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CONCEPTUAL MITIGATION PLAN

Sammamish Bridge and Road (SR 202) Project

City of Woodinville, Washington

Prepared by:

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December 2011

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LIST OF ABBREVIATED TERMS

BMP	Best Management Practice
CAO	Critical Areas Ordinance
DNR	Washington Department of Natural Resources
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
GPS	Global Positioning System
HGM	Hydrogeomorphic
HPA	Hydraulic Project Approval
MP	Mile Post
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent
RCW	Revised Code of Washington
SR	State Route
TESC	Temporary Erosion and Sediment Control
WDFW	Washington Department of Fish and Wildlife
WMC	Woodinville Municipal Code
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

This Conceptual Mitigation Plan is being submitted to support permit applications to the City of Woodinville (the "City") for construction of the proposed Sammamish River Bridge and Road (SR 202) Project (the "project"). This report describes wetlands, streams, and buffers on the project site; proposed effects on these resources; and proposed actions to compensate (mitigate) for project impacts in accordance with the City's Critical Areas Ordinance (CAO) (Woodinville Municipal Code [WMC] 21.24.010 to 440).

Appendix A contains a conceptual mitigation design that corresponds to the proposed mitigation approach and planting plan described in this report. This Conceptual Mitigation Plan will be finalized once it has been approved by the permitting authorities.

1.1 PROJECT LOCATION

The proposed project is located on NE 175th Street (a.k.a. SR 202) within the corporate limits of the City of Woodinville, in King County, Washington. The project corridor extends from 131st Avenue NE (mile post [MP] 0.31) to Woodinville-Redmond Road NE (MP 0.55), spanning the Sammamish River. The project corridor consists predominantly of developed areas, including the existing roadway and bridge over the Sammamish River, two at-grade railroad crossings, and portions of adjacent commercial properties. The proposed project is located in Water Resource Inventory Area (WRIA) 8 (Cedar-Sammamish) in the Sammamish River Basin, in the southeast quarter of Section 9 of Township 26 North, Range 5 East (T 26N R 5E S9). Refer to Figure 1-1 *(Vicinity Map)*.

1.2 RESPONSIBLE PARTIES

1.2.1 Applicant / Owner

The City of Woodinville is the applicant for the proposed project, the owner of the proposed mitigation site property, and the party responsible for long-term maintenance and monitoring of mitigation elements. The primary contact person for the proposed Sammamish River Bridge and Road (SR 202) Project and for the proposed Mitigation Plan for permitting purposes is:

Thomas Hansen, Public Works Director
Public Works Department
17301 - 133rd Avenue NE
Woodinville, WA 98072

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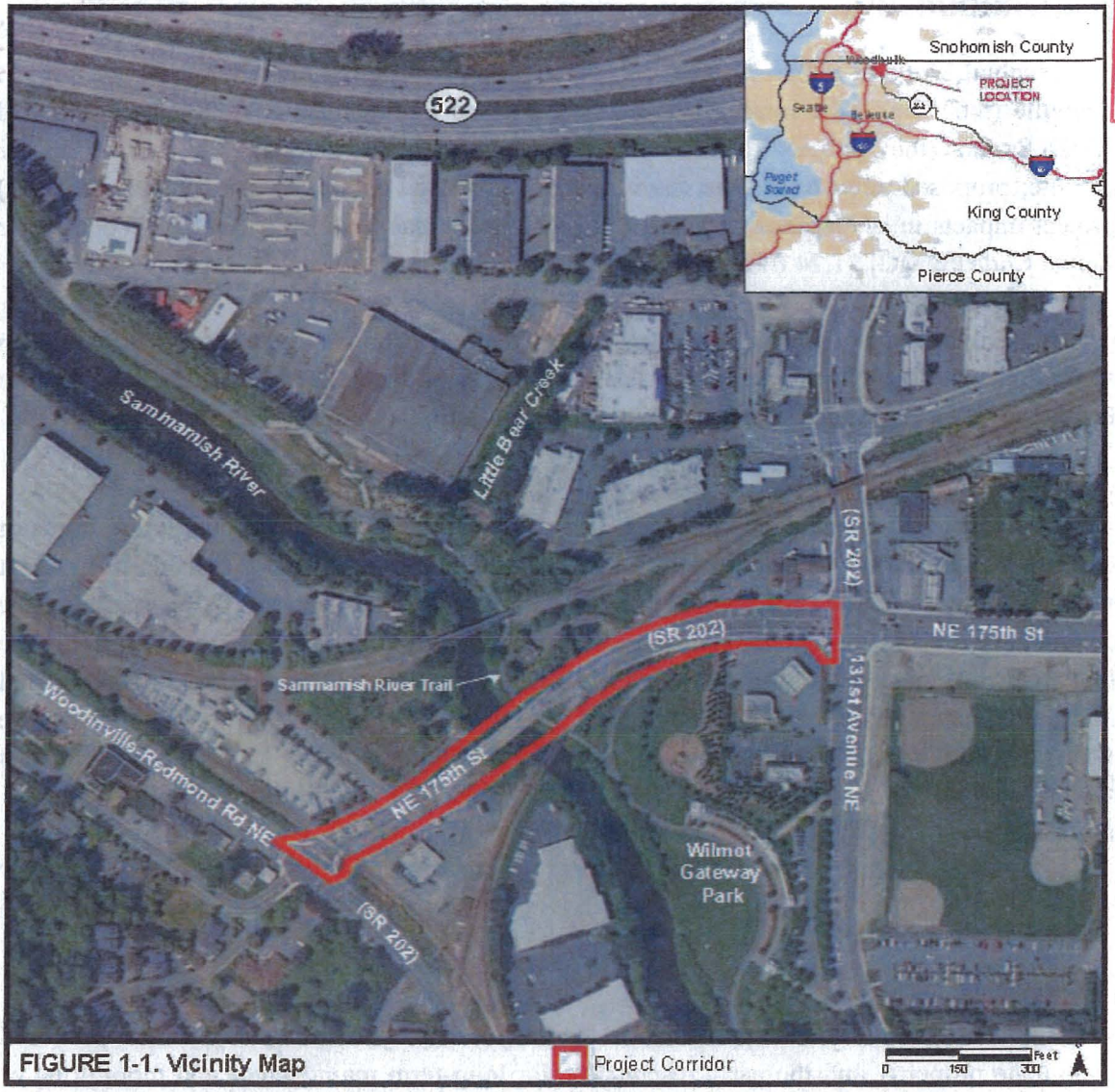

FIGURE 1-1. Vicinity Map

1.2.2 AUTHOR OF MITIGATION PLAN

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1.3 PROJECT DESCRIPTION

SR 202 serves as one of five entrances to the downtown core. The City's proposed Sammamish River Bridge and Road (SR 202) Project is part of a larger overall strategy to reduce congestion in the downtown core of the city. Intersection improvements at both ends of the project, at Woodinville-Redmond Road NE and 131st Avenue NE, have already been completed.

The proposed project involves widening NE 175th Street (SR 202) from the intersection of 131st Avenue NE to Woodinville-Redmond Road NE. There is currently one eastbound through/right-turn lane, two left-turn lanes, and one westbound lane at the intersection of 131st Avenue NE. At the intersection of Woodinville-Redmond Road NE there is currently one westbound through/right-turn lane, one left-turn lane, and one eastbound lane. The center of the project currently consists of a two-lane bridge (one lane in each direction) that crosses over the Sammamish River. The project corridor includes two railroad crossings, one just east of Woodinville-Redmond Road NE, and the other just east of the bridge. Concrete sidewalks, curbs, and gutters are present along the majority of both sides of the roadway (Figure 1-1).

The proposed project would widen NE 175th Street between 131st Avenue NE and Woodinville-Redmond Road NE to four continuous through lanes by constructing a new two-lane bridge adjacent to and south of the existing two-lane bridge, widening the approach roadways, and reconfiguring travel lanes. The existing bridge would accommodate the westbound lanes, and the new bridge would accommodate the eastbound lanes. At the 131st Avenue NE intersection, an additional westbound through lane would be added to the existing configuration. At the Woodinville-Redmond Road intersection, an additional eastbound through lane and a westbound right-turn pocket would be added to the existing configuration. The roadway lanes would vary in width from 11 to 13 feet. The vertical profile of the existing roadway would be maintained. Figure 1-2 illustrates the proposed project.

The proposed project includes bike lanes, curb and gutter, and sidewalks along both sides of the road. Bike lanes would extend the length of the project corridor on both sides of the road and vary in width from 4 to 5 feet. Sidewalks would also extend the length of the project corridor and vary in width from 5 to 8 feet. The intersections of SR 202 with Woodinville-Redmond Road NE and 131st Avenue NE are both signalized. The existing wire-span signal at the Woodinville-Redmond Road NE intersection would be upgraded with new signal poles. The existing railroad signals

would be relocated and modified for the new roadway width. Project construction is expected to begin in March 2013 and last approximately 9 months.

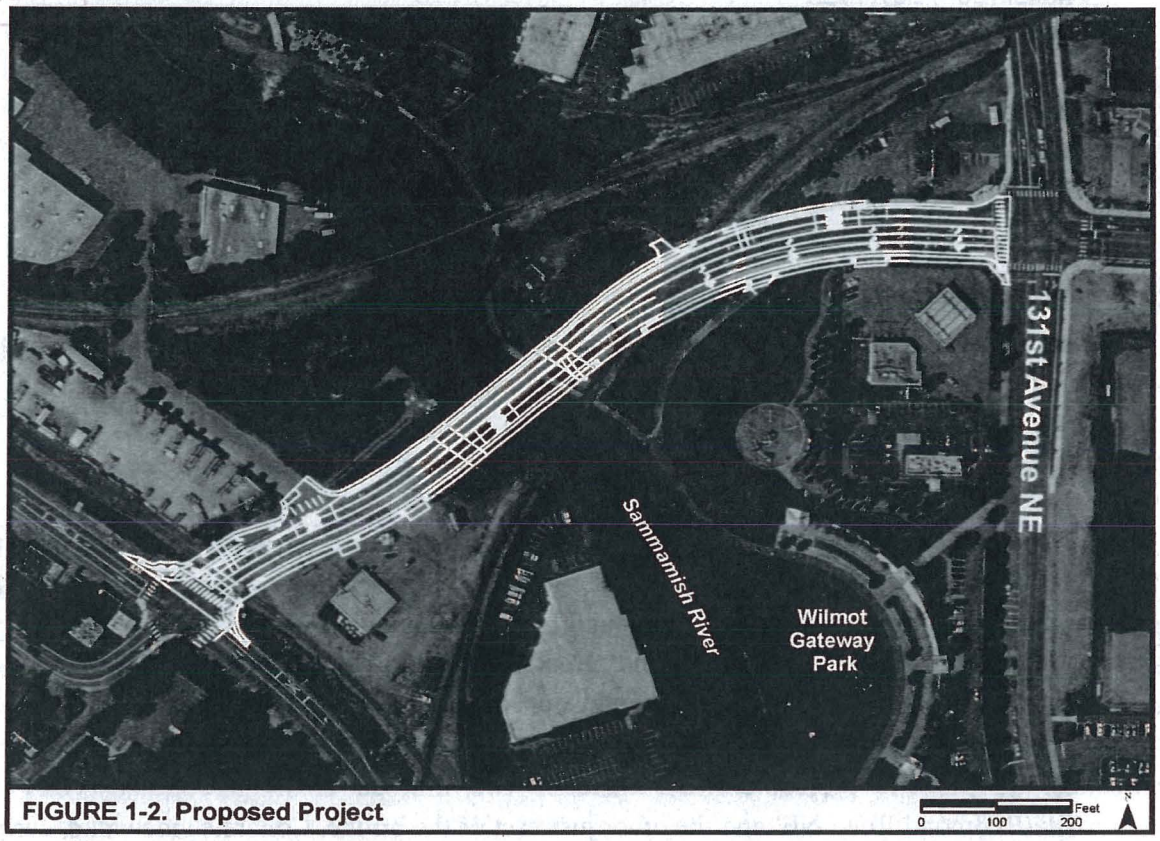


FIGURE 1-2. Proposed Project

The Sammamish River flows through the project site, and a small (872 square foot) wetland (Wetland A) occurs on the south bank of the river within the floodway. The WMC designates the Sammamish River as a Type 1 stream (WMC 21.24.370) and Wetland A as a Class 1 wetland due to its proximity and hydrological connection to the Sammamish River (WMC 21.24.320 [2][a]). Under the WMC, both Class 1 wetlands and Type 1 streams have a standard buffer width of 150 feet (WMC 21.24.330 [1] and 21.24.380 [1]). Impacts on Class 1 wetland buffers require a 1:1 enhancement ratio (WMC 21.24.350 (8)(c). The WMC does not specify specific mitigation ratios for stream buffer impacts, but requires enhancement to provide a net improvement in overall stream and buffer function and value (WMC 21.24.380 [1][a]). Full mitigation typically encompasses the entire bank from the Ordinary High Water Mark (OHWM) to the buffer boundary (City of Woodinville 2011b).

The project would permanently alter 0.28 acre (12,286 square feet) of combined stream and wetland buffer area, effectively reducing the standard regulatory buffer widths. Therefore, the project requires 0.28 acre of compensation (mitigation) in the form of stream/wetland buffer enhancement, and the enhancement measