not limited to, the following:

- Plant substitutions of type, species, quantity, and/or location
- Additional plant installation to address survival or cover problems
- Weeding and additional plant installation to address invasive weed cover
- Providing fencing or plant guards around plants to prevent animal damage

Contingency plans will be developed for review and approval by the City as appropriate. In addition, implemented contingency plans will be described in the monitoring report following each year's visit. Success of the wetland buffer enhancement/restoration will be based on the restoration goals, performance standards, and contingency measures.

5 YEAR 3 MONITORING RESULTS

5.1 Vegetation

Supplemental planting within the Wetland I buffer area was performed in March 2014 (Farallon Consulting, LLC 2014; Appendix C) due to the plant mortality documented during the Year 1 and Year 2 monitoring (Anchor QEA 2012, 2013). Vegetation planted during the original 2011 planting and the March 2014 supplemental planting are discussed in individual sections, so these two planting efforts can be evaluated separately. The March 2014 supplemental planting is easily distinguishable from the original 2011 planting because the March 2014 supplemental planting occurred within three separate clusters within the Wetland I buffer area within 6-foot-high chicken wire fencing that was installed around the three clusters of new plantings to protect the new plantings from deer browsing. Vegetation planted during the original 2011 planting effort is discussed in Section 5.1.1. Colonizing vegetation within the Wetland I buffer area is discussed in Section 5.1.2. The March 2014 supplemental planting is discussed in Section 5.1.3.

5.1.1 2011 Planted Vegetation

The site is planted with a variety of native plant species in approximate locations, as identified in the *Wetland Buffer Enhancement/Restoration Plan* (Anchor QEA 2010a) and *Wetland Buffer Enhancement/Restoration As-Built Report* (Anchor QEA 2011a). All planted species identified in the planting plan (Appendix A) and shown on Table 2 were observed within the restoration area. The overall condition of the planted species at the site ranges from good to poor. As described in the 2012 Year 1 and 2013 Year 2 reports, in the Wetland I restoration area, several of the plants showed evidence of deer browsing and significantly fewer plants were identified during both the Year 1 and Year 2 monitoring than were identified in the planting plan and As-Built report. During the 2014 Year 3 monitoring, the majority of the observed planted vegetation appeared to be in good health, and no decrease in planted vegetation was observed between the 2013 Year 2 and 2014 Year 3 monitoring. In the Wetland M restoration area, planted vegetation was in good health and all planted species were accounted for. Monitoring photographs from the wetland buffer plantings for Wetlands M and I are shown in Appendix B. Table 3 lists species composition and cover values of planted vegetation. Table 4 lists species composition and numbers of

individual planted species. Average heights of planted trees and shrubs are provided in Table 5.

Table 3

Species Composition and Percentage of Areal Cover of Planted Vegetation

Species	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)
Wetland I Buffer Area			
Trees			
Acer macrophylum	1%	1%	1%
Alnus rubra	5%	5%	5%
Pseudotsuga menziesii	5%	5%	5%
Thuja plicata	5%	5%	5%
Shrubs			
Oemleria cerasiformis	1%	1%	1%
Rosa nutkana	10%	10%	10%
Rubus spectabilis	5%	5%	1%
Symphoricarpos albus	15%	20%	25%
Groundcover			
Polystichum munitum	5%	5%	1%
Wetland M Buffer Area			
Shrubs			
Rubus spectabilis	20%	25%	20%

Table 4

Species Composition and Numbers of Planted Vegetation

Species	Year 0 (2011)	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)	Variation from Year 0 to Year 3
Wetland I Buffer Area					
Trees					
Acer macrophylum	6	3	3	3	-3
Alnus rubra	9	5	4	4	-5
Pseudotsuga menziesii	8	7	6	6	-2
Thuja plicata	5	3	3	3	-2
Total Trees	28	18	16	16	-12

Species	Year 0 (2011)	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)	Variation from Year 0 to Year 3
Shrubs					
Oemleria cerasiformis	36	4	4	5	-31
Rosa nutkana	28	22	17	23	-5
Rubus spectabilis	45	19	14	5	-40
Symphoricarpos albus	35	30	30	41	6
Total Shrubs	144	75	65	74	-70
Groundcover					
Polystichum munitum	147	26	17	9	-138
Total Groundcover	147	26	17	9	-138
Wetland M Buffer Area					
Shrubs					
Rubus spectabilis	7	10	10	7	0
Total Shrubs	7	10	10	7	0

Table 5

Average Height of Planted Trees and Shrubs

Species	Year 1 (2012) Height (feet)	Year 2 (2013) Height (feet)	Year 3 (2014) Height (feet)
Wetland I Buffer Area			
Trees			
Acer macrophylum	8.7	9.0	10.3
Alnus rubra	8.5	9.0	10.8
Pseudotsuga menziesii	7.5	7.9	9
Thuja plicata	5.9	6.0	7.3
Shrubs			
Oemleria cerasiformis	2.5	3.1	3.4
Rosa nutkana	3.9	4.6	3.9
Rubus spectabilis	1.3	2.0	1.6
Symphoricarpos albus	4.1	5.2	6.9
Groundcover			
Polystichum munitum	NA	NA	NA
Wetland M Buffer Area			
Shrubs			
Rubus spectabilis	1.8	2.3	2.4

About 3 years after planting, individual tree plant species in the Wetland I buffer area showed trace (1 percent) to 5 percent areal cover, and shrub species showed 1 to 25 percent areal cover (see Table 3). Snowberry (*Symphoricarpos albus*) showed the highest areal cover at 25 percent, and has increased every year of the monitoring period. Nootka rose (*Rosa nutkana*) showed 10 percent areal cover, the same as in Years 1 and 2. In the Wetland M buffer area, salmonberry (*Rubus spectabilis*), the only planted species, had 20 percent areal cover, a decrease of 5 percent from 25 percent observed in Year 2.

The average height of tree and shrub species within the Wetland I buffer area ranged from 7.3 feet to greater than 10.0 feet for tree species, and from 1.6 feet to 6.9 feet for shrub species. The average height of all planted trees increased compared to the Year 2 monitoring results (see Table 5). The average height of all planted shrubs increased compared to the Year 2 monitoring results, with the exception of salmonberry, which showed a decrease in average plant height due to plant mortality. The average height of salmonberry in the Wetland M buffer area was 2.4 feet, representing an increase of 0.1 feet since the Year 2 monitoring.

The condition of trees and shrubs within the Wetland I buffer area ranged from good to poor health. During the Year 3 monitoring, the tree species appeared in good health, and most of the shrub species appeared to be in good health. Evidence of browsing by deer that was significant during the Year 1 and Year 2 monitoring was much less evident during Year 3, possibly because the surviving trees and shrubs have had the ability to become established past the sapling stage. Within the Wetland M buffer area, planted shrubs were in good health with no evidence of browsing observed.

Planted tree and shrub species were counted for individual survival rates (see Table 4). The results of the 2014 Year 3 monitoring show that no plant mortality of planted tree species has occurred in the Wetland I buffer area since the 2013 Year 2 monitoring was performed. Only one shrub species, salmonberry, showed a decrease in surviving plants between the Year 2 and Year 3 monitoring. The other three shrub species, Indian plum (*Oemleria cerasiformis*), Nootka rose, and snowberry, showed an increase in the number of plants observed due to colonizing plants. Overall, the number of total surviving planted trees was 16 in 2013 and 2014. The number of surviving planted shrubs increased from 65 plants in

2013 to 74 plants in 2014. As described in previous monitoring reports, a decrease in planted trees and shrubs was observed during the Year 1 and Year 2 monitoring (Table 4).

The planted groundcover species sword fern (*Polystichum munitum*) decreased from 17 plants in 2013 to 9 plants observed in 2014. A decrease in surviving sword fern has been observed during each monitoring year (Table 4). However, as described in Section 5.1.4, similar to the 2012 Year 1 and 2013 Year 2 monitoring results, a very dense layer of colonizing herbaceous cover was present at the site, which may be concealing some of the planted sword fern.

In the Wetland M buffer area, the number of planted salmonberry shrubs observed in the 2014 Year 3 monitoring was seven plants, which is the same number that was originally planted, but a decrease from ten that were observed during the 2013 Year 2 monitoring. The three colonizing plants documented during the Year 2 monitoring appear to have died since that monitoring occurred.

5.1.2 Colonizing Vegetation

Several tree and shrub species are colonizing the buffer restoration areas. In the Wetland I buffer area a total of 24 red alder (*Alnus rubra*) and 14 Pacific willow (*Salix lasiandra*) were documented during the 2014 Year 3 monitoring. The number of red alder and Pacific willow observed during the Year 3 monitoring decreased from the numbers observed during the Year 2 monitoring. Twenty-four red alder were documented in 2014 compared to 38 in 2013. Fourteen Pacific willows were observed in 2014 compared to 23 in 2013.

The tree species Oregon ash (*Fraxinus latifolia*) was not observed during the 2012 Year 1 monitoring but was documented within the Wetland I buffer area during the 2013 Year 2 and 2014 Year 3 monitoring. Three Oregon ash saplings were documented during the 2014 Year 3 monitoring, a decrease of six from the nine Oregon ash saplings documented during the 2013 Year 2 monitoring.

The average height of colonizing red alder was 3.6 feet, with a range from 1.9 to 5.3 feet, an increase in average height of 0.8 feet from the 2013 Year 2 monitoring results. The average height of Pacific willow was 1.4 feet, with a range from 1.2 feet to 1.8 feet. The average

height of Oregon ash saplings was 1.3 feet with a range from 0.4 feet to 1.8 feet. Although the number of observed colonizing red alder, Pacific willow, and Oregon ash decreased from the 2013 Year 2 monitoring results, there was still a significant number of colonizing trees occurring in the Wetland I restoration area, which is a positive element for the buffer restoration area. The decrease in colonizing tree saplings could be the result of deer browsing, as was described in the Year 1 and Year 2 monitoring reports to explain the reduction of planted vegetation. The more established colonizing trees appear in good health while younger saplings are not as prevalent at the site. Young saplings of colonizing plants were also observed during the Year 1 and Year 2 monitoring in dense clusters and the reduction in colonizing plants could also be natural mortality of saplings as the trees compete while becoming established.

Colonizing shrub species observed within the Wetland I buffer area included the non-native species Himalayan blackberry and evergreen blackberry (*Rubus laciniatus*). The nonnative species Scot's broom and butterfly bush (*Buddleia davidii*) were observed during the 2013 monitoring but were not observed during the 2014 monitoring. These two species were removed as part of the invasive species removal performed during the 2014 supplemental planting effort (Farallon Consulting, LLC 2014; Appendix C). In the Wetland M buffer area, colonizing species included snowberry and Himalayan blackberry. Table 6 lists species composition and cover values for colonizing shrub and tree vegetation. Table 7 lists species composition and numbers of individual colonizing shrubs and trees by species. Average heights of colonizing trees and shrubs are provided in Table 8.

Table 6

Species Composition and Percentage of Areal Cover of Colonizing Tree and Shrub Vegetation

Species	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)
Wetland I Buffer Area			
Colonizing Trees			
Alnus rubra	5%	5%	5%
Fraxinus latifolia	0%	1%	1%
Salix lasiandra	5%	5%	1%
Colonizing Shrubs			
Buddleia davidii	5%	5%	0%

Species	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)
Cytisus scoparius	1%	1%	0%
Rubus armeniacus	5%	5%	10%
Rubus laciniatus	1%	1%	5%
Wetland M Buffer Area			
Colonizing Shrubs			
Rubus armeniacus	5%	5%	5%
Symphoricarpos albus	15%	30%	60%

Table 7
Species Composition and Numbers of Colonizing Tree and Shrub Vegetation

Species	Year 0 (2011)	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)	Variation from Year 0 to Year 3
Wetland I Buffer Area					
Colonizing Trees					
Alnus rubra	0	52	38	24	24
Fraxinus latifolia	0	0	9	3	3
Salix lasiandra	0	46	23	14	14
Total Colonizing Trees	0	98	70	41	41
Colonizing Shrubs					
Buddleia davidii	0	3	4	0	0
Cytisus scoparius	0	5	3	0	0
Rubus armeniacus[1]	NA	NA	NA	NA	NA
Rubus laciniatus[1]	NA	NA	NA	NA	NA
Total Colonizing Shrubs	0	8	7	0	0
Wetland M Buffer Area					
Colonizing Shrubs					
Rubus armeniacus[1]	NA	NA	NA	NA	
Symphoricarpos albus	0	6	7	7	7
Total Colonizing Shrubs	0	6	7	9	9

Note:
1 Species not applicable for counting number of individuals because the growth pattern does not produce individual stalks

Table 8
Average Height of Colonizing Trees and Shrubs

Species	Year 1 (2012) Height (feet)	Year 2 (2013) Height (feet)	Year 3 (2014) Height (feet)
Wetland I Buffer Area			
Colonizing Trees			
Alnus rubra	1.4	2.8	3.6
Fraxinus latifolia	0	0.7	1.3
Salix lasiandra	0.9	1.5	1.4
Colonizing Shrubs			
Buddleia davidii	3.5	8.5	0.0
Cytisus scoparius	1.6	5.5	0.0
Rubus armeniacus[1]	NA	NA	NA
Rubus laciniatus[1]	NA	NA	NA
Wetland M Buffer Area			
Colonizing Shrubs			
Rubus armeniacus[1]	NA	NA	NA
Symphoricarpos albus	3.4	3.4	4.2

Note:
1 Species not applicable for averaging heights because of the spreading vine-like growth pattern

A variety of grass and herbaceous species was observed at the site. Within the Wetland I buffer area, the native species cleavers bedstraw (*Galium aparine*) was the most dominant groundcover vegetation, providing approximately 70 percent areal cover, which is an increase from the approximately 10 percent cover observed during the Year 2 monitoring. Cleavers bedstraw was growing around and over the majority of the site, covering many of the shrub species. Fireweed (*Epilobium angustifolium*), the dominant groundcover vegetation during the Year 1 and Year 2 monitoring, was the second most dominant herbaceous species, with 25 percent areal cover. The species prickly lettuce (*Lactuca serriola*) was the third most common herbaceous species, providing 10 percent cover. Prickly lettuce is a non-native plant. These three plants may be concealing planted sword ferns, influencing the number of sword ferns observed (Table 4). Additional frequently observed grass and herbaceous species included Canada thistle (*Cirsium arvense*), colonial bentgrass (*Agrostis capillaris*), meadow fescue (*Festuca pratensis*), common velvetgrass (*Holcus lanatus*), common tansy (*Tanacetum vulgare*), and common dandelion (*Taraxacum officinale*).

The Wetland M buffer area was dominated by bare ground, and field horsetail (*Equisetum arvense*) was the only herbaceous plant observed. A complete list of colonizing species observed at the site, and the percent areal cover within the buffer restoration areas, is presented in Table 9.

Table 9
Colonizing Plant Species and Percent Areal Cover

Scientific Name	Common Name	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)
Wetland I Buffer Area				
Agrostis capillaris	Colonial bentgrass	5%	5%	5%
Buddleia davidii	Butterflybush	5%	5%	0%
Carex obnupta	Slough sedge	1%	1%	0%
Cirsium arvense	Canada thistle	1%	10%	5%
Cytisus scoparius	Scot's broom	1%	1%	0%
Epilobium angustifolium	Fireweed	70%	40%	25%
Equisetum arvense	Field horsetail	1%	1%	1%
Festuca pratensis	Meadow fescue	5%	5%	5%
Fraxinus latifolia	Oregon ash	0%	1%	1%
Galium aparine	Cleavers bedstraw	0%	10%	70%
Holcus lanatus	Common velvetgrass	1%	1%	1%
Juncus effusus	Soft rush	5%	5%	5%
Lactuca serriola	Prickly lettuce	10%	15%	10%
Lotus corniculatus	Birds-foot trefoil	5%	5%	5%
Phalaris arundinacea	Reed canarygrass	0%	1%	1%
Poa pratensis	Kentucky bluegrass	1%	1%	1%
Rubus armeniacus	Himalayan blackberry	5%	10%	10%
Rubus laciniatus	Evergreen blackberry	1%	1%	5%
Salix lasiandra	Pacific willow	5%	5%	5%
Tanacetum vulgare	Common tansy	5%	5%	5%
Taraxacum officinale	Common dandelion	5%	5%	1%
Trifolium pratense	Red clover	1%	1%	1%
Trifolium repens	White clover	1%	1%	1%
Wetland M Buffer Area				
Equisetum arvense	Field horsetail	10%	5%	5%
Rubus armeniacus	Himalayan blackberry	5%	5%	5%

5.1.3 2014 Supplemental Planting

Supplemental planting within the Wetland I buffer area was performed in March 2014 in response to the plant mortality documented during the Year 1 and Year 2 monitoring (Anchor QEA 2012, 2013). Overall, the March 2014 supplemental planting included the planting of 79 shrubs and removal of non-native invasive species such as Scot's broom, butterfly bush, Himalayan blackberry, Canada thistle, prickly lettuce, and reed canarygrass (*Phalaris arundinacea*). The supplemental planting was performed in three separate clusters within the Wetland I buffer area. To protect the new plantings from deer browsing, 6-foot-high chicken wire fencing was also installed around the three clusters of new plantings. The March 2014 supplemental planting technical memorandum (Farallon Consulting, LLC 2014) is provided in Appendix C.

The status of the supplemental planting effort was evaluated during the Year 3 monitoring effort. According to the March 2014 supplemental planting technical memorandum (Farallon Consulting, LLC 2014), the 79 shrubs planted within the Wetland I buffer area included 32 Indian plum, 11 Nootka rose, 31 salmonberry, and five snowberry. The supplemental planting technical memorandum does not identify the species and number of shrubs that were planted within each of the three fenced clusters. The locations of the three fenced clusters are identified in the figures in the supplemental planting technical memorandum. Photographs of the supplemental planting effort are also presented in the supplemental planting technical memorandum.

Very few shrubs were alive within the three fenced clusters at the time of the 2014 Year 3 monitoring. Overall, 16 live plants of the 79 planted shrubs were observed during the Year 3 monitoring. Live shrubs observed within the three clusters included four Indian plum, five Nootka rose, five salmonberry, and two snowberry. During the Year 3 monitoring the three clusters were identified as Cluster 1, 2, and 3 based on their north, middle, and south location within the Wetland I buffer area, respectively. Eleven shrubs were observed within Cluster 1. No live shrubs were observed within Cluster 2, and five salmonberry shrubs were observed within Cluster 3. The salmonberry shrubs appeared to be very stressed. The fencing around the shrubs appeared to be intact, and no evidence of deer browsing of vegetation was observed within the fenced areas. The area within the three fenced clusters was also overgrown with dense grass and herbaceous vegetation such as cleavers bedstraw,

fireweed, prickly lettuce, reed canarygrass, and Canada thistle. Young shoots of Himalayan blackberry are also growing within the three fenced clusters. Photographs of the existing conditions within the three fenced clusters are presented in Appendix B. Table 10 lists species composition and cover number of planted vegetation within the three fenced clusters, per cluster.

