Final

Critical Areas Study and Mitigation Plan
Fennel Creek Trail

Prepared for

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June 2010 | 214-1611-027 (02/21)

CITATION

Parametrix. 2010. Final Critical Areas Study and Mitigation Plan Fennel Creek Trail. Prepared by Parametrix, Bellevue, Washington. June 2010.

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ACRONYMS AND ABBREVIATIONS

BLMC	Bonney Lake Municipal Code
BMP	best management practice
CAS	Critical Areas Study
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DNR	Department of Natural Resources
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FAC	Facultative
FACW	Facultative Wetland
HPA	Hydraulic Project Approval
HGM	hydrogeomorphic classification
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate
PHS	Priority Habitats and Species
SF	square feet
TNW	Traditionally Navigable Water
USFWS	U.S. Fish and Wildlife Service
USDA	U.S. Department of Agriculture
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

1.1 PROJECT OVERVIEW

The City of Bonney Lake is proposing to construct approximately 1 mile of multi-use trail along the west side of Fennel Creek as well as a bridge to cross the creek. The proposed trail to the west of Fennel Creek would be 10 feet wide with a surface of porous asphalt over a crushed rock base. The trail would be along a small berm between the residential areas and Fennel Creek. To the east of Fennel Creek the proposed trail would be a raised boardwalk on pin piles. When complete, the trail would provide a safe route to the Victor Falls Elementary and Mountain View Middle Schools away from vehicular traffic. This section of proposed trail would connect to an existing section of trail along Fennel Creek. The trail will utilize stairs and switchbacks to traverse the hill.

The trail has been located to avoid wetlands where possible and the bridge has been cited to cross the creek where it will have the least impact on the creek and its riparian environment.

1.2 PURPOSE OF THE REPORT

Parametrix has undertaken this Critical Areas Study (CAS) and Mitigation Plan to describe wetlands and streams in the project area; evaluate potential impacts to critical areas from the proposed project; and present mitigation for these impacts. The information in this report is intended to facilitate project planning and support acquisition of a Clean Water Act (CWA) Section 404 permit from the U.S. Army Corps of Engineers (Corps) and a CWA Section 401 Water Quality Certification from the Washington State Department of Ecology (Ecology). Permits would also be required by the City of Bonney Lake.

This study is part of the Fennel Creek Trail and 192nd Avenue Sidewalks project. This report only addresses critical areas in the Fennel Creek Trail study area as there are no crucial areas associated with the 192nd Avenue sidewalks. Also, this report does not address other critical areas regulated by the City of Bonney Lake, such as geologically hazardous areas, critical aquifer recharge areas, and flood hazard areas.

1.3 PROJECT AREA

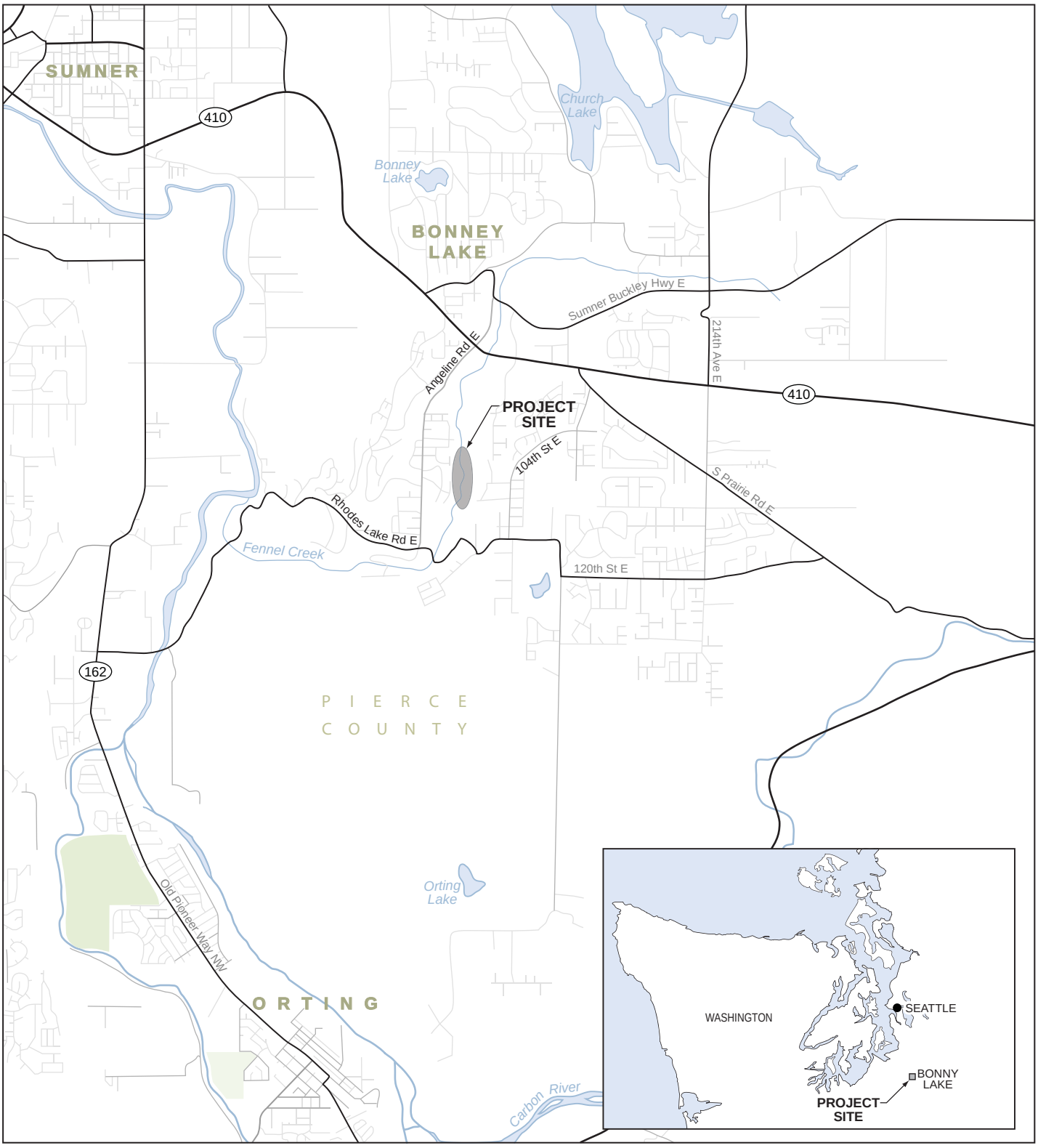
The study area for the CAS investigation is the trail corridor, in the vicinity Fennel Creek within 200 feet of the project alignment, and the potential mitigation area east of Fennel Creek (Figure 1-1).

1.4 APPLICABLE LAWS AND REGULATIONS

Wetlands in the City of Bonney Lake are regulated under City of Bonney Lake Municipal Code (BLMC) Chapter 16.20. A portion of the trail is located within Pierce County. Wetlands in Pierce County are regulated under Title 18E.30 of the Pierce County Code (PCC).

Wetlands, streams, and other sensitive resources in the project vicinity are also subject to federal and state regulations. At the federal level, wetlands and streams are regulated by CWA Section 404, which regulates placement of fill in waters of the United States. The Corps is responsible for issuing permits under Section 404 of the CWA. Activities that affect wetlands and streams may also require a water quality certification (Section 401 of the CWA), which is administered at the federal level by the U.S. Environmental Protection Agency (EPA) and implemented at the state level by Ecology. Ecology reviews projects for

compliance with state water quality standards and makes permitting and mitigation decisions based on the nature and extent of impacts, as well as the type and quality of wetlands or streams being affected. Activities that use, divert, obstruct, or change the flow of a water of the state, including some wetlands, typically require a Hydraulic Project Approval (HPA) permit. Washington Department of Fish and Wildlife (WDFW) is responsible for implementing HPAs under the State Hydraulic Code.



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N

0 1

Scale in Miles

Figure 1-1
Vicinity Map

2. METHODS

This study is based on a review of existing information and field investigations. The goal of these efforts is to document existing information to reflect current site conditions and to collect new information to assess impacts.

2.1 REVIEW OF EXISTING INFORMATION

Prior to conducting fieldwork, Parametrix reviewed maps and materials including, but not limited to:

- *Soil Survey of Pierce County Area* (Zulauf 1979).
- National Wetlands Inventory (NWI), online interactive mapper (U.S. Fish and Wildlife Service [USFWS] 2009).
- Washington State Department of Fish and Wildlife (WDFW). 2009. Habitats and Species Report (February 2009).
- Washington State Department of Natural Resources (DNR). Natural Heritage Program CAD Layer.
- *A Catalog of Washington Streams and Salmon Utilization*. Volume 1, Puget Sound Region (Williams et al. 1975).

2.2 FIELD INVESTIGATION

Field investigations of the Fennel Creek Trail study area occurred during two site visits in March of 2009. The potential mitigation area was investigated during two additional site visits in December 2009.

2.2.1 Wetland Identification and Delineation

The methods specified in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (April 2008) were used by Parametrix biologists to delineate on-site wetlands. These methods comply with those in the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997).

2.2.1.1 Vegetation

The dominant plants and their wetland indicator status were evaluated to determine if the vegetation was hydrophytic. Hydrophytic vegetation is generally defined as vegetation adapted to prolonged saturated soil conditions. To meet the hydrophytic vegetation criterion, more than 50 percent of the dominant plants must be Facultative (FAC), Facultative Wetland (FACW), or Obligate (OBL), based on the plant indicator status category assigned to each plant species by USFWS (Reed 1988, 1993). Table 2-1 lists the definitions of the indicator status categories.

Table 2-1. Key to Plant Indicator Status Categories

Plant Indicator Status Category	Symbol	Definition
Obligate Wetland Plants	OBL	Plants that almost always (> 99% of the time) occur in wetlands, but which may rarely (< 1% of the time) occur in non-wetlands.
Facultative Wetland Plants	FACW	Plants that often (67% to 99% of the time) occur in wetlands, but sometimes (1% to 33% of the time) occur in non-wetlands.
Facultative Plants	FAC	Plants with a similar likelihood (33% to 66% of the time) of occurring in both wetlands and non-wetlands.
Facultative Upland Plants	FACU	Plants that sometimes (1% to 33% of the time) occur in wetlands, but occur more often (67% to 99% of the time) in non-wetlands.
Upland Plants	UPL	Plants that rarely (< 1% of the time) occur in wetlands, and almost always (> 99% of the time) occur in non-wetlands.

Source: Environmental Laboratory (1987).

Scientific and common plant names follow currently accepted nomenclature. Most names are consistent with *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973) and the PLANTS Database (U.S. Department of Agriculture [USDA], Natural Resources Conservation Service [NRCS] 2009a). During the field investigations by Parametrix biologists, dominant plant species were observed and recorded on data forms for each sample plot (Appendix A).

2.2.1.2 Soils

Generally, an area must have hydric soils to be a wetland. Hydric soil forms when soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Biological activities in saturated soil result in reduced oxygen concentrations that result in a preponderance of organisms using anaerobic processes for metabolism. Over time, anaerobic biological processes result in certain soil color patterns, which are used as indicators of hydric soil. Typically, low-chroma colors are formed in the soil matrix. Bright-colored redoximorphic features form within the matrix under a fluctuating water table. Other important hydric soil indicators include organic matter accumulations in the surface horizon, reduced sulfur odors, and organic matter staining in the subsurface. Soils were examined by excavating sample plots to a depth of 18 inches or more to observe soil profiles, colors, and textures. Munsell color charts (GretagMacbeth 2000) were used to describe soil colors.

2.2.1.3 Hydrology

The project area was examined for evidence of hydrology. An area is considered to have wetland hydrology when soils are ponded or saturated consecutively for greater than 12.5 percent of the growing season. Areas that are wet between 5 percent and 12.5 percent of the growing season in most years may or may not be wetlands. In Pierce County (Puyallup station), the growing season generally lasts from early March (March 6) to late November (November 23) (NRCS 2002), so ponding or saturation must be present for approximately 33 consecutive days. Primary indicators of hydrology include surface inundation and

saturated soils. Secondary indicators of hydrology include drainage patterns, watermarks on vegetation, water-stained leaves, and oxidized root channels.

2.2.2 Wetland Classification and Rating

Delineated wetlands were classified according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). Wetlands were rated according to BLMC 16.22.020 and PCC 18E.30.020; the City of Bonney Lake and Pierce County have adopted the *Washington State Wetland Rating System for Western Washington – Revised* (Hruby 2004) (Appendix B). Table 2-2 summarizes the state rating criteria for each wetland category. Buffer widths assigned to wetlands in the project area reflect requirements of BLMC 16.22.040 B.

Table 2-2. Criteria for Wetland Rating Categories as Specified by Ecology and the City of Bonney Lake

Category	Ecology [a]
Category I	Wetlands of exceptional value in terms of protecting water quality, storing flood water and stormwater, and/or providing habitat for wildlife as indicated by a rating system score of 70 points or more. These are wetland communities of infrequent occurrence that often provide documented habitat for sensitive, threatened, or endangered species and/or have other attributes that are very difficult or impossible to replace if altered.
Category II	Wetlands that have very important resources as indicated by a rating system score of between 51 and 69 points. These wetlands occur more commonly than Category I wetlands but still require a high level of protection.
Category III	Wetlands that have important resource value as indicated by a rating system score of between 30 and 50 points. They occur commonly in Pierce County.
Category IV	Wetlands that are of limited resource value as indicated by a rating system score of less than 30 points. They typically have vegetation of similar age and class, lack special habitat features, and/or are isolated or disconnected from other aquatic systems or high quality upland habitats.

[a] Hruby et al. (2004)

2.2.3 Wetland Functional Assessment

Functions of individual wetlands were assessed using the Washington State Department of Transportation (WSDOT) *Best Professional Judgment Functional Assessment Form* (Null et al. 2000) (Appendix C). This method allows evaluation of wetland function, using best professional judgment and readily observed environmental characteristics. For example, an area of open water may provide habitat for waterfowl or aquatic animals. The upland habitats and buffers surrounding wetlands were also considered in the evaluation because adjacent land uses affect the performance of wetland functions. Parametrix reviewed the indicator characteristics present for each wetland and assigned a summary rating of low, low-moderate, moderate, moderate-high, or high for each wetland function.

Functions that were considered most relevant to this project are grouped into three categories: habitat, water quality, and hydrological support. Habitat functions include providing fish, avian species, and other wildlife access to food, cover, and breeding and rearing opportunities. Hydrological functions assessed include groundwater recharge/discharge, base

flow support, and flood flow alteration (storage and desynchronization). Water quality functions include protection and enhancement through sedimentation, erosion protection, and nutrient retention/nutrient transformation.

2.2.4 Bonney Lake Wildlife Habitat Areas

The City of Bonney Lake defines wildlife habitat areas as:

1. Areas having a primary association with fish and wildlife species identified by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service as being in danger of extinction or threatened to become endangered;
2. Areas having a primary association with fish and wildlife species identified by the Washington Department of Fish and Wildlife as being in danger of extinction, threatened to become endangered, vulnerable, or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. See WAC 232-12-014 (state endangered species) and WAC 232-12-011 (state threatened and sensitive species);
3. State priority habitats as identified by the State Department of Fish and Wildlife;
4. Habitats and species of local importance as identified by the city in accordance with BLMC 16.30.020;
5. Waters of the state, including lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington, as classified in WAC 222-16-031;
6. Ponds under 20 acres that provide fish or wildlife habitat except artificial ponds created for a nonwildlife purpose such as stormwater detention facilities, wastewater treatment facilities, farm ponds, and temporary construction ponds;
7. Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity;
8. Natural area preserves and natural resource conservation areas as defined by the Washington State Department of Natural Resources;
9. Areas of rare plant species and high quality ecosystems as identified by the Washington State Department of Natural Resources through the Natural Heritage Program (see Chapter 79.70 RCW); and
10. Land useful or essential for preserving connections between habitat blocks and open spaces (Ord. 1070 § 2, 2004).

2.2.4.1 Stream Identification

Streams in the City of Bonney Lake are regulated under BLMC 16.30.010. Streams are defined as areas where naturally occurring surface waters flow sufficiently to produce a defined channel or bed that demonstrates clear evidence of the passage of water, including but not limited to bedrock channels, gravel beds, sand and silt beds, and defined channel swales. Ordinary high water marks upstream and downstream of the proposed bridge crossing were identified, flagged, and instrument-surveyed by Parametrix.

Parametrix identified primary association areas for critical species using data from the Priority Habitats and Species (PHS) database, species lists provided by USFWS, and Natural Heritage information provided by DNR. Species likely to inhabit the project area were also

identified during the field investigations based on actual sightings; recognition of vocalizations; and presence of tracks, scat, burrows, nesting structures, and other signs.

2.2.5 Pierce County Fish and Wildlife Species and Habitat Conservation Areas

According to Pierce County, wildlife habitat conservation areas are those areas that support regulated fish and wildlife species, typically identified either by known point locations of specific species (such as a nest or den) or by habitat areas or both. (PCC 18E.40.020)

2.2.5.1 Stream Identification

Pierce County defines streams or "Natural Waters" as any area that "includes areas where surface water has produced a channel or bed and includes: bedrock, gravel beds, and sand or silt beds. Natural waters may also include swales which lack a channel or bed if such areas are connected to a fish and wildlife habitat conservation area. A channel need not contain water year-round to be considered natural water. Natural water includes man-made drainage channels that result from the modification to a natural watercourse or wetland and excludes only artificial channels." (PCC 18.25.030)

2.3 IMPACT ASSESSMENT

Impacts to wetlands, streams, and buffers were assessed by overlaying the proposed design onto project base maps showing wetland, stream, and buffer locations. Impact areas were determined as the area of intersection between the proposed design and the base maps. This assessment also considered loss of wetland and stream function (based on the amount of clearing, filling, and/or excavation as a result of the project) and other direct and indirect impacts to wetlands and wildlife habitat areas. Areas where wetland and stream buffers overlap and would be impacted by the proposed project were calculated as wetland impacts.

3. RESULTS

The following sections describe critical areas in the study area. This includes an overview of general site characteristics and descriptions of individual wetlands, wildlife habitat areas, and Fennel Creek.

3.1 SUMMARY OF EXISTING INFORMATION

The NWI identifies one wetland complex with three components in the study area: a palustrine emergent component with a temporarily flooded hydrologic regime, a palustrine emergent component with a seasonally flooded hydrologic regime, and a palustrine forested component with a seasonally flooded hydrologic regime (Figure 3-1).

WDFW PHS data do not identify priority species within the study area (WDFW 2009). However, the database does identify wetlands associated with Fennel Creek and small concentrations of water fowl within the study area.

The DNR Natural Heritage Program does not identify any rare plants within the study area. However, bog clubmoss (*Lycopodiella inundata*) has been identified south of the project in Section 9, Township 19 North, Range 5 East.

Buckley loam was mapped in the study area (NRCS 2009b) (Figure 3-2). Additional information on soils is provided in Section 3.2.

One creek (Fennel Creek) is located within the project area (Williams et al. 1975).

3.2 SITE CHARACTERISTICS

Characteristics of the study area, including soils, vegetation, topography, and watersheds, are described below. Photographs of wetlands are included in Appendix D.

3.2.1 Watershed

The Fennel Creek Trail Project is located within vicinity of Fennel Creek. Fennel Creek is in the Puyallup River Watershed, within the Puyallup/White Water Resource Inventory Area (WRIA) 10.

The primary land use in the areas surrounding the project is residential. Many of the properties within the study area have residential structures and outbuildings, associated driveways, lawns, and ornamental plantings.

3.2.2 Soils

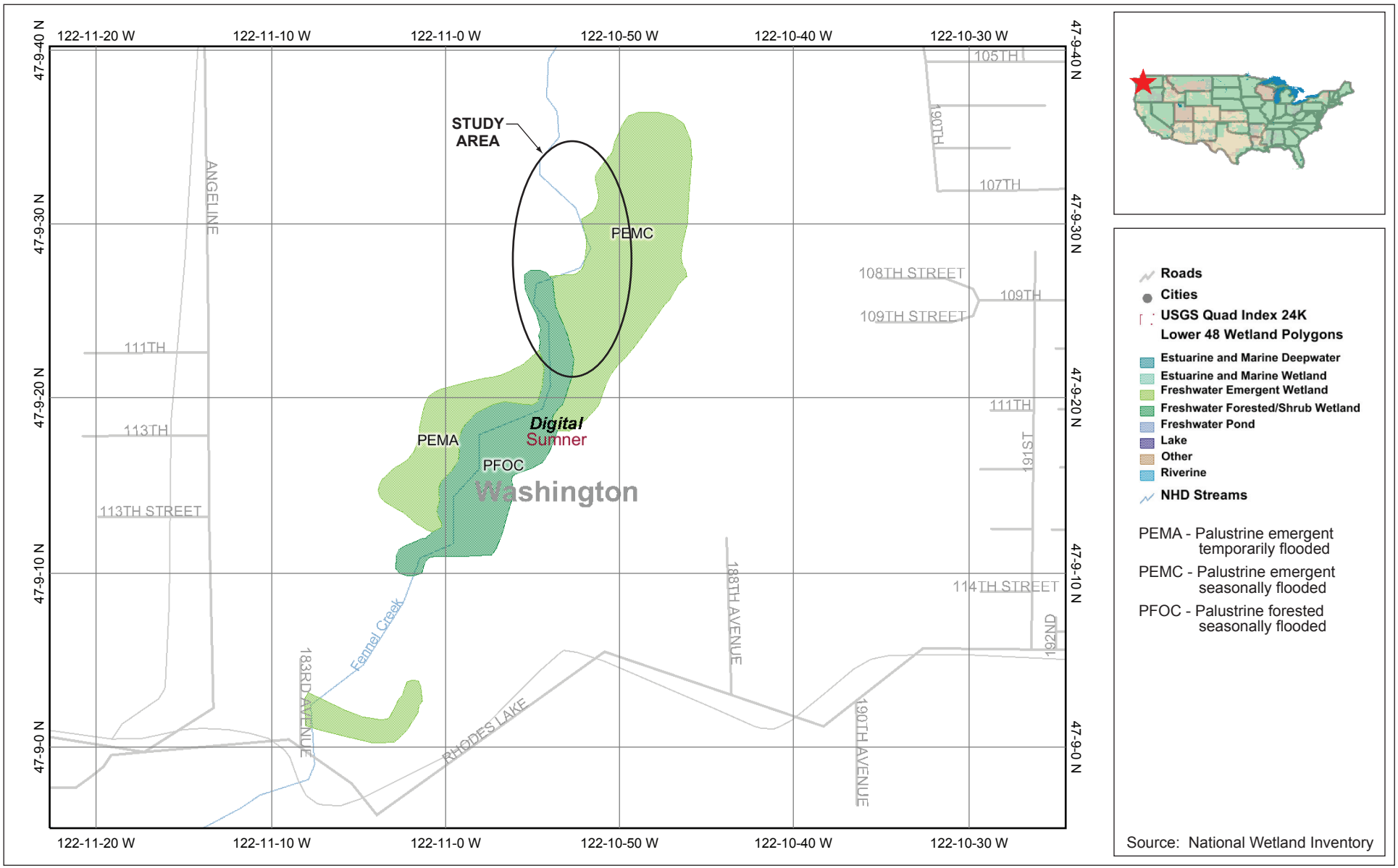
Buckley loam was mapped in the study area (NRCS 2009b) (Figure 3-2). Buckley series soils are poorly drained soils and are listed on the Pierce County hydric soils list. The Buckley series consists of poorly drained soils that formed in the Osceola mudflow (from a prior Mt. Rainier eruption) on the nearly level plain between the Green and White Rivers near Enumclaw and Buckley. This level soil occurs as slightly concave tracts that are irregular in shape at elevations of 500 to 700 feet.

3.2.3 Vegetation

Vegetation in the project area consists of both wetland and upland species. Wetlands in the study area contain emergent and forested habitats. Wetland habitats in the study area are further detailed in Section 3.3.

Upland plant communities in the study area consist of upland forest, shrub, grasses, and grasslands. Vegetation includes red alder (*Alnus rubra*), tall fescue (*Schedonorus phoenix)*, scouring rush (*Equisetum hyemale*), stinging nettle (*Urtica dioica*), Pacific ninebark (*Physocarpus capitatus*), salmonberry (*Rubus spectabilis*), stickywilly (*Galium aparine*), colonial bentgrass (*Agrostis capillaris*), orchard grass (*Dactylis glomerata*), reed canarygrass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus armeniacus*), cutleaf blackberry (*Rubus laciniatus*), fringed willowherb (*Epilobium ciliatum*), dock (*Rumex* sp.), Canada thistle (C*irsium arvense*), beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circinatum*), black cottonwood (*Populus balsamifera*), western redcedar (*Thuja plicata*), western sword fern (*Polystichum munitum*), bigleaf maple (*Acer macrophyllum*), red-osier dogwood (C*ornus sericea*), and western hemlock (*Tsuga heterophylla*).

Vegetation communities in the wetland include palustrine forested and palustrine emergent. Vegetation includes bentgrass, common rush (*Juncus effusus*), quackgrass (*Elymus repens*), American speedwell (*Veronica americana*), creeping buttercup (*Ranunculus repens*), fringed willowherb, reed canarygrass, stinging nettle, Oregon ash (*Fraxinus latifolia*), black cottonwood, red-osier dogwood, small-fruited bulrush (*Scirpus microcarpus*), field horsetail (*Equisetum arvense*), bluegrass (*Poa* sp.), colonial bentgrass, red fescue (*Festuca rubra*), Himalayan blackberry, western redcedar, common ladyfern (*Athyrium filix-femina*), salmonberry, fringed willowherb, large-leaf avens (*Geum macrophyllum*), and American skunk cabbage (*Lysichiton americana*).



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N

Figure 3-1
Project National Wetland Inventory Map

Source: USDA Natural Resources Conservation Service

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N

0 400

Scale in Feet

Legend

Map Unit Symbol	Map Unit Name
8A	Buckley loam
18E	Indianola loamy sand
47F	Xerochrepts

Figure 3-2
Project Soil Map

3.3 WETLAND DESCRIPTIONS, CLASSIFICATIONS, AND FUNCTIONS

Parametrix identified and delineated four wetlands in the study area (Wetlands 1–4) (Figure 3-3). Wetlands 1 through 3 are located completely within the study area. Wetland 4 extends beyond the study area to the north and south. Classifications of all wetlands are provided in Table 3-1, and wetland functions are summarized in Tables 3-2a and 3-2b. General wetland characteristics are discussed below. Also included in this report are specific information for each of the sample plots (Appendix A), wetland rating forms (Appendix B), wetland functional assessment forms (Appendix C), and site photographs (Appendix D).

Table 3-1. Classification, Rating, and Hydrologic Sources for Wetlands in the Study Area

Wetland	Area (SF)	Area (acre)	City of Bonney Lake [a]	Wetland Buffer Width [b] (Feet)	Ecology Rating [c]	Classification [d]	Hydrology
1	677	0.02	III	75	III	PEM	Riverine
2	1,247	0.03	III	75	III	PEM	Riverine
3	16,906	0.39	II	150	II	PFO, PEM	Riverine
4	>313,000	2.38	II	150	II	PFO, PEM	Riverine, slope

[a] Wetland ratings according to BLMC 16.22.020

[b] Wetland buffers according to BLMC 16.22.040B

[c] Hruby (2004).

[d] Cowardin et al. (1979). PEM=palustrine emergent, PFO=palustrine forested emergent.

SF square feet

Table 3-2a. Summary of Wetland Functions for Wetlands in the Study Area

Wetland	Flood Flow Alteration	Sediment Removal	Nutrient and Toxicant Removal	Erosion Control and Shoreline Stabilization	Production of Organic Matter and its Export	General Habitat Suitability	Habitat for Aquatic Invertebrates
1	Moderate	Low	Moderate	Low	Moderate	Moderate	Moderate
2	Moderate	Low	Moderate	Low	Moderate	Moderate	Moderate
3	Moderate	Moderate	High	Moderate	Moderate	Moderate	High
4	Moderate	Moderate	Moderate	High	High	High	High

Table 3-2b. Summary of Wetland Functions for Wetlands in the Study Area

Wetland	Habitat for Amphibians	Habitat for Wetland-Associated Mammals	Habitat for Wetland-Associated Birds	General Fish Habitat	Native Plant Richness	Educational or Scientific Value	Uniqueness and Heritage
1	Moderate	NA	NA	Moderate	Low	NA	NA
2	Moderate	NA	NA	Moderate	Low	NA	NA
3	High	NA	NA	Moderate	Low	NA	NA
4	High	NA	NA	Moderate	High	NA	NA

Note: Functions assessed using WSDOT method (Null et al. 2000); see Appendix B for indicator characteristics present in each wetland.

Approximate
Stream Buffer

200'
Stream Buffer

Ordinary High
Water Line

75'
Wetland Buffer

SPU-2

W2-2

Wetland 2

4MSP-8

4MSP-7

4MSP-6

SPU-2

W1-2

Wetland 1

W1-1

75'
Wetland Buffer

Approximate Location of
Fennel Creek

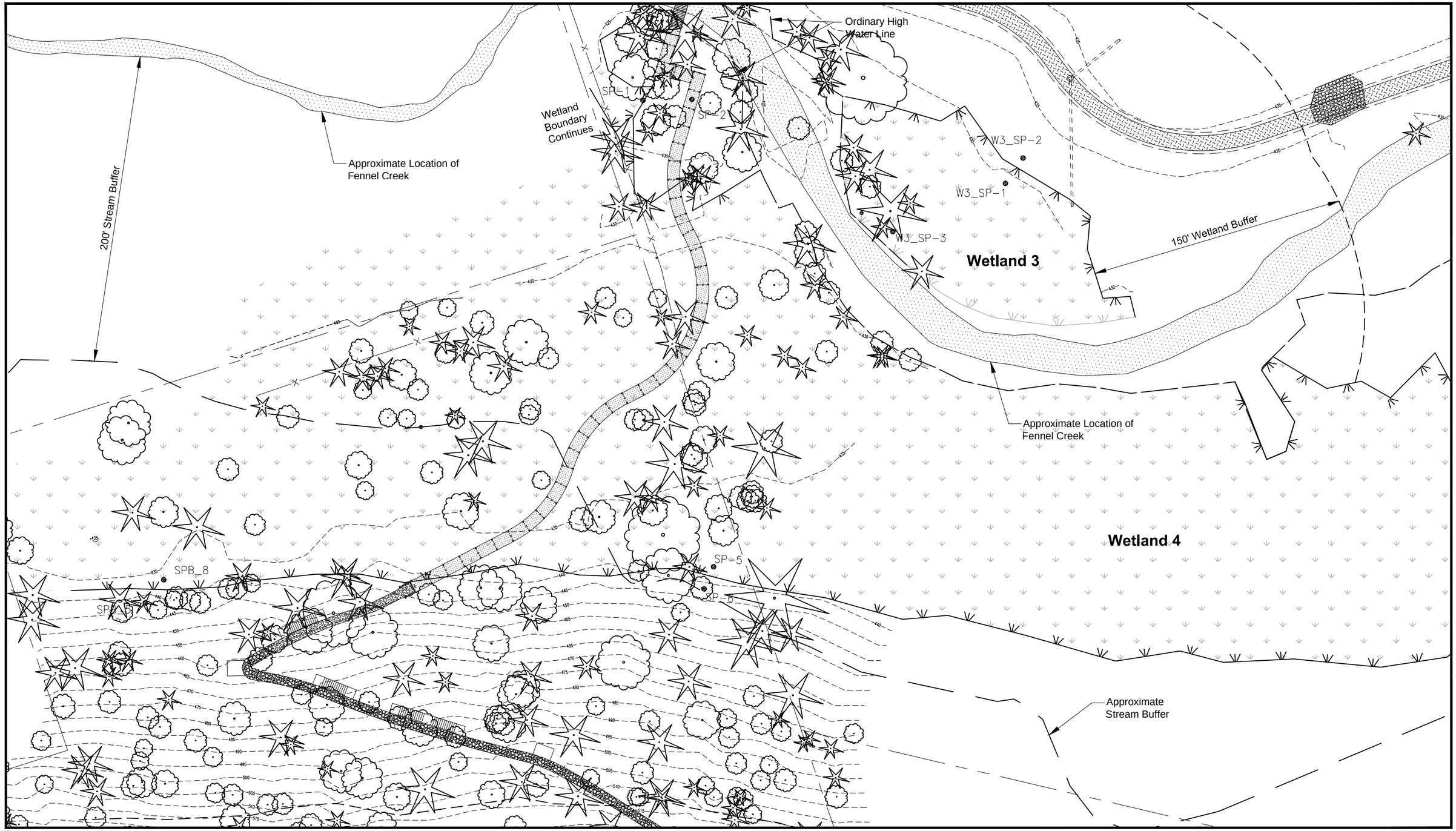
Parametrix DATE: Jun 11, 2010 FILE: 1611027P02T21-F-01

N

0 60'

SCALE IN FEET

Figure 3-3A
Fennel Creek Trail
Project Wetlands and Streams



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0 60'
SCALE IN FEET

Figure 3-3B
Fennel Creek Trail
Project Wetlands and Streams

Wetland 1
Size: 677 SF
City of Bonney Lake: Class III
Ecology Rating: III
USFWS Classification: Palustrine Emergent

Wetland 1 is located along the right bank (west) of Fennel Creek and east of 185th Avenue (Figure 3-3).

Wetland hydrology is supported by overbank flow from Fennel Creek and a shallow groundwater table. Saturation at the surface was observed throughout most of the wetland with small areas inundated with 1 to 2 inches of water. The wetland drains east to Fennel Creek.

Wetland 1 contains an emergent vegetation community. Vegetation includes small-fruited bulrush, common rush, bluegrass, colonial bentgrass, American speedwell, and red fescue.

One sample plot (W1-SP1) was dug in Wetland 1. Soil in SP-1 was examined to a depth of 10 inches and consists of two horizons. The top horizon is a 5-inch layer of very dark brown (10YR 2/2) loamy silt. The lower horizon is a very dark grayish brown (10YR 3/2) sandy gravel. Organic streaking was observed in the second horizon. Soil in the wetland is mapped by the NRCS as Buckley loam.

The buffers surrounding Wetland 1 consist of upland grasses and forbs to the west, forested areas to the north and south, and Fennel Creek and Wetland 4 to the east. Vegetation in the buffer includes red alder, tall fescue, orchard grass, colonial bentgrass, and Himalayan blackberry. The wetland is located in a vegetated corridor that runs north/south within the riparian zone of Fennel Creek. The vegetated buffer provides habitat connectivity to Wetlands 2, 3, and 4.

Wetland 1 is a palustrine emergent wetland under the Cowardin (1979) system and it is a riverine wetland under the HGM system (Brinson et al. 1995). Wetland 1 is rated as a Category III wetland based on its score. The wetland scored 33 points on Ecology's rating form for Western Washington (12 points for water quality, 4 points for hydrologic functions, and 17 points for habitat functions) (Appendix B). The City of Bonney Lake requires a 75-foot buffer from Class III wetlands for moderate intensity uses, which includes trails (BLMC 16.22.040B).

Wetland 2
Size: 1,247 SF
City of Bonney Lake Rating: Class III
Ecology Rating: III
USFWS Classification: Palustrine Emergent

Wetland 2 is located along the right bank (west) of Fennel Creek and east of 185th Avenue (Figure 3-3).

Wetland hydrology is supported by overbank flow from Fennel Creek and a shallow groundwater table. Saturation at the surface was observed throughout most of the wetland with small areas inundated with 2 to 3 inches of water. The wetland drains east to Fennel Creek and a small side channel of Fennel Creek is forming in the wetland.

Wetland 2 contains an emergent vegetation community. The emergent community is dominated by reed canarygrass with patches of Himalayan blackberry, red-osier dogwood, creeping buttercup, and American speedwell.

One sample plot (W2-SP1) was examined in Wetland 2. Soil in Wetland 2 was examined to a depth of 20 inches and consists of three horizons. The upper horizon consists of a 6-inch layer of very dark brown (10YR 2/2) silt loam. The second horizon is a 14-inch layer of reddish black (2.5Y 2.5/1) silty loam. The low horizon is a reddish black gravelly sandy loam with cobbles. Soil in the wetland is mapped by the NRCS as Buckley loam.

The buffers surrounding Wetland 2 consists of upland grasses and forbs to the west and forested areas to the north and south; Fennel Creek and Wetland 4 are to the east. Vegetation in the buffer includes red alder, western swordfern, western redcedar, salmonberry, colonial bentgrass, and Himalayan blackberry. The wetland is located in a vegetated corridor that runs north/south along the riparian zone of Fennel Creek. Vegetated buffer provides habitat connectivity to Wetlands 1, 3, and 4.

Wetland 2 is a palustrine emergent wetland under the Cowardin (1979) system and is a riverine wetland under the HGM system (Brinson et al. 1995). Wetland 2 is rated as a Category III wetland based on the score. The wetland scored 35 points on Ecology's rating form for Western Washington (16 points for water quality, 4 points for hydrologic functions, and 15 points for habitat functions) (Appendix B). The City of Bonney Lake requires a 75-foot buffer for Class III wetlands for moderate intensity uses, which includes trails (BLMC 16.22.040B).

Wetland 3
Size: 16,906 SF
City of Bonney Lake Rating: Class II
Ecology Rating: II
USFWS Classification: Palustrine Forested/Palustrine Emergent

Wetland 3 is located along the right bank (west) of Fennel Creek and east of 185th Avenue (Figure 3-3).

Wetland hydrology is supported by Fennel Creek and stormwater runoff. Water from a detention pond discharges into the wetland from a culvert located at the western boundary of the wetland and sheet flows east to Fennel Creek. Inundation up to approximately 3 inches was observed throughout most of the wetland during the site visits in March and December of 2009.

Wetland 3 contains forested and emergent vegetation communities. The emergent vegetation community is dominated by reed canarygrass. The forested community is vegetated with western redcedar, common ladyfern, salmonberry, creeping buttercup, dock, red alder, fringed willowherb, Himalayan blackberry, large-leaf avens, common rush, and American skunk cabbage.

Two sample plots (W3-SP1 and W3-SP3) were examined in Wetland 3. Sample plot W3-SP1 is located in the emergent vegetation community. The sample plot was examined to a depth of 20 inches and consists of two horizons. The upper horizon is a 9-inch layer of very dark brown (10YR 2/2) silt. The second horizon is a black (10YR 2/1) silt loam. Sample plot W3-SP3 is located in the forested vegetation community. The sample plot was examined to a depth of 20 inches and consists of three horizons under a 1-inch layer of duff. The upper horizon is a 7-inch layer of very dark brown (10YR 2/2) silt loam. The second horizon is a layer of black (10YR 2/1) loam with abundant partially decomposed organic material. The lower horizon is a black gravelly sandy loam with cobbles. The low horizon is a reddish black gravelly sandy loam with cobbles. Soil in the wetland is mapped by the NRCS as Buckley loam.

The buffer around Wetland 3 consists of upland grasses and forbs to the west; upland forest to the south; Fennel Creek and Wetland 4 to the southeast, east, and northeast; and upland shrubs to the north. Vegetation in the buffer includes western redcedar, bigleaf maple, red alder, salmonberry, and vine maple. Vegetated buffer provides habitat connectivity to Wetlands 1, 2, and 4.

Wetland 3 is a palustrine forested and palustrine emergent wetland under the Cowardin (1979) system and is a riverine/slope wetland under the HGM system (Brinson et al. 1995). Wetland 3 is rated as a Category II wetland based on the score. The wetland scored 61 points on Ecology's rating form for Western Washington (20 points for water quality, 20 points for hydrologic functions, and 19 points for habitat functions) (Appendix B). The City of Bonney Lake requires a 150-foot buffer for Class II wetlands for moderate intensity uses, which includes trails (BLMC 16.22.040B).

Wetland 4
Size: >313,000 SF
City of Bonney Lake Rating: Class II
Ecology Rating: II
USFWS Classification: Palustrine Forested/Palustrine Emergent

Wetland 4 is located along the left bank of Fennel Creek between the stream and the toe of the slope to the east. The wetland extends north and south beyond the study area (Figure 3-3).

Wetland hydrology is supported primarily by groundwater seeps from the hillside to the east and the shallow groundwater table. Soil saturation was observed at the surface throughout most of the site during site visits conducted in April of 2009. Small areas of inundation up to 3 inches were observed in depressions scattered throughout the site.

Wetland 4 contains emergent and forested vegetation communities. The emergent vegetation community is dominated by common rush and creeping buttercup. The forested vegetation community contains western redcedar, red alder, black cottonwood, Indian plum (*Oemleria cerasiformis)*, salmonberry, vine maple, red elderberry, devil's club (*Oplopanax horridus*), water clover (*Marsilia* sp.), western sword fern, common ladyfern, and creeping buttercup.

Seven sample plots (W4-SP1, W4-SP3, W4-SP5, 4MSP-1, 4MSP-3, 4MSP-5, and 4MSP-7) are located in the wetland. Sample plot W4-SP1 was examined to a depth of 21 inches and consists of two layers. The upper horizon is a 16-inch layer of black (10YR 2/1) loam. The lower horizon is a black loam with cobbles. Sample Plot W4-SP3 was examined to a depth of 20 inches and consists of three horizons. The upper horizon is an 8-inch layer of black mucky silty loam. The second horizon is an 8-inch layer of black clay loam with high organic content. The lower horizon is a very dark gray (10YR 3/1) sandy loam with medium to fine yellowish red (5YR 4/6) redoximorphic features. Sample plot W4-SP5 was examined to a depth of 20 inches and consists of three horizons. The upper horizon is an 8-inch layer of black mucky loam. The second horizon is a layer of dark gray (2.5Y 4/2) sandy clay loam with strong brown (7.5YR 4/6) redoximorphic features. The lower horizon is a dark gray sandy clay loam with cobbles and strong brown redoximorphic features. Soil in the wetland is mapped by the NRCS as Buckley loam.

The buffer to the west of Wetland 4 consists of Fennel Creek and upland forest in the lower portion and a mix of forest, shrub, and grasses in the northern portion. An upland forest exists on the slope to the east. The wetland extends beyond the study area to the north and south. The areas to the north and south are a forested corridor along the Fennel Creek riparian zone.

Wetland 4 is a palustrine forested wetland under the Cowardin (1979) system and a riverine/slope wetland under the HGM system (Brinson et al. 1995). The City of Bonney Lake has adopted Ecology's wetland rating system and the wetland is rated as a Category II wetland based on the score (BLMC 16.22.020). The wetland scored 62 points on Ecology's rating form for Western Washington (16 points for water quality, 23 points for hydrologic functions, and 23 points for habitat functions) (Appendix B). The City of Bonney Lake requires a 150-foot buffer for Class II wetlands for moderate intensity uses, which includes trails (BLMC 16.22.040B).

3.4 STREAM DESCRIPTIONS AND CLASSIFICATIONS

3.4.1 Fennel Creek

One stream (Fennel Creek) was identified in the study area. Fennel Creek is a type F stream (16.30.050.K) and requires a 200-foot buffer. The stream originates south of Lake Tapps and then flows south through the study area. It lies within the Puyallup River drainage basin, in Water Resource Inventory Area (WRIA) 10.

3.5 HABITAT CONSERVATION AREAS

WDFW PHS data do not identify priority species within the study area (WDFW 2009). However, the database does identify wetlands associated with Fennel Creek and small concentrations of water fowl within the study area.

Natural Heritage data show no federal or state-listed endangered, threatened, or critical species.

The lower 2 miles of Fennel Creek are known to contain coho (*Oncorhynchus kisutch*) and chum salmon (*Oncorhynchus keta*) (Williams et al. 1975). However, the upper reaches of the creek are not accessible to anadromous fish due to Victor Falls. The stream may contain non-anadromous fish above Victor Falls. Fennel Creek drains to the Puyallup River, which supports populations of fall Chinook (*Oncorhynchus tshawytscha*), coho fall chum, and pink (*Oncorhynchus gorbuscha*) salmon, as well as bull trout (*Salvelinus confluentus*) and winter steelhead (*Oncorhynchus mykiss*) (WDFW 2009).

4. IMPACT ASSESSMENT

4.1 WETLAND IMPACTS

This section describes the extent and type of temporary and permanent impacts to wetlands that would occur as a result of the proposed project. Permanent wetland impacts would occur to Wetland 4 from the Fennel Creek Trail Project. Temporary impacts to wetlands would occur from minor clearing and grading to construct the project, as well as from the potential for erosion, sedimentation, and noise disturbance during construction. Specific impacts are described below. Wetland, stream, and buffer impacts are shown in Table 4-1 and Figure 4-1. Wetland and stream buffer impacts were not differentiated due to significant overlap between stream buffers and wetland buffers, as well as multiple wetland buffers.

Table 4-1. Wetland, Stream, and Buffer Impacts

Sensitive Area	Classification/ Rating	Permanent Impacts (square feet)	Temporary Impacts (square feet)
Wetland 4	II [a]	2,760	2,613
Fennel Creek	F [b]	246	NA
Buffer	N/A	38,858	33,156
Total		**41,864**	**35,769**

[a] Wetland ratings according to BLMC 16.22.020
[b] Stream typing according to BLMC 16.30.050.K

4.1.1 Permanent Impacts

Wetland 4 and its buffer would be permanently affected by the project. Impacts to Wetland 4 would result from a minor grading to construct a boardwalk on piles. A total of 123 pin piles will be used in the construction of the boardwalk. The combined impact in Wetland 4 from both shading and grading is 0.061 acre (2,674 square feet). There would be an additional 0.002 acre (86 square feet) of impacts from the installation of the pin piles. Therefore, a total of 0.063 acre (2,760 square feet) of impacts to Wetland 4 are anticipated. No permanent impacts would occur to Wetlands 1, 2, or 3.

Physical changes to the wetlands and their buffers would affect the ecological functions and values these areas provide. Filling wetlands would reduce the overall stormwater storage capacity in this portion of the basin. This, in turn, could affect groundwater and stream flows because wetlands typically store waters that infiltrate over time and maintain base flows during the dry season. It is assumed that proper stormwater management would mitigate for this lost function.

4.1.2 Temporary Impacts

Temporary impacts totaling approximately 0.063 acre (2,760 square feet) would occur to Wetland 4. Temporary impacts to the wetland would occur from minor clearing and grading work to install erosion control features.

Temporary impacts to wetlands would occur from construction-related activities including, but not limited to, clearing, grading, and filling.

4.2 STREAM IMPACTS

This section describes the extent and type of temporary and permanent impacts to streams and their buffers that would occur as a result of the proposed project. Permanent stream impacts would occur to Fennel Creek due to shading from the bridge. There would also be permanent stream buffer impacts that would occur from the Fennel Creek Trail Project. Temporary impacts to Fennel Creek and its buffers would occur from minor clearing and grading to construct the project, as well as from the potential for erosion, sedimentation, and noise disturbance during construction. Specific impacts are described below.

4.2.1 Permanent Impacts

There would be approximately 246 square feet of permanent impacts to Fennel Creek due to shading by the bridge.

4.2.2 Temporary Impacts

It is anticipated that temporary impacts to Fennel Creek will be minimal and limited to short-term construction activities associated with the bridge.

4.3 BUFFER IMPACTS

The buffers of Wetlands 1, 2, 3, and 4 and Fennel Creek overlap in several areas throughout the project area. Therefore, impacts to specific sensitive areas were not differentiated. There would be a total of 38,858 square feet of impacts to buffers. It is anticipated that approximately 0.077 acre (3,341 square feet) of buffer east of Wetland 4 and 28,254 square feet of stream buffer, west of Fennel Creek would be impacted by the project. The remainder of the buffer impacts is located in areas where buffers overlap.

Impacts to the stream buffer will occur on both the east and west side of the trail. Approximately 2,462 linear feet of the trail is located within stream and/or wetland buffers west of the trail and 384 linear feet is located within wetland and/or stream buffers east of the stream.

A 25-foot-wide construction area along the length of the trail would create the potential for approximately 26,933 square feet of temporary impacts to buffers west of Fennel Creek and 6,223 square feet of temporary buffer impacts to buffers east of Fennel Creek.

Loss of buffers could affect water quality functions by reducing biofiltration potential and making wetlands potentially more susceptible to erosion, pollution, and sedimentation. Reducing wetland and wetland buffers through clearing and grading would decrease wildlife habitat and the overall value of the area for wildlife because buffer vegetation provides visual and aural screening.

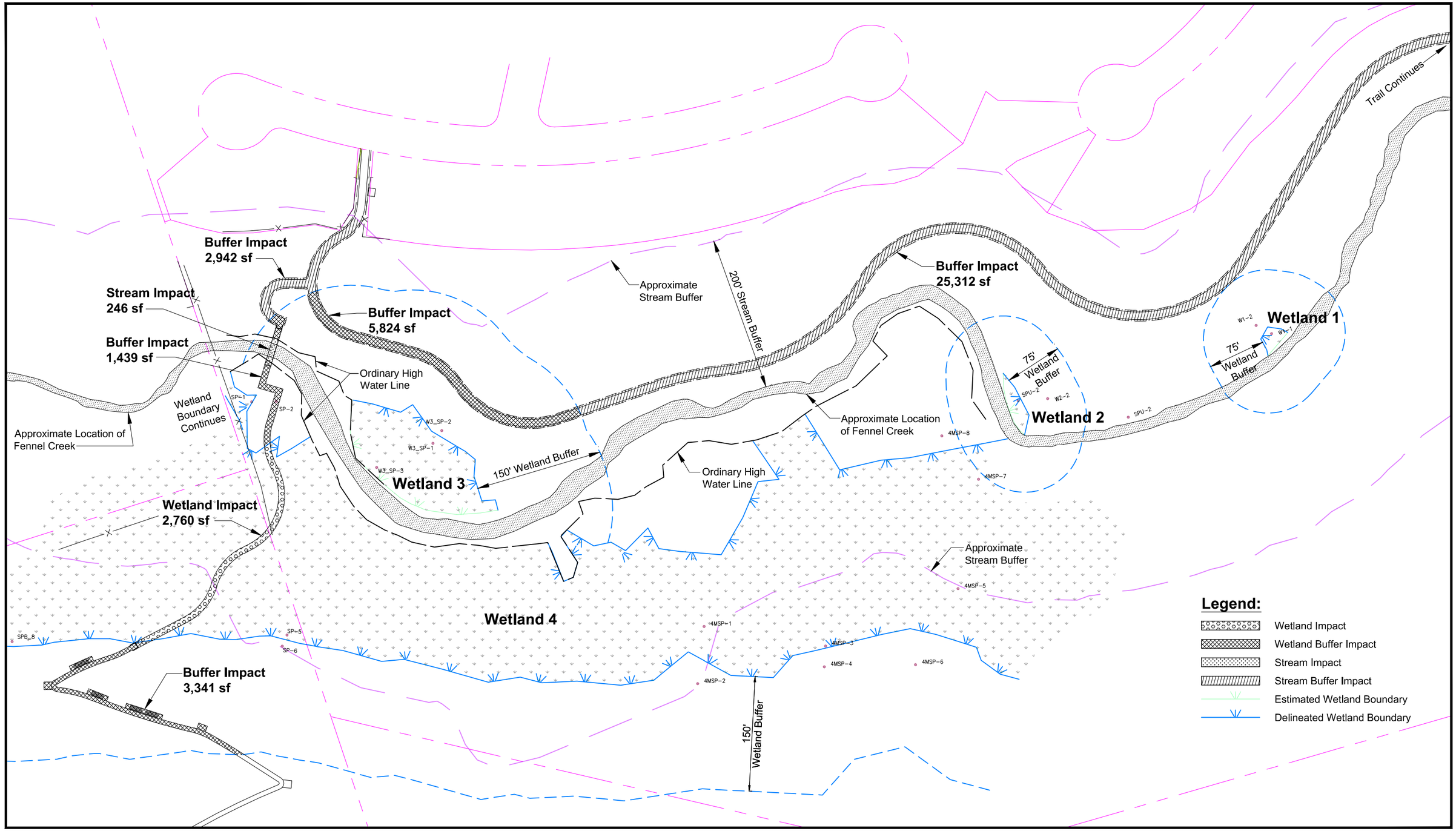

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Figure 4-1
Fennel Creek Trail
Wetland, Stream and Buffer Impacts

5. MITIGATION

The following mitigation plan will avoid, minimize, and compensate for project impacts to wetlands and wetland buffers pursuant to the City of Bonney Lake standards. Later sections describe the goals and objectives, performance standards, construction plan, planting plan, monitoring plan, maintenance plan, contingency plan, and performance security. The conceptual mitigation is primarily focused on restoration of temporary impact areas

5.1 MITIGATION SEQUENCING

The City of Bonney Lake, Washington State, and federal regulatory agencies require that mitigation efforts follow the prescribed sequence below:

- Avoiding the impacts altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.
- Monitoring the impact and taking appropriate corrective measures.

5.1.1 Avoidance and Minimization

The project as proposed was designed to avoid and minimize impacts to critical areas where feasible. Although complete avoidance of project impacts is not possible, the proposed design was chosen based on its ability to fulfill the project goals while minimizing disturbance to critical areas and minimizing project costs.

Best management practices (BMPs) will be implemented throughout the project to avoid or reduce adverse impacts to critical areas. During project construction, BMPs will be implemented for pollution, erosion control, and stormwater management. Measures used may include mulching, matting, and netting; filter fabric fencing; quarry rock entrance mats; sediment traps and ponds; and surface water interceptor swales and ditches. Significant long-term water quality impacts are not expected if erosion control BMPs, stormwater, and spill containment measures are properly implemented, monitored, and maintained during construction. A temporary erosion and sediment control plan will be implemented to minimize and control pollution and erosion from stormwater. Construction staging and stockpiling areas would be kept away from wetlands as an avoidance measure.

Impacts to Wetland 4 will be minimized by using a boardwalk on piles instead of paved asphalt over crushed rock. A boardwalk on piles will reduce the amount of wetland fill and impervious surfaces.

5.1.2 Reduce and Rectify Impacts

Design considerations and construction sequencing have reduced temporary impacts to a minimum. The temporary impacts associated with the project will be approximately

0.060 acre (2,613 square feet) of wetland and 0.76 acre (33,156 square feet) of wetland buffer. All areas temporarily affected will be restored to pre-construction conditions.

5.2 COMPENSATORY MITIGATION STRATEGY

5.2.1 Compensatory Mitigation Strategy

5.2.1.1 Mitigation Goals

The overall goal of the mitigation is to replace the habitats and functions lost as a result of the Fennel Creek Trail Project. The proposed mitigation will accomplish this by enhancing 0.76 acre (33,120 square feet) of wetland and 0.89 acre (38,858 square feet) of wetland/riparian buffer. The mitigation is intended to provide a variety of functions including:

- **Stream Channel Shading**

  Stream channel shading is an important regulator of stream temperature, resulting in cool water in summer and warm water in winter. An overhead leaf canopy, consisting of various plant strata, is important for providing adequate stream channel shading. Shading will be enhanced by the planting of native trees and shrubs in the riparian zone.

- **Large Woody Debris (LWD) Recruitment**

  LWD is an important component of stream habitat. It provides cover for fish and other aquatic organisms; forms pools, backwater, and off-channel habitats; and improves bank stability.

  Enhancing the riparian management zone with native trees and shrubs will increase the opportunity for LWD recruitment.

- **Organic Litter Input**

  Many stream invertebrates depend on organic litter, such as leaves, twigs and grasses, as a food source. These stream invertebrates are important prey items for salmonids and other fish. Invasive shrubs and grasses will be replaced with plantings of native trees and shrubs, improving both the quality and the quantity of organic litter input over time.

- **Streambank Stabilization**

  Riparian vegetation is essential for stabilizing streambanks. Unstable banks may contribute sediment to streams and increase turbidity, which is detrimental to spawning fish. Enhancement with tree and shrub species will improve the long-term stability of the riverbank.

- **Water Quality**

  Riparian vegetation will reduce the flow of stormwater runoff and allow infiltration of the runoff, nutrient uptake from the runoff, and settling of sediment before the runoff enters the creek.

- **Wildlife Habitat**

  Planting with native trees and shrubs will improve the overall habitat functions of the riparian area by increasing habitat complexity.

5.2.1.2 Site Selection

Project impacts would occur in the Fennel Creek drainage basin. Therefore, locating a mitigation site in the Fennel Creek drainage basin is preferred. Although some impacts occur in Pierce County the preferred mitigation site is located in the City of Bonney Lake. The preferred mitigation site is located within Wetland 4, the wetland impacted by the project, and is a palustrine emergent portion of the wetland. This portion of Wetland 4 was historically used as pasture. The site lack woody vegetation and generally has low habitat and water quality functions. Much of the bank along Fennel Creek is vegetated with Himalayan blackberry and the presence of coniferous trees is generally lacking. Enhancement of the site would increase habitat, biodiversity, and water quality functions. The proposed site location is shown in Figure 5-1.

5.2.1.3 Replacement Ratios

BLMC 16.22.050 recommends replacement ratios based on Ecology's recommended ratios as stated in "Wetland Replacement Ratios: Defining Equivalency," Washington Department of Ecology, 1992, Publication #92-08; "Freshwater Wetlands in Washington State," Volume 2, Appendix 8-C; and similar science. Permanent wetland impacts in the study area will be compensated by enhancement of existing wetland at a ratio of 12:1 for Category II wetlands. The BLMC requirements will be used for compensatory mitigation, because they would require a higher ratio than would PCC. Buffers will be compensated by enhancement of existing buffers at a ratio of 1:1. The required area of enhancement will be 0.76 acre (33,120 square feet) of wetland and 0.89 acre (38,858 square feet) of wetland/riparian buffer.

5.2.1.4 Invasive species Control

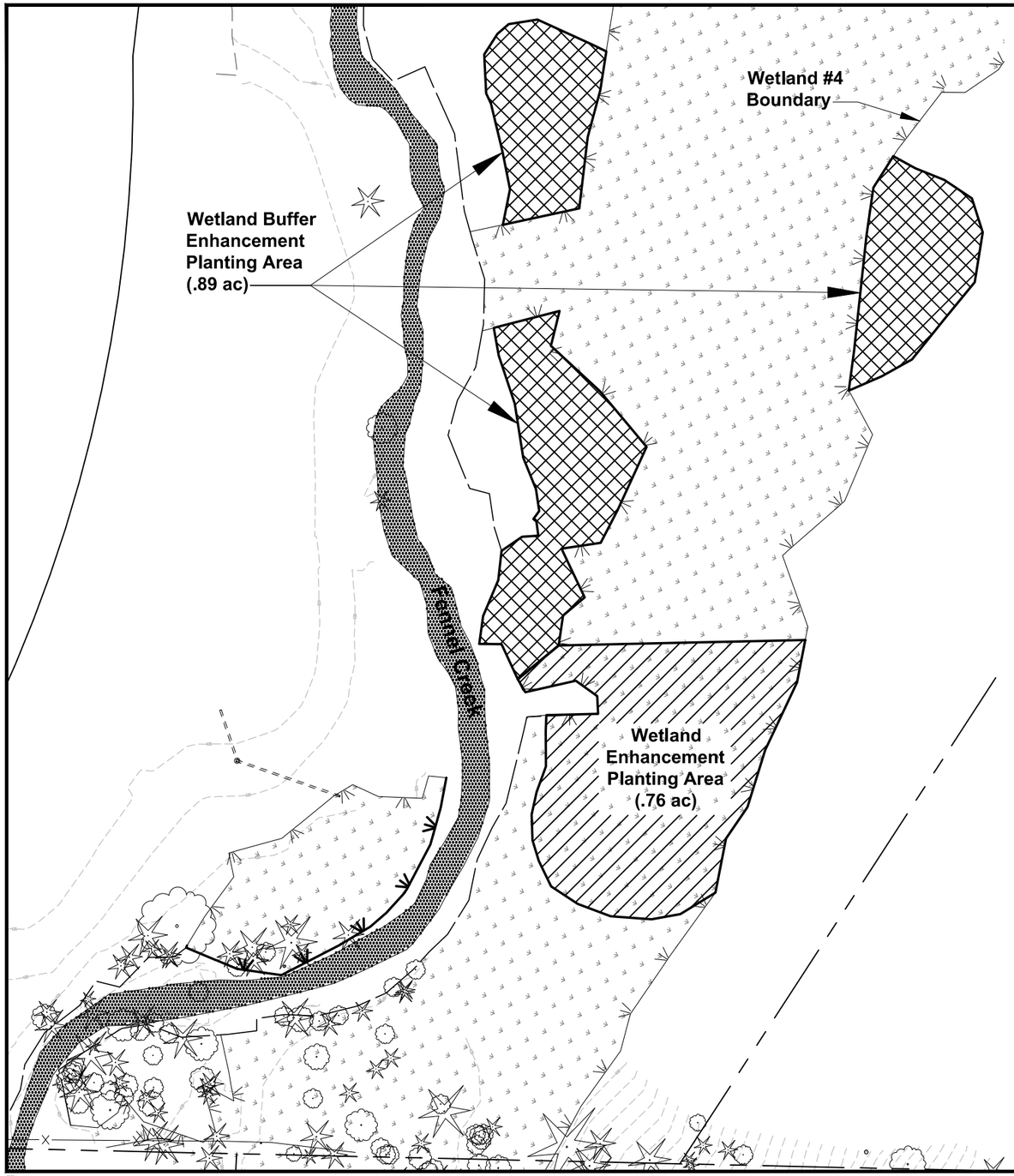
Prior to installing new plant material in Wetland 4, noxious weeds in the wetland enhancement areas will be removed. The existing site has a variety of weed species that could limit the success of the mitigation plan, primarily reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*). These species, as well as other noxious weeds on the Washington State list of noxious weeds will be controlled prior to planting.

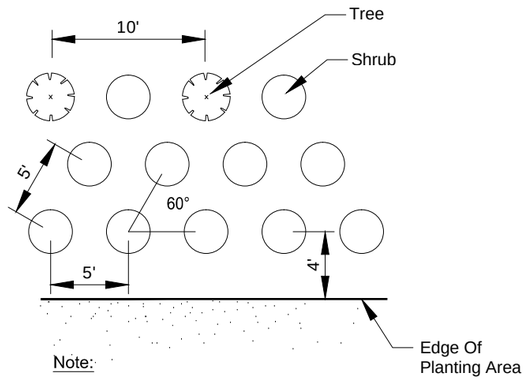
5.2.1.5 Planting Plan

Following weed removal, the restoration area will be planted with native woody vegetation to achieve a diverse habitat. Plants will be installed 5 feet on center in a naturalistic pattern. Planting installation is proposed in the dormant season. Following planting, 2 inches of wood chip mulch will be placed in a 2-foot-diameter ring around each tree or shrub to retain moisture and prevent tall growing weeds and grasses from suffocating the plant. Final plant selection anticipated plant species and sizes are provided in Table 5-1. Plant layout is shown in Figure 5-1

5.2.1.6 Site Protection

A restrictive covenant will be recorded on the mitigation site to protect it from future development, and permanent signs will be installed to identify the site as a protected area. A smooth wire fence will be constructed along the border to protect against encroachment from neighboring land uses while still allowing for wildlife passage.

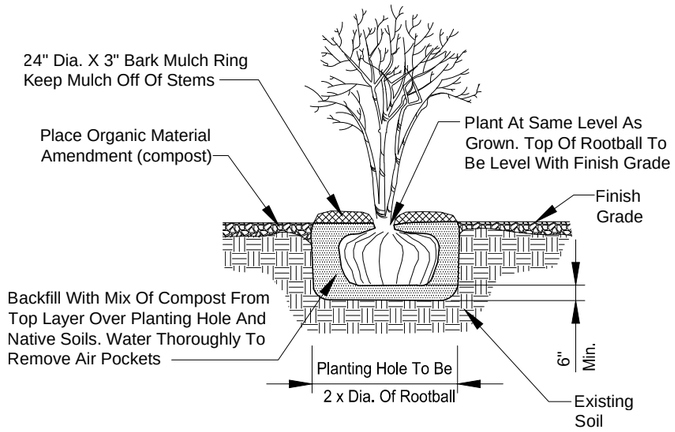




Note:

Plant Shrubs In Single Species Groups Of 7 To 12 Plants Each And Space Shrubs 5' O.C.. Plant Trees In Single Species Groups Of 1 To 5 Plants Each And Space Trees 10' O.C.

Typical Tree And Shrub Spacing
Detail 1
No Scale



Shrub Planting
Detail 2
No Scale

Legend

WETLAND ENHANCEMENT PLANTING AREA

Quantity	Botanical Name	Common Name	Size	Spacing
	Trees			
19	Crataegus douglasii	Black hawthorn	2 gallon container	10' o.c.
19	Malus fusca	Pacific crab apple	2 gallon container	10' o.c.
57	Picea sitchensis	Sitka spruce	2 gallon container	10' o.c.
57	Populus balsamifera	Black cottonwood	2 gallon container	10' o.c.
76	Salix lasiandra	Pacific willow	1/2" Dia. live stakes	10' o.c.
76	Salix sitchensis	Sitka willow	1/2" Dia. live stakes	10' o.c.
76	Thuja plicata	Western red cedar	2 gallon container	10' o.c.
	Shrubs			
229	Cornus sericea	Red-osier dogwood	1 gallon container	5' o.c.
229	Lonicera involucrata	Black twinberry	1 gallon container	5' o.c.
229	Physocarpus capitatus	Pacific ninebark	1 gallon container	5' o.c.
229	Rosa pisocarpa	Clustered rose	1 gallon container	5' o.c.
229	Rubus spectabilis	Salmonberry	1 gallon container	5' o.c.

WETLAND BUFFER ENHANCEMENT PLANTING AREA

Quantity	Botanical Name	Common Name	Size	Spacing
	Trees			
67	Acer circinatum	Vine maple	2 gallon container	10' o.c.
90	Acer macrophyllum	Bigleaf maple	2 gallon container	10' o.c.
67	Populus balsamifera	Black cottonwood	2 gallon container	10' o.c.
67	Pseudotsuga menziesii	Douglas-fir	2 gallon container	10' o.c.
45	Salix scouleriana	Scouler's willow	2 gallon container	10' o.c.
67	Thuja plicata	Western red cedar	2 gallon container	10' o.c.
45	Tsuga heterophylla	Western hemlock	2 gallon container	10' o.c.
	Shrubs			
269	Holodiscus discolor	Oceanspray	1 gallon container	5' o.c.
201	Ribes sanguineum	Red-flowering currant	1 gallon container	5' o.c.
336	Rosa nutkana	Nootka rose	1 gallon container	5' o.c.
201	Sambucus racemosa	Red elderberry	1 gallon container	5' o.c.
336	Symphoricarpos albus	Snowberry	1 gallon container	5' o.c.

Notes:

1. Refer to details and specifications for additional information.
2. No plant substitutions shall be permitted without prior approval of landscape architect/owner.
3. All work shall be performed to the satisfaction of the landscape architect/owner.
4. Plant list quantities are shown for reference only. Contractor is responsible for verifying all quantities in list with specified spacing.
5. Material shall be planted in groups of 3s and 5s.

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N

0 100'

SCALE IN FEET

Figure 5-1
Proposed Wetland and Wetland Buffer Mitigation Areas
Fennel Creek

5.2.2 Objectives and Performance Standards

Plant Community

Objective 1: Enhance a minimum of 0.76 acre (33,120 square feet) of wetland vegetation. It is expected that the wetland will include both forested and scrub-shrub plant communities. Natural succession will be allowed to determine the ultimate area of each community.

Performance Standards:

End of Year 1: At least 35 percent cover of native vegetation

End of Year 1: 100 percent survival of planted material. For container plantings, installed woody species will achieve 100 percent survival at the end of the first year plant establishment period. For live stakes, at least one live stake within each grouping will have survived at the end of the first year plant establishment period.

End of Year 3*:* At least 50 percent cover of native vegetation.

End of Year 5: At least 75 percent cover of native vegetation.

Objective 2: Enhance a minimum of 0.89 acre (38,858 square feet) of wetland and riparian buffer by planting native trees and shrubs.

Performance Standards:

End of Year 1: At least 35 percent cover of native vegetation.

End of Year 3: At least 50 percent cover of native vegetation.

End of Year 5: At least 75 percent cover of native vegetation.

Objective 3: Limit the areal cover of invasive non-native species throughout the planting areas.

Performance Standard:

Year 1 – 5: Areal cover of invasive non-native species is less than 20 percent.

Objective 4: Document site development.

Performance Standard:

Permanent photographic stations will be established to monitor the development of the mitigation site. Photo pans will be taken during scheduled monitoring visits in Years 1, 3, and 5 in addition to photographs taken along transect lines. All photographs will be labeled to identify locations.

Wildlife Habitat

Objective 5: Provide riparian and wetland habitat.

Performance Standard:

Increase in areal cover of native shrubs in the wetland buffer, as measured in Objectives 2, 3, and 4, will be used as a surrogate to indicate increasing habitat functions.

Table 5-1. Proposed Planting Schedule

Scientific Name	Common Name	Container Size
Trees		
Acer macrophyllum	bigleaf maple	2 gallon
Alnus rubra	red alder	2 gallon
Crataegus douglasii	black hawthorn	2 gallon
Malus fusca	Pacific crab apple	2 gallon
Picea sitchensis	Sitka spruce	2 gallon
Populus balsamifera	black cottonwood	2 gallon
Pseudotsuga menziesii	Douglas-fir	2 gallon
Rhamnus purshiana	cascara	2 gallon
Salix lasiandra	Pacific willow	1 gallon
Salix scouleriana	Scouler's willow	1 gallon
Thuja plicata	western redcedar	2 gallon
Tsuga heterophylla	western hemlock	2 gallon
Shrubs		
Acer circinatum	vine maple	1 gallon
Cornus sericea	red-osier dogwood	1 gallon
Holodiscus discolor	oceanspray	1 gallon
Lonicera involucrata	black twinberry	1 gallon
Physocarpus capitatus	Pacific ninebark	1 gallon
Ribes sanguineum	red-flowering currant	1 gallon
Rosa gymnocarpa	baldhip rose	1 gallon
Rosa pisocarpa	clustered rose	1 gallon
Rosa nutkana	Nootka rose	1 gallon
Rubus parviflorus	thimbleberry	1 gallon
Rubus spectabilis	salmonberry	1 gallon
Salix sitchensis	Sitka willow	1 gallon
Sambucus racemosa	red elderberry	1 gallon
Spiraea douglasii	Douglas spirea	1 gallon
Symphoricarpos albus	snowberry	1 gallon
Live Stakes		
Salix lasiandra	Pacific willow	
Salix sitchensis	Sitka willow	

Preservation

Objective 6: Conduct long-term management of the mitigation site.

Performance Standard:

Conduct qualitative monitoring to assess the status of the mitigation site yearly to monitor for disturbances including, but not limited to, dumping, invasive species, or human disturbance. Conduct maintenance as necessary to remove trash, control invasive species, and conduct repairs due to vandalism.

Record a description of the mitigation area identified in the final mitigation plan as approved, and any subsequent mitigation area revisions, with the Register of Deeds or other appropriate official responsible for maintaining records to, or interest in, real property.

Install appropriate permanent signs around the perimeter of the mitigation site to identify its protected status.

6. MONITORING AND ASSESSMENT

6.1 MONITORING

The mitigation areas will be monitored during and following construction. During construction, monitoring will ensure that BMPs are observed to minimize impacts. On-site construction work (including grading and planting) will be coordinated to ensure that the site is constructed as designed. A total count of all trees and shrubs will be conducted after the first year of installation. This first-year monitoring will serve as the one-year warranty inspection.

After construction is completed the mitigation site will be monitored for at least 5 years. Successful mitigation will be measured by attainment of the performance standards described above. Specific monitoring will include, but not be limited to a discussion of vegetation establishment, wetland hydrology, weed populations, wildlife usage, and site disturbances. Monitoring of the mitigation site will be performed by qualified wetland ecologists. A combination of qualitative and quantitative monitoring activities will be used to assess the management objectives and associated performance standards described in this mitigation plan.

6.1.1 Quantitative Monitoring

Planting success in the mitigation site will be determined using a belt-transect line intercept sampling methods. Each transect endpoint will be permanently staked in the field. The survivorship of each tree and shrub will be documented using a 2-meter-wide belt centered along the transect. The percent cover by species will be recorded using a line intercept transects. Thus, both survivorship and percent cover data will be collected and analyzed. Volunteer trees and shrubs will also be included in the quantitative evaluation. The results from the transects will be averaged. The results will be compared to the performance standards to determine the success of the mitigation areas. Quantitative assessments will follow the same method in each consecutive monitoring year and will be performed between June 15 and September 15 of each monitoring year.

6.1.2 Qualitative Monitoring

Qualitative assessment will be performed during each monitoring year to visually assess the health of plants, wetland hydrology, weed populations, wildlife usage, and site disturbances. Quantitative monitoring will include photographic documentation of the site from permanent photo stations.

6.2 MAINTENANCE

The proposed mitigation is intended to achieve the performance standards with minimal ongoing maintenance. Species proposed in the plant list are adapted to varying site conditions in the Puget Sound lowland; however, supplemental irrigation may be needed during the first two growing seasons following installation to ensure long-term survival. The need for irrigation will be evaluated based on the conditions observed during the establishment period.

To ensure rapid plant community establishment, trees will be planted closer together than would generally occur in natural mature stands. Some natural mortality is expected to occur during the monitoring period. All dead and downed woody material will be left in place to provide micro-habitats for wildlife. Plants will be replaced as needed to meet performance standards.

Maintenance to control nuisance species in the mitigation areas may be necessary. If during the monitoring period it becomes evident that invasive species are impeding establishment of desirable native plants, measures will be implemented to control nuisance species. A progressively aggressive approach will be used to control nuisance species. Control measures will first include hand cutting and removal, and if this fails to control them, a herbicide will be applied by a certified professional.

6.2.1 Wildlife Observations

Monitoring will occur for all types of wildlife species including birds, mammals, amphibians, and reptiles. Wildlife will be observed by visual observations or using binoculars. Observations will be made for each mitigation area via a walkthrough of the entire mitigation site during the regular monitoring periods.

6.3 CONTINGENCY PLAN

It is anticipated that the mitigation goal will be achieved by the construction and installation of the mitigation design as shown on the planting plans. If the results of monitoring indicate that the mitigation site is not meeting performance objectives, contingency measures will be implemented as described in Table 6-1 prior to implementing any corrective actions.

The contingency measures may be enacted in whole or in part whenever the action is warranted by the monitoring reports. If the desired mitigation goal and objectives, as measured by the monitoring program and performance standards, are not achieved, a joint determination by the regulatory agencies and the project sponsor may be made to implement contingency measures.

Table 6-1. Contingency Measures for the Mitigation Site

Problem	Contingency Measure
Less than 80% of planted woody species stock survive in Year 1	A qualified wetland ecologist will assess the site to determine what conditions are preventing the plants from thriving. Appropriate measures will be taken to correct any conditions that are limiting growth. Plant species will be evaluated in relation to site conditions to determine if plant species substitutions will be required. Lost plants will be replaced with appropriate native species unless appropriate native woody species are volunteering at a rate sufficient to replace them. Additional measures (such as the addition of protective measures or modification of irrigation practices) will be considered if necessary. If survival standards are not met because of animal browse, the responsible wildlife will be identified and appropriate damage control methods employed. Possible control methods could include use of repellents and temporary barriers.
Percent cover for woody species not increasing	A qualified wetland ecologist will assess the site to determine what conditions are preventing the plants from thriving. Appropriate measures will be taken to correct any conditions that are limiting growth.
Greater than 20% invasive non-native species	Methods of weed control could include hand or mechanical weeding, herbicide, or mulching.
Performance standards not met at Year 5	Continue the monitoring regime for 2 additional years. The site will continue to be evaluated every 2 years until it has met the stated performance standards associated with management objectives. Other contingency measures may be implemented during this period.

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