Table 10
Species Composition and Numbers of Supplemental Planted Vegetation

Species	Year 0 (2014)	Year 1 (2014) Cluster 1 (North)	Year 1 (2014) Cluster 2 (Middle)	Year 1 (2014) Cluster 3 (South)	Year 1 (2014) Total	Variation from Year 0 to Year 1
Wetland I Buffer Area						
Shrubs						
Oemleria cerasiformis	32	4	0	0	4	-28
Rosa nutkana	11	5	0	0	5	-6
Rubus spectabilis	31	0	0	5	5	-26
Symphoricarpos albus	5	2	0	0	2	-3
Total Shrubs	79	11	0	5	16	-63

Factors that may have contributed to the significant plant mortality of the 2014 supplemental planting could include a lack of irrigation, exposure to sun, dense herbaceous growth over the plants, and the time of year that the supplemental planting occurred. Lack of irrigation and exposure to the sun is often a contributing factor for plant mortality in restoration sites and appears to be associated with the high plant mortality observed during the Year 1 and Year 2 monitoring. The establishment of dense herbaceous cover that grows over the planted vegetation can shade the plants and prevent effective photosynthesis from occurring. Finally, the supplemental planting occurred on March 24. Restoration plantings typically occur during the late fall or winter, when plants are dormant and weather conditions are more favorable for new plantings, cooler temperatures, and higher precipitation. Deer browsing does not appear to be a factor in the high mortality of supplemental planting, since the areas were fenced off from wildlife access, and no evidence of deer browsing was observed.

5.1.4 Summary

Total native tree, shrub, and groundcover areal cover was estimated for the Wetlands I and M buffer areas (Table 11). Table 11 includes planted species and native colonizing tree, shrub, and groundcover species.

Table 11
Total Overall Native Tree, Shrub, and Groundcover Areal Cover

Canopy	Year 1 (2012)	Year 2 (2013)	Year 3 (2014)
Wetland Buffer Area I			
Trees	25%	25%	30%
Shrubs	30%	35%	40%
Groundcover	90%	85%	85%
Wetland Buffer Area M			
Trees	0%	0%	0%
Shrubs	35%	55%	80%
Groundcover	10%	5%	5%

As described previously, no plant mortality was observed within the Wetland M buffer area, and several native colonizing shrubs were identified in this area. In the Wetland I buffer area, existing trees and shrubs planted during the initial 2011 planting effort appears to be in good health with no reduction in tree or shrub species occurring since the 2013 Year 2 monitoring. This is a positive change in plant survival as a reduction in planted tree and shrub vegetation was observed during both previous Year 1 and Year 2 monitoring efforts. Several native colonizing trees and shrubs are also becoming established in the Wetland I buffer area.

A reduction in the groundcover species sword fern has occurred during each year of monitoring, including between the 2013 Year 2 and the 2014 Year 3 monitoring. Only 26 of the 147 planted sword fern (17 percent) were documented during the 2012 Year 1 monitoring. During the 2013 Year 2 monitoring, 17 sword ferns were observed, representing a total decrease of 130 sword ferns (88 percent). During the 2014 Year 3 monitoring, nine sword ferns were observed, representing a total decrease of 138 sword ferns (94 percent). Most of the observed sword fern plants were growing within the dense herbaceous

groundcover vegetation, and none of the sword fern plants extended above the herbaceous plants. While there may be several sword ferns present beneath the herbaceous groundcover, it is unlikely that a significant number is growing in the full shade of the herbaceous plants. Conditions at the site indicate that the dense groundcover is responsible for the low number of observed sword ferns at the site and may be contributing to sword fern mortality. While grass and herbaceous vegetation provide short-term erosion control measures at restoration sites, it appears that the dense groundcover vegetation may be contributing to the low success rate of planted material. Prickly lettuce is a non-native plant. However, fireweed and cleavers bedstraw are native species, and per the performance goals and standards of success, colonizing native plants are a benefit to the restoration effort, and they are accounted for in evaluating the success of the restoration.

As described in Section 5.1.3, plant mortality has occurred for the 2014 supplemental planting effort. Overall, 16 of the 79 plants (20 percent) planted in March 2014 were alive during the 2014 Year 3 monitoring effort. Factors that may have contributed to the plant mortality of the 2014 supplemental planting could include a lack of irrigation, exposure to sun, dense herbaceous growth over the plants, and the time of year that the supplemental planting occurred (March 24).

As described in Section 4.2 on performance standards, standards of success, and contingency plans, success of the wetland buffer enhancement/restoration area will be based on an 80 percent survival rate of planted and colonizing native trees and shrubs after 3 years. Contingency measures for less than 80 percent plant survival and to achieve performance standards include: evaluating the reasons for mortality; making substitutions in plant type, species, quantity, and/or location; additional plant installation to address survival; weeding and additional plant installation to address invasive weed cover; and providing fencing or plant guards around plants to prevent animal damage. Based on the numbers of planted vegetation observed during the 2014 Year 3 monitoring, current plant survival under existing conditions is below the restoration performance goals and standards for shrub species. Due to colonizing native red alder, Oregon ash, and willow species, the tree canopy layer is meeting restoration performance goals and standards.

During the 2014 Year 3 monitoring, the non-native invasive shrub species Himalayan blackberry was observed within the restoration area. Within the Wetland I buffer area, areal cover of Himalayan blackberry was 10 percent, and evergreen blackberry cover was 5 percent. Himalayan blackberry consisted mostly of young shoots and branches extending into the site from outside the site boundary. The non-native shrub species butterfly bush and Scot's broom were not observed in the Wetland I restoration area during the Year 3 monitoring. The non-native herbaceous species Canada thistle, prickly lettuce, common tansy, and reed canarygrass provide 5 percent, 10 percent, 5 percent, and 1 percent areal cover, respectively. Within the Wetland M buffer area, areal cover of Himalayan blackberry was 5 percent. Blackberry bushes are growing along the roads on the north and west sides of the restoration site and are providing a seed source for colonizing blackberry shrubs within the site.

5.2 Wildlife

Wildlife data are collected during the annual monitoring. Three bird species commonly associated with urban areas in western Washington were observed during the 2014 Year 3 monitoring. Scat for two mammal species, coyote (*Canis latrans*) and black-tailed deer (*Odocoileus hemionus columbianus*), was observed in several locations of the site during the 2012 Year 1, 2013 Year 2, and 2014 Year 3 monitoring events. During the 2013 Year 2 and 2014 Year 3 monitoring, the reptile species western garter snake (*Thamnophis elegans*) was observed. As described previously, evidence of deer browsing of vegetation was also observed during the 2012 Year 2 and 2013 Year 3 monitoring events. A list of all wildlife species observed at the restoration site during the Year 1, Year 2, and Year 3 monitoring periods is presented in Table 12.

Table 12
List of Wildlife Species Observed at the Restoration Site

Common Name	Scientific Name	August 2012	August 2013	July 2014
Birds				
American crow	*Corvus brachyrhynchos*	X	X	X
American robin	*Turdus migratorius*	X	X	X
Black-capped chickadee	*Parus atricapillus*	X	X	
Dark-eyed junco	*Junco hyemalis*	X	X	

Common Name	Scientific Name	August 2012	August 2013	July 2014
Song sparrow	*Melospiza melodia*		X	X
Mammals				
Coyote	*Canis latrans*	X	X	X
Black-tailed deer	*Odocoileus hemionus columbianus*	X	X	X
Amphibians				
Pacific chorus frog	*Pseudacris regilla*		X	
Reptiles				
Western garter snake	*Thamnophis elegans*		X	X

5.3 Human Intrusion/Vandalism

Evidence of human intrusion included litter, tires, aluminum cans, plastic bags, and one fire pit located at the south end of the site near Wetland M. Litter and articles of clothing were also observed between Wetland I and the wetland buffer mitigation planting area, indicating that an individual or individuals may have been camping at the site. No evidence of vandalism was observed in the site.

6 CONCLUSIONS AND RECOMMENDATIONS

The findings of the 2014 Year 3 monitoring did not identify a reduction in the number of tree and shrub plantings in the Wetland I buffer area since the 2013 Year 2 monitoring report was completed. The majority of planted tree and shrub vegetation within the Wetland I buffer area is in good health, and a variety of native tree and shrub species are also colonizing the buffer area. Planted groundcover vegetation within the Wetland I buffer area, sword fern, decreased for the third consecutive year. Supplemental planting within the Wetland I buffer area that occurred in March 2014 show a very low survival rate. Sixteen of the 79 plants (20 percent) planted in March 2014 were alive during the 2014 monitoring. The Wetland M buffer area vegetation is in good health with an overall increase in native plant numbers due to colonization. The following is a summary of the performance goal status based on the Year 3 monitoring results. The Year 3 conditions of the site compared to the Year 3 performance standards (Section 4.2) are presented in Table 13:

- Colonizing native trees and shrubs can be applied to the plant survival rate performance standard.
- Wetland I buffer area survival rate of planted tree vegetation is 57 percent (16 out of 28).
- Wetland I buffer area has 41 colonizing native trees (red alder, Pacific willow, and Oregon ash), increasing the survival rate of planted and colonizing native trees to above 100 percent.
- Wetland I buffer area performance standard of 80 percent survival rate of planted and colonizing native trees after 3 years has been met.
- Wetland I buffer area shrub plant survival rate is 51 percent (74 out of 144).
- Wetland I buffer area supplemental planting of shrubs performed in March 2014 showed only a 20 percent (16 out of 79) survival rate during the Year 3 monitoring.
- Wetland buffer area shrub plant survival rate is only 63 percent (90 out of 144) when factoring in the 16 supplemental shrub species.
- Wetland I buffer area performance standard of 80 percent survival rate of planted and colonizing native shrubs after 3 years has not been met.
- Wetland I buffer area groundcover plants have shown a decrease each year since 2011. Performance standards do not include survival goals for groundcover vegetation.

- The Wetland I buffer area percent cover of native trees is 30 percent, percent cover of native shrubs is 40 percent, and percent cover of native groundcover species is 85 percent, for a cumulative total of native vegetation greater than 100 percent.
- The Wetland I buffer area performance standard of 80 percent cover of native trees, shrubs, and groundcover species after 3 years has been met.
- The Wetland M buffer area percent cover of native shrubs is 80 and percent cover of native groundcover species is 5 percent, for a cumulative total of native vegetation of 85 percent.
- The Wetland M buffer area performance standard of 80 percent cover of native trees, shrubs, and groundcover species after 3 years has been met.
- The Wetland I buffer area percent cover of invasive species is 35 percent.
- The Wetland I buffer area performance standard of less than 20 percent cover of invasive species has not been met.
- The Wetland M buffer area percent cover of invasive species is 5 percent.
- The Wetland M buffer area performance standard of less than 20 percent cover of invasive species has been met.

Table 13

Summary of Current Site Conditions Compared to Year 3 Performance Standards

Performance Standard	Performance Standard Percentage	Year 3 (2014) Conditions	Performance Standard Met
Wetland I Buffer			
Percent Survival of Planted and Colonizing Native Trees after 3 Years	80%	>100%[1]	Yes
Percent Survival of Planted and Colonizing Native Shrubs after 3 Years	80%	63%[2]	No
Percent Cover of Native Trees after 3 Years	80%[3]	25%	Yes
Percent Cover of Native Shrubs after 3 Years	80%[3]	35%	Yes
Percent Cover of Native Groundcover after 3 Years	80%[3]	85%	Yes
Cumulative Native Vegetation Percent Cover after 3 Years	80%[3]	>100%[1]	Yes
Cover of Invasive Species	<20%	35%	No
Wetland M Buffer Area			
Percent Survival of Planted and Colonizing Native Shrubs after 3 Years	80%	>100%[1]	Yes

Performance Standard	Performance Standard Percentage	Year 3 (2014) Conditions	Performance Standard Met
Percent Cover of Native Shrubs after 3 Years[4]	80%[3]	80%	Yes
Percent Cover of Native Groundcover after 3 Years	80%[3]	5%	Yes
Cumulative Native Vegetation Percent Cover after 3 Years	80%[3]	85%	Yes
Cover of Invasive Species	<20%	5%	Yes

Notes:
1 Greater than 100% due to colonizing native species.
2 Includes 16 surviving plants from the 2014 supplemental planting.
3 Percent cover performance standard for native tree, shrub, and groundcover species is cumulative total of the cover types.
4 Only shrubs were planted in Wetland M Buffer Area.

Numerous native and some non-native grass and herbaceous species have become established and have contributed to the groundcover present. While the density of grass and herbaceous cover in the Wetland I buffer area is currently competing with, and may be restricting the growth of, planted shrubs and sword ferns, native species are the dominant herbaceous groundcover at the site, and colonizing native species are considered a benefit to the restoration effort.

The overall condition of the planted vegetation at the site ranges from good to poor. Many of the native plant species in the restoration areas are developing and are beginning to provide wildlife foraging, shelter, and resting habitat for terrestrial wildlife species. Based on the observations of shrub mortality at the site during the 2012 Year 1 and 2013 Year 2 monitoring events, supplemental shrub plantings were made in March 2014 in an effort to meet the restoration site goals and performance standards. Additional planting of tree species was not recommended because native trees species were colonizing the site at a rate to meet performance goals. Supplemental planting in the Wetland I buffer area was performed in March 2014. The supplemental planting resulted in a very low survival rate. Additional recommended measures such as mulching, maintenance of non-native vegetation, and fencing was also performed during the March 2014 supplemental planting. Irrigation has not been implemented at the mitigation site.

Overall, current shrub plant survival and minimum invasive species cover in the Wetland I buffer area do not meet the 3-Year performance standards. Wetland M buffer area 3-Year

performance standards have been met. Additional plantings and invasive species removal at the Wetland I buffer area site are necessary to meet the performance standards criteria.

7 REFERENCES

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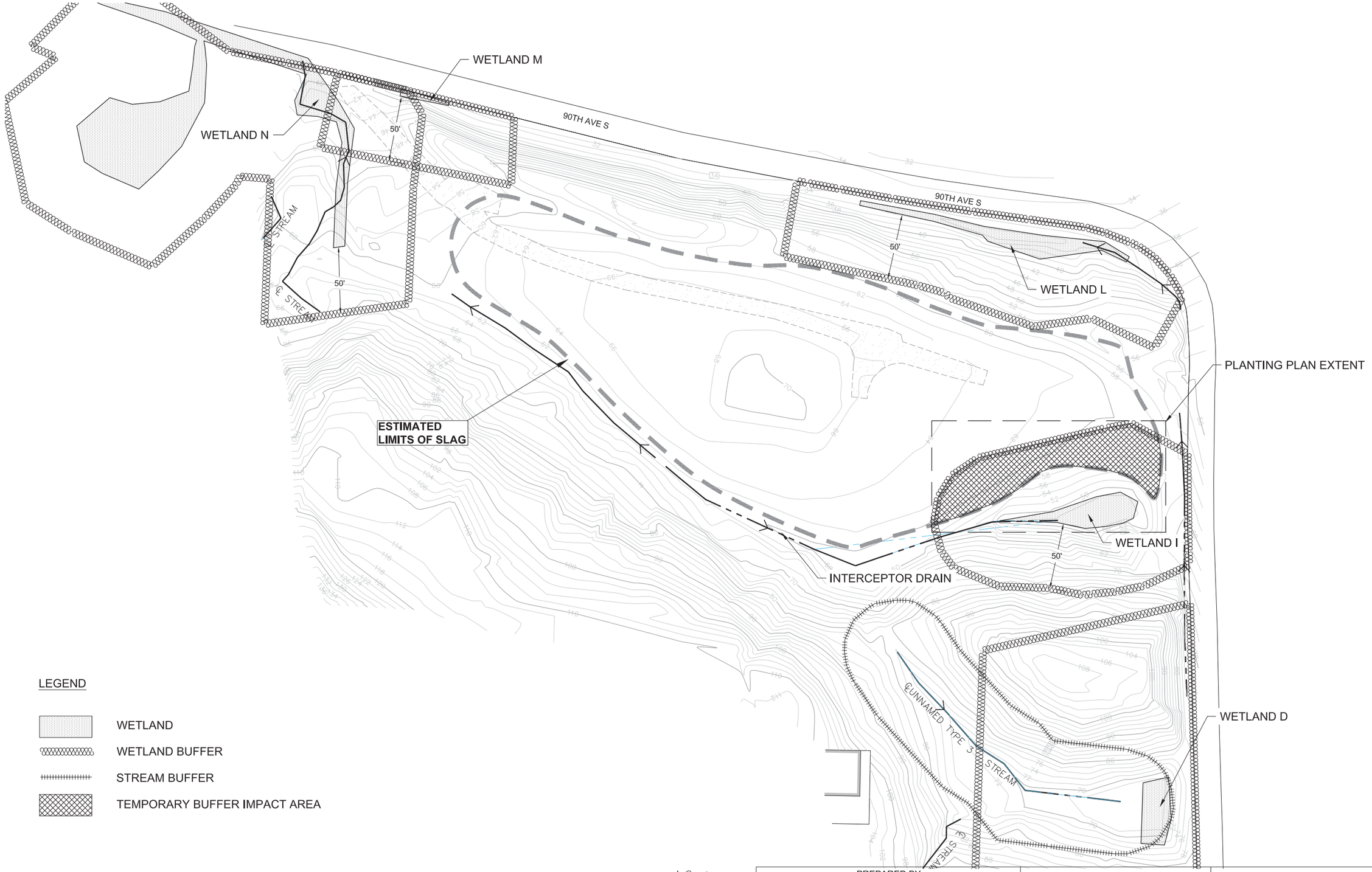
Springwood Associates, Inc., 1995. *Beckwith Property Slag Disposal Site Wetland Delineation Report*. Prepared for SECOR International, Inc. Bellevue, Washington.

APPENDIX A
WETLAND BUFFER ENHANCEMENT/ RESTORATION DRAWINGS



LEGEND

- WETLAND
- WETLAND BUFFER
- STREAM BUFFER
- TEMPORARY BUFFER IMPACT AREA

	6/15/10	ISSUED FOR CONSTRUCTION	BMB	PH	6/22/10
	DATE	DESCRIPTION	BY	CKD.	APP.

0 70
Scale in feet
CONTOUR INTERVAL: 2 FOOT

PREPARED BY
FARALLON CONSULTING
ANCHOR QEA

PREPARED FOR
EARLE M. JORGENSEN COMPANY
10650 ALAMEDA STREET
LYNWOOD, CALIFORNIA 90262

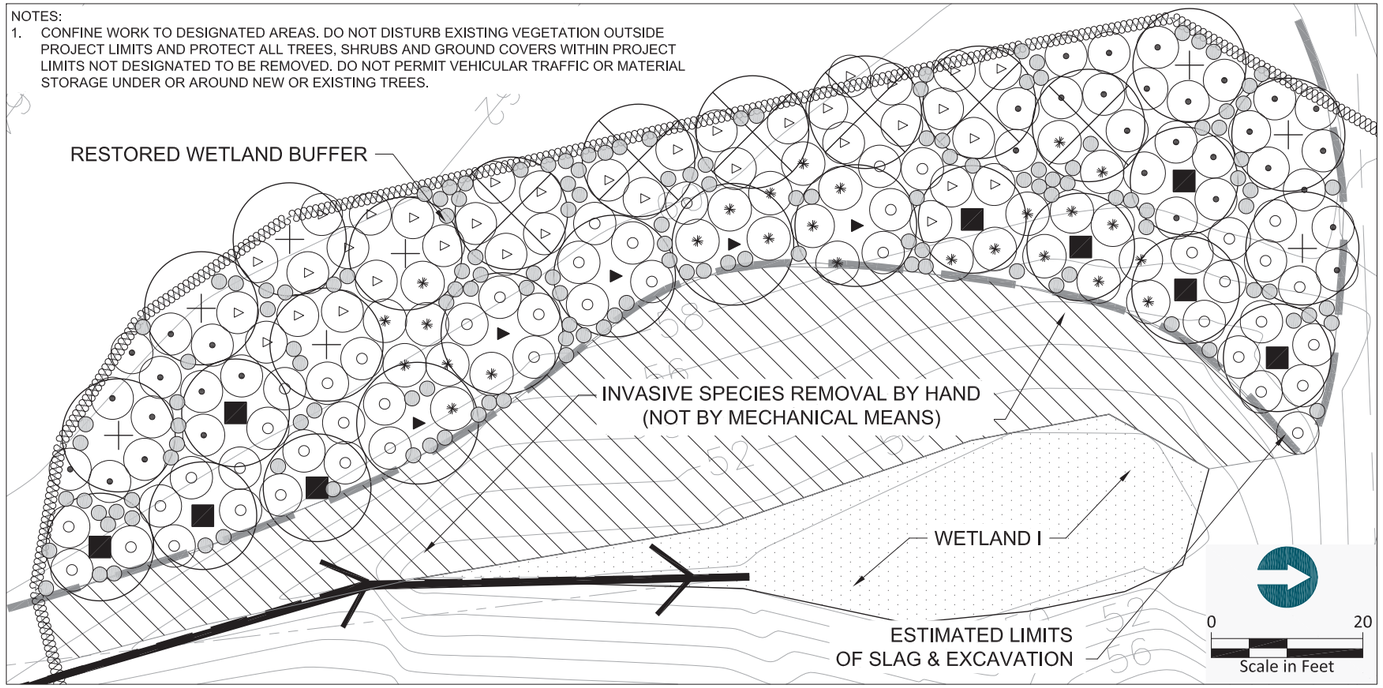
SLAG DISPOSAL BECKWITH PROPERTY SITE
KENT, WASHINGTON

WETLAND BUFFER PLAN

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
PETER C. HUMMEL
CERTIFICATE NO. 422

SCALE AS SHOWN
PROJECT NO. 831-022
FILE NAME: 100224-PL-001.dwg
SHEET NO. W1 OF 3

NOTES:
1. CONFINE WORK TO DESIGNATED AREAS. DO NOT DISTURB EXISTING VEGETATION OUTSIDE PROJECT LIMITS AND PROTECT ALL TREES, SHRUBS AND GROUND COVERS WITHIN PROJECT LIMITS NOT DESIGNATED TO BE REMOVED. DO NOT PERMIT VEHICULAR TRAFFIC OR MATERIAL STORAGE UNDER OR AROUND NEW OR EXISTING TREES.



PLANTING PLAN

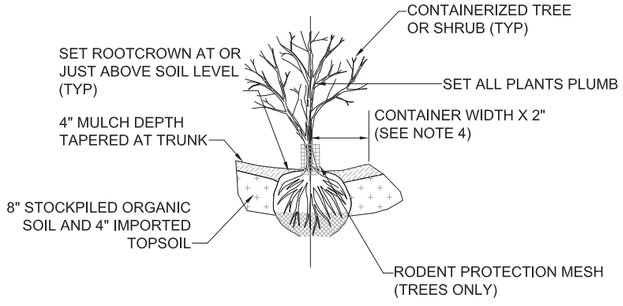
PLANTING SEQUENCE / NOTES:

1. STRIP ORGANIC SOIL AND STOCKPILE SEPARATELY FROM SLAG AND OVERBURDEN.
2. RIP, DISC, OR SCARIFY SUBGRADE SOILS TO A MINIMUM DEPTH OF 12 INCHES. DO NOT SCARIFY WITHIN DRIP LINE OF EXISTING TREES TO BE RETAINED.
3. PLACE 8" OF STOCKPILED SOILS AND 4" OF IMPORTED TOPSOIL WTIHIN WETLAND BUFFER PLANTING AREA.
4. DIG PLANTING PIT THAT IS AT LEAST TWICE THE DIAMETER OF CONTAINER. REMOVE ALL ROCKS, ROOTS, STICKS AND OTHER DEBRIS LARGER THAN 1" DIAMETER. SCARIFY THE PLANTING PIT BOTTOM AND SIDES TO A DEPTH OF 4 INCHES.
5. SET PLANT MATERIAL IN THE PLANTING PIT TO PROPER GRADE AND ALIGNMENT. SET PLANTS UPRIGHT, PLUMB, AND FACED TO GIVE THE BEST APPEARANCE OR RELATIONSHIP TO EACH OTHER. SET CROWN OF PLANT MATERIAL AT THE FINISH GRADE. NO FILLING WILL BE PERMITTED AROUND TRUNKS OR STEMS. BACKFILL THE PLANTING PIT WITH SOIL, DO NOT USE MUDDY MIXTURES FOR BACKFILLING.
6. SPACE PLANTS USING TRIANGULAR SPACING IN ACCORDANCE WITH PLANT SCHEDULE DIMENSIONS. PLANT GROUND COVERS TO WITHIN 18" OF THE TRUNKS OF TREES AND SHRUBS WITHIN PLANTING AREA AND TO WITHIN 12" OF THE EDGE OF PLANTING AREA. PLANT SHRUBS WITHIN 5' OF THE TRUNKS OF TREES WITHIN PLANTING AREA AND TO WITHIN 3' OF THE EDGE OF PLANTING AREA.
7. SHAPE SOIL TO PROVIDE WATERING RING WITH A DIAMETER EQUAL TO 2X THE CONTAINER WIDTH.
8. MULCH PLANTING BEDS IMMEDIATELY AFTER PLANTING. THOROUGHLY WATER MULCHED AREA. AFTER WATERING, RAKE MULCH TO PROVIDE A UNIFORM FINISHED SURFACE.

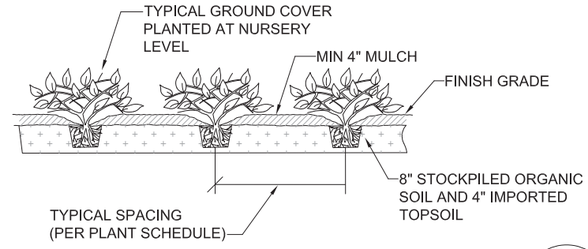
PLANTING SCHEDULE / LEGEND

Common Name	Scientific Name	Size	Spacing	Quantity
TREES				
Red Alder	*Alnus rubra*	5 gal.	15' O.C.	9
Big leaf Maple	*Acer macrophyllum*	5 gal.	15' O.C.	6
Douglas Fir	*Pseudotsuga menziesii*	5 gal.	15' O.C.	8
Western Red Cedar	*Thuja plicata*	5 gal.	15' O.C.	5
SHRUBS				
Indian Plum	*Oemleria cerasiformis*	1 gal.	6' O.C.	36
Salmonberry	*Rubus spectabilis*	1 gal.	6' O.C.	45
Nootka Rose	*Rosa nutkana*	1 gal.	6' O.C.	28
Snowberry	*Symphoricarpos albus*	1 gal.	6' O.C.	35
GROUNDCOVER				
Western Sword Fern	*Polystichum munitum*	1 gal.	As Shown	147

EXISTING WETLAND PREVIOUSLY RESTORED WITH NATIVE PLANTS



1 - TYPICAL TREE AND SHRUB PLANTING DETAIL
SCALE:NTS



2 - GROUNDCOVER PLANTING
SCALE:NTS

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
PETER C. HUMMEL
CERTIFICATE NO. 422

	6/15/10	ISSUED FOR CONSTRUCTION	BMB	PH	6/22/10
	DATE	DESCRIPTION	BY	CKD.	APP.

CONTOUR INTERVAL: 2 FOOT

PREPARED BY
FARALLON CONSULTING
ANCHOR QEA

PREPARED FOR
EARLE M. JORGENSEN COMPANY
10650 ALAMEDA STREET
LYNWOOD, CALIFORNIA 90262

SLAG DISPOSAL BECKWITH PROPERTY SITE
KENT, WASHINGTON

PLANTING PLAN

SCALE AS SHOWN
PROJECT NO. 831-022
FILE NAME: 100224-PL-002.dwg
SHEET NO. W2 OF 3

PLANTING SPECIFICATIONS

Submittals:

1. Topsoil analysis results of a 5 pound bag from soils testing laboratory, indicate source and obtain Owner's approval before hauling topsoil to site.
2. Source of the mulch supply and a 1 gallon sample for approval before installation.
3. List of nurseries supplying all plant species with Name and phone number of contact person. Submit representative color, dated photographs of each plant species.

Notifications:

Notify the Owner at least five working days prior to the installation of plant material.

Products:

Topsoil:

The Topsoil shall consist of 60 percent Sand Component and 40 percent Composted Organic Amendment by volume and shall meet or exceed the following specifications:

The Sand Component shall meet the following specifications within reasonable variations:

Screen Size	Percent Passing
6.35 mm	95
#10	85
#30	50
#60	40
#100	20
#200	10

The Composted Organic Soil Amendment shall consist of 100 percent decomposed organic mulch material, and shall consist of yard waste debris or other organic waste materials that have been sorted, ground up, aerated, and aged, and shall be fully composted, stable, and mature (non-aerobic). The composting process shall be for at least 6 months' time and the organic amendment shall have a uniform dark, soil-like appearance and consist of 100 percent recycled content. In addition, the organic amendment shall have the following physical characteristics:

1. Shall be certified by the Process to Further Reduce Pathogens (PFRP) guideline for hot composting as established by EPA. Shall be fully mature and stable before usage.
2. Shall be screened using a sieve no finer than 1/4-inch and no greater than 1/2-inch. Based on dry weight of total organic amendment sample, it must comply with the following percent by weight passing:

Sieve Size	Maximum %	Minimum %
12.7 mm (1/2 inch)	0	100
6.35 mm (1/4 inch)	100	95
4.76 mm	100	90
2.38 mm	100	75
1.00 mm	45	70
500 micron	30	0

3. Meets "composted materials" definition in WAC 173-350 Section 220, available at: http://www.ecy.wa.gov/programs/swfa/compost/
4. Has Organic Matter Content 35 to 65 percent and Carbon to Nitrogen ratio of 25:1.
5. Shall have heavy metal concentrations below the Washington State Department of Agriculture (WSDA) per year load limits as follows:

Metal	WSDA-Maxium pounds per acre per year
Arsenic	0.297
Cadmium	0.079
Cobalt	0.594
Lead	1.981
Mercury	0.019
Molybdenum	0.079
Nickel	0.713
Selenium	0.055
Zinc	7.329

6. Shall be certified by PFRP guidelines for composting as established by the U.S. Environmental Protection Agency (EPA).

PLANTING SPECIFICATIONS CONTINUED

The topsoil mix shall also have the following characteristics:

1. The pH range shall be from 5.5 to 7.5.
2. The Sodium Adsorption Ratio shall be less than 6.0.
3. The Saturation Extract Concentration of Boron shall be less than 1.0 part per million (ppm).
4. The Water Percolation/Infiltration Rate of the disturbed soil sample shall be a minimum of 0.4 inches per hour.
5. The Soil Structure shall be loose, friable, and not subject to consolidation or compaction.
6. The soil mix shall contain less than 100 plant parasitic nematodes per 100 cubic centimeters (cc) of soil.
7. The soil mix shall be relatively free of soil-borne plant pathogens.
8. Minimal weed seed shall be present, based on germination testing of a representative sample.
9. Non-soil components shall be less than 1 percent by volume (i.e., plastic, sticks, glass, etc.).
10. The Final Topsoil Mix shall contain sufficient quantities of available nitrogen, phosphorus, potassium, calcium, magnesium, sulfate, copper, zinc, manganese, iron, and boron to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials prior to planting.

Mulch:

Bark or wood chip mulch shall be derived from Douglas fir, pine, or hemlock species. It shall be ground so that a minimum of 95% of the material will pass through a 2-inch sieve and no more than 25%, by loose volume, will pass through a No. 4 sieve. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Arborist woodchips, sawdust or wood shavings shall not be used as mulch.

Plants:

Comply with sizing and grading standards of th latest edition of "American Standards for Nursery Stock."

Protect existing native vegetation from damage caused by landscaping operations.

All plants shall by nursery grown and from a nursery with similar climatic conditions to the locality of the project. Stock furnished shall be at least the minimum size indicated.

Provide only sound, healthy, vigorous plants free from weeds, defects, sunscald injuries, and abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids, open spaces, broken branches, bruised bark, flush cuts or stubs. No plants shall be loose in the container or pot bound.

Plants shall be packed, transported and handled with care. Cover plants transported on open vehicles with a protective covering to prevent wind burn. No plant material will be bound with rope or wire in a manner that would damage or break the branches. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner. Water heeled in plantings daily. Do not handle plants by trunks, stems or tops.

Plant material shall be inspected and approved by the Consultant and the Owner on site prior to installation. Remove unsatisfactory material from the site immediately.

Planting vegetation shall be performed during the period between October 1 and April 1.

Stock shall not be installed when ambient temperatures are below 35 degrees F or above 80 degrees, or when wind velocity exceeds 30 miles per hour.

Warrant plant material to remain alive and be in healthy, vigorous condition for a period of one year after the date of Physical Completion.

Rodent Protection Mesh:

Encircle woody trunks of planted trees with thin plastic mesh to protect against cambian damage by rodents. Extend mesh cylinder 3" below and 12" above the finished grade line. Assure that the guage of protective wrap is such that tree growth will split the material if it is not physically removed.

Maintenance:

Maintain planting until acceptance by Owner. Maintenance shall include cultivating, weeding, watering, pruning (only as directed), and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

Reset settled plants to proper grade and position. Restore planting watering ring and adjacent material and remove dead material.

Water trees, shrub, and ground cover beds within the first 24 hours of initial planting, and not less than twice per week (including rain) until Physical Completion.

Physical Completion:

Inspection to determine Physical Completion of planted areas will be made by the Owner, upon the Contractor's request. Provide notification at least 10 working days before requested inspection date.

Planted areas will be accepted provided all requirements, including the maintenance period have been complied with and plant materials are alive and in a healthy vigorous condition.

Upon Physical Completion, the Owner will assume plant maintenance.

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
PETER C. HUMMEL
CERTIFICATE NO. 422

	6/15/10	ISSUED FOR CONSTRUCTION	BMB	PH	6/22/10
	DATE	DESCRIPTION	BY	CKD.	APP.

CONTOUR INTERVAL: 2 FOOT

PREPARED BY
FARALLON CONSULTING
ANCHOR QEA

PREPARED FOR
EARLE M. JORGENSEN COMPANY
10650 ALAMEDA STREET
LYNWOOD, CALIFORNIA 90262

SLAG DISPOSAL BECKWITH PROPERTY SITE
KENT, WASHINGTON

PLANTING SPECIFICATIONS

SCALE AS SHOWN
PROJECT NO. 831-022
FILE NAME: 100224-PL-002.dwg
SHEET NO. W3 OF 3

APPENDIX B
MONITORING SITE PHOTOGRAPHS

Photograph 1. Photo Point 1: Wetland I Buffer Facing North from West Side of Buffer

Photograph 2. Photo Point 2: Wetland I Buffer Facing South from West Side of Buffer

Photograph 3. Photo Point 3: Wetland I Buffer Facing South from Middle of Buffer

Photograph 4. Photo Point 4: Wetland M Buffer Facing North from East Side of Buffer

Photograph 5. Existing Conditions within the Supplemental Planting Area Cluster 1 (North), Facing North

Photograph 6. Existing Conditions within the Supplemental Planting Area Cluster 2 (Middle), Facing North

Photograph 7. Existing Conditions within the Supplemental Planting Area Cluster 2 (South), Facing South

APPENDIX C
2014 SUPPLEMENTAL PLANTING TECHNICAL MEMORANDUM

FARALLON CONSULTING, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Phone
(425) 295-0800

Fax
(425) 295-0850

T E C H N I C A L M E M O R A N D U M

TO: E. Gilbert Leon, Earle M. Jorgensen Company

cc: David South, Washington State Department of Ecology
Calvin Kelly Douglas, Anchor QEA

FROM: Andrew Vining, Project Engineer
Amy Essig Desai, Principal

DATE: May 16, 2014

RE: **SUPPLEMENTAL LANDSCAPING—WETLAND I BUFFER AREA**
SLAG DISPOSAL BECKWITH PROPERTY SITE
SOUTH 218th STREET AND 90th AVENUE SOUTH
KENT, WASHINGTON
FARALLON PN: 831-022

Farallon Consulting, L.L.C. (Farallon) has prepared this technical memorandum to document the supplemental landscaping performed on March 24 and 25, 2014 to meet the Year 3 performance goals as summarized in the *Wetland Buffer Enhancement/Restoration Year 2 Monitoring Report* dated November 2013, prepared by Anchor QEA (Anchor) for the Slag Disposal Beckwith Property Site at South 218th Street and 90th Avenue South in Kent, Washington (herein referred to as the Site) (Sheet W1 of Attachment A). The technical memorandum documents the supplemental landscaping effort and provides as-built information that will assist in the

preparation of the Year 3 Monitoring Report to be completed following Year 3 monitoring, expected to be completed in the fall of 2014.

Wetland buffer area improvements were completed at the Site in February 2011 in accordance with the *Wetland Buffer Enhancement/Restoration Plan* dated June 2010, prepared by Anchor (Restoration Plan). The goal of the wetland buffer enhancement/restoration is to address the overall wetland buffer function. Annual wetland buffer restoration area performance monitoring was conducted in April 2011 (Year 0 monitoring), in August 2012 (Year 1 monitoring), and in August 2013 (Year 2 monitoring). Following completion of Year 2 monitoring and to meet the performance goals, planting of additional shrubs, removal of non-native invasive plant species, and installation of deer browsing protection (i.e., netting or temporary fencing) were recommended by Anchor.

Presented below is a summary of the scope of work, a detailed description of the work completed, and a general schedule of remaining Site work.

SCOPE OF WORK

The scope of work for the supplemental landscaping included planting 79 shrubs with associated plant guards and removing non-native invasive species. This work was outlined in the *Wetland Buffer Enhancement/Restoration Year 2 Monitoring Report*, and was described in the letter regarding Scope of Work and Cost Estimate for Supplemental Landscaping, Slag Disposal, Beckwith Property Site, South 218th Street and 90th Avenue South dated January 28, 2014, prepared by Farallon. Double Eagle Landscaping of Woodinville, Washington (Double Eagle) installed the new shrubs and plant guards, and removed non-native invasive species, and a Farallon Scientist provided field observation for the landscaping improvements.

SUPPLEMENTAL LANDSCAPING WORK COMPLETED

Double Eagle removed non-native invasive species from the Wetland I Buffer Area, as defined in the Restoration Plan, on March 24, 2014. Species removed included Himalayan Blackberry, Scot's Broom, Butterfly Bush, Canada Thistle, Prickly Lettuce, and Reed Canary Grass. Farallon observed two large dead leaf maples and one dead alder, which were removed from the

Wetland I Buffer Area as shown on Sheet W2 of Attachment A (Sheet W2). Photograph 1 shows invasive species removed from the Wetland I Buffer Area.

Double Eagle planted 79 shrubs on March 25, 2014 in accordance with the Restoration Plan. The shrubs planted included 32 Indian Plum, 11 Nootka rose, 31 Salmonberry, and 5 Snowberry shrubs, which were installed to replace shrubs installed in February 2011 that did not survive. To protect the shrubs from deer browsing, chicken wire fencing was installed around all of the newly installed shrubs. The shrubs were planted in three separate clusters, all located within the Wetland I Buffer Area (Sheet W2). Photograph 2 shows the new shrubs prior to planting. Two of the shrub clusters were located at the southern end of the Wetland I Buffer Area, and the third, larger, cluster was located at the northern end of the Wetland I Buffer Area, as shown in Photograph 3 and on Sheet W2. Six-foot-high chicken wire fencing was installed around each of the three clusters for protection from deer browsing, as shown in Photographs 4 and 5.

REMAINING WORK TO BE PERFORMED AND SCHEDULE

Year 3 monitoring will be performed by Anchor during late summer of 2014. If the performance measures and success standards outlined in the Restoration Plan are met following Year 3 monitoring, the wetland buffer functions have been achieved, and no further monitoring events will be required. The plant guards will be removed by Farallon after approximately 2 years or in March 2016 to allow unrestricted plant growth as recommended by Anchor.

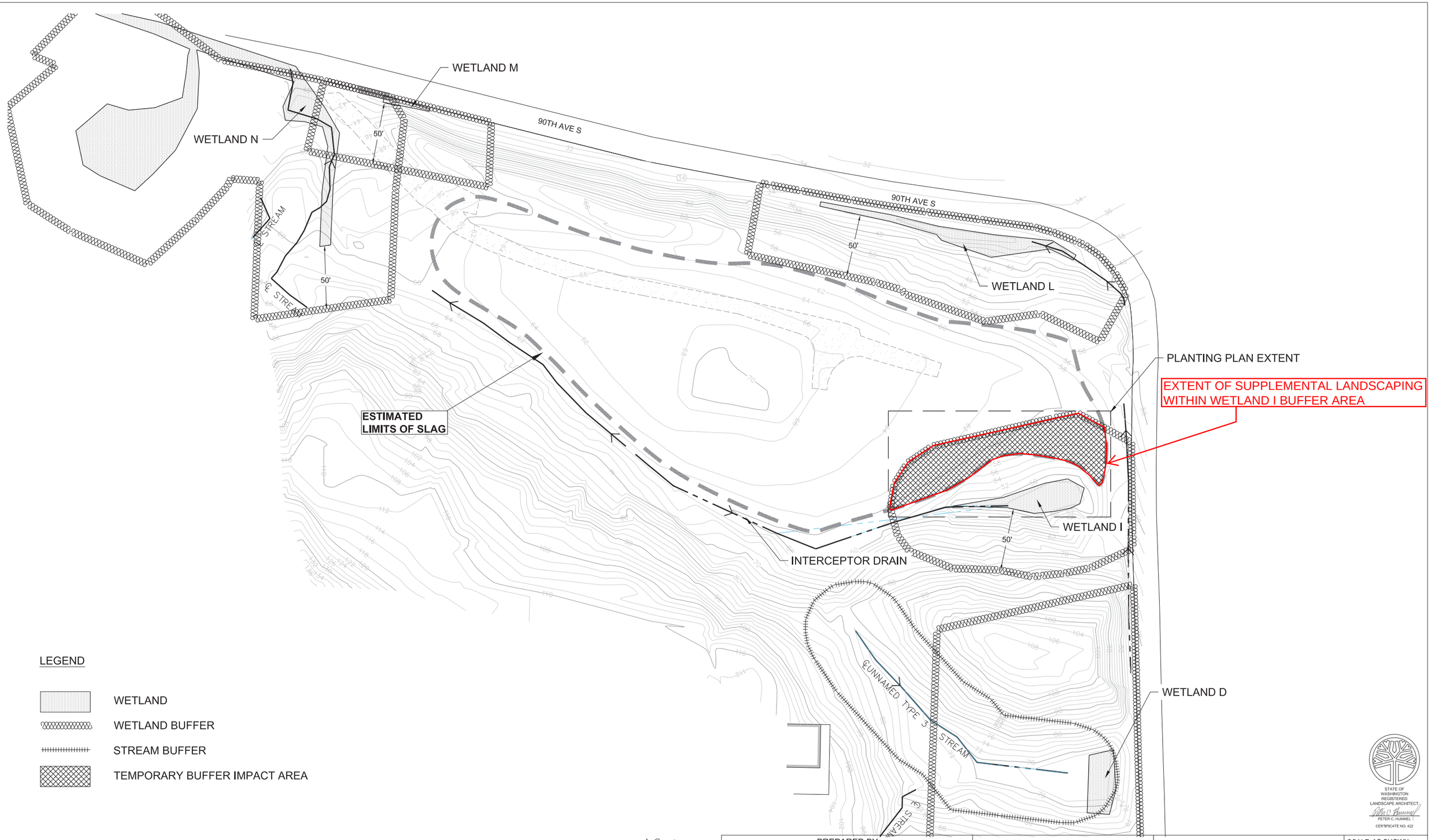
Attachments: Attachment A: Supplemental Landscaping As-Built
Attachment B: Site Photographs

AV/AED:bjj

ATTACHMENT A
SUPPLEMENTAL LANDSCAPING AS-BUILT

SUPPLEMENTAL LANDSCAPING—WETLAND I BUFFER AREA
Slag Disposal Beckwith Property Site
South 218th Street and 90th Avenue South
Kent, Washington

Farallon PN: 831-022



LEGEND

- WETLAND
- WETLAND BUFFER
- STREAM BUFFER
- TEMPORARY BUFFER IMPACT AREA

	6/15/10	ISSUED FOR CONSTRUCTION	BMB	PH	6/22/10
	DATE	DESCRIPTION	BY	CKD.	APP.

0 70
Scale in feet
CONTOUR INTERVAL: 2 FOOT

PREPARED BY
FARALLON CONSULTING
ANCHOR QEA

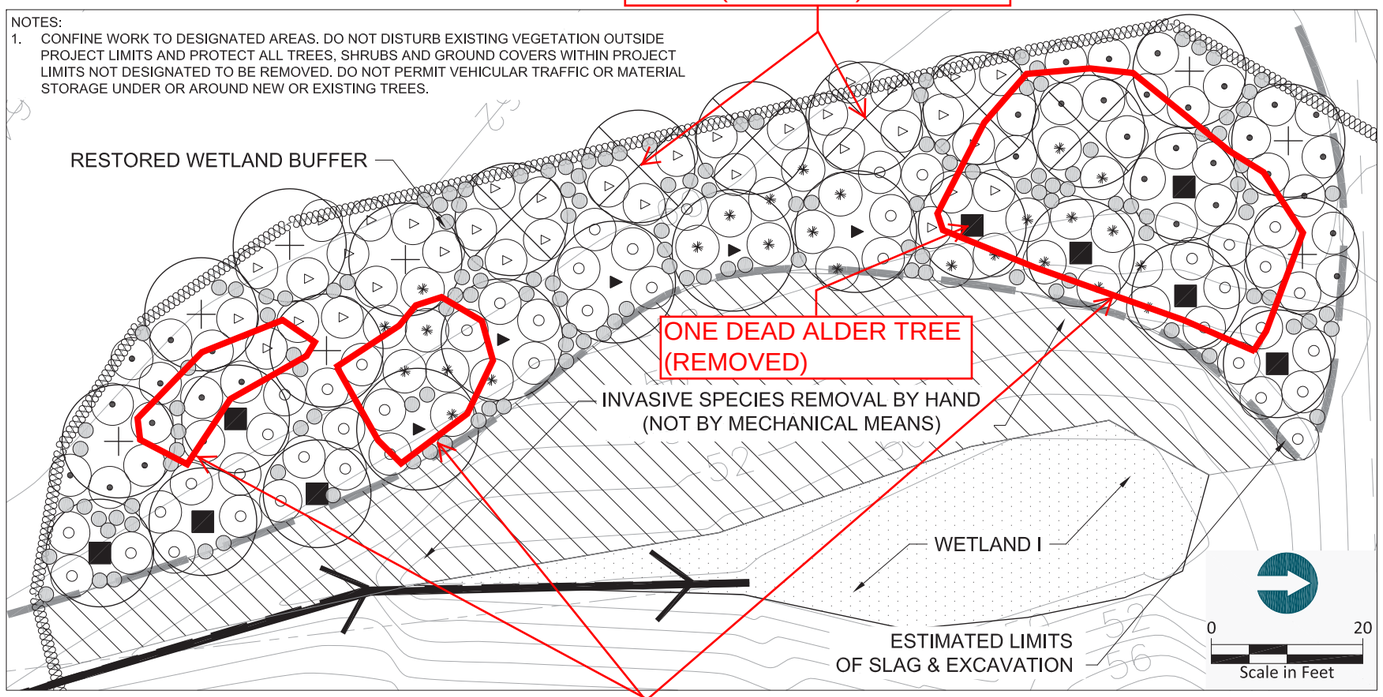
PREPARED FOR
EARLE M. JORGENSEN COMPANY
10650 ALAMEDA STREET
LYNWOOD, CALIFORNIA 90262

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
PETER C. HUMMEL
CERTIFICATE NO. 422

SLAG DISPOSAL BECKWITH PROPERTY SITE
KENT, WASHINGTON

WETLAND BUFFER PLAN
SUPPLEMENTAL LANDSCAPING AS-BUILT

SCALE AS SHOWN
PROJECT NO. 831-022
FILE NAME: 100224-PL-001.dwg
SHEET NO. W1 OF 3



PLANTING PLAN

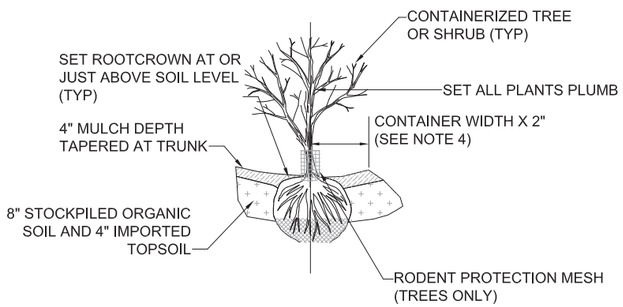
PLANTING SEQUENCE / NOTES:

1. STRIP ORGANIC SOIL AND STOCKPILE SEPARATELY FROM SLAG AND OVERBURDEN.
2. RIP, DISC, OR SCARIFY SUBGRADE SOILS TO A MINIMUM DEPTH OF 12 INCHES. DO NOT SCARIFY WITHIN DRIP LINE OF EXISTING TREES TO BE RETAINED.
3. PLACE 8" OF STOCKPILED SOILS AND 4" OF IMPORTED TOPSOIL WTIHIN WETLAND BUFFER PLANTING AREA.
4. DIG PLANTING PIT THAT IS AT LEAST TWICE THE DIAMETER OF CONTAINER. REMOVE ALL ROCKS, ROOTS, STICKS AND OTHER DEBRIS LARGER THAN 1" DIAMETER. SCARIFY THE PLANTING PIT BOTTOM AND SIDES TO A DEPTH OF 4 INCHES.
5. SET PLANT MATERIAL IN THE PLANTING PIT TO PROPER GRADE AND ALIGNMENT. SET PLANTS UPRIGHT, PLUMB, AND FACED TO GIVE THE BEST APPEARANCE OR RELATIONSHIP TO EACH OTHER. SET CROWN OF PLANT MATERIAL AT THE FINISH GRADE. NO FILLING WILL BE PERMITTED AROUND TRUNKS OR STEMS. BACKFILL THE PLANTING PIT WITH SOIL, DO NOT USE MUDDY MIXTURES FOR BACKFILLING.
6. SPACE PLANTS USING TRIANGULAR SPACING IN ACCORDANCE WITH PLANT SCHEDULE DIMENSIONS. PLANT GROUND COVERS TO WITHIN 18" OF THE TRUNKS OF TREES AND SHRUBS WITHIN PLANTING AREA AND TO WITHIN 12" OF THE EDGE OF PLANTING AREA. PLANT SHRUBS WITHIN 5' OF THE TRUNKS OF TREES WITHIN PLANTING AREA AND TO WITHIN 3' OF THE EDGE OF PLANTING AREA.
7. SHAPE SOIL TO PROVIDE WATERING RING WITH A DIAMETER EQUAL TO 2X THE CONTAINER WIDTH.
8. MULCH PLANTING BEDS IMMEDIATELY AFTER PLANTING. THOROUGHLY WATER MULCHED AREA. AFTER WATERING, RAKE MULCH TO PROVIDE A UNIFORM FINISHED SURFACE.

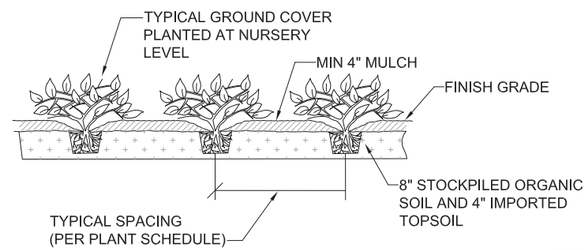
PLANTING SCHEDULE / LEGEND

Common Name	Scientific Name	Size	Spacing	Quantity
TREES				
Red Alder	*Alnus rubra*	5 gal.	15' O.C.	9
Big leaf Maple	*Acer macrophyllum*	5 gal.	15' O.C.	6
Douglas Fir	*Pseudotsuga menziesii*	5 gal.	15' O.C.	8
Western Red Cedar	*Thuja plicata*	5 gal.	15' O.C.	5
SHRUBS				
Indian Plum	*Oemleria cerasiformis*	1 gal.	6' O.C.	36
Salmonberry	*Rubus spectabilis*	1 gal.	6' O.C.	45
Nootka Rose	*Rosa nutkana*	1 gal.	6' O.C.	28
Snowberry	*Symphoricarpos albus*	1 gal.	6' O.C.	35
GROUNDCOVER				
Western Sword Fern	*Polystichum munitum*	1 gal.	As Shown	147

EXISTING WETLAND PREVIOUSLY RESTORED WITH NATIVE PLANTS



1 - TYPICAL TREE AND SHRUB PLANTING DETAIL
SCALE:NTS



2 - GROUNDCOVER PLANTING
SCALE:NTS

STATE OF WASHINGTON
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SLAG DISPOSAL BECKWITH PROPERTY SITE
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PLANTING PLAN
SUPPLEMENTAL LANDSCAPING AS-BUILT

SCALE AS SHOWN
PROJECT NO. 831-022
FILE NAME: 100224-PL-002.dwg
SHEET NO. W2 OF 3

ATTACHMENT B
SITE PHOTOGRAPHS

SUPPLEMENTAL LANDSCAPING—WETLAND I BUFFER AREA
Slag Disposal Beckwith Property Site
South 218th Street and 90th Avenue South
Kent, Washington

Farallon PN: 831-022

SITE PHOTOGRAPHS

Supplemental Planting – Wetland I Buffer Area
Slag Disposal Beckwith Property Site
Kent, Washington
Farallon PN: 831-022

Photograph 1: Invasive species removal in Wetland I Buffer Area, looking southeast.

Photograph 2: Inventory of shrubs prior to planting.

Photograph 3: Planting in north end of Wetland I Buffer Area, looking southwest.

Photograph 4: Wetland I Buffer Area following completion of species removal, shrub planting, and installation of plant guards, looking east.

Photograph 5: Wetland I Buffer Area following completion of invasive species removal, shrub planting, and installation of plant guards, looking southeast.

Photograph 1: Invasive species removal in Wetland I Buffer Area, looking southeast.

Photograph 2: Inventory of shrubs prior to planting.

Photograph 3: Planting in north end of Wetland I Buffer Area, looking southwest.

Photograph 4: Wetland I Buffer Area following completion of species removal, shrub planting, and installation of plant guards, looking east.

SITE PHOTOGRAPHS (continued)
Supplemental Planting – Wetland I Buffer Area
Slag Disposal Beckwith Property Site
Kent, Washington

Photograph 5: Wetland I Buffer Area following completion of invasive species removal, shrub planting, and installation of plant guards, looking southeast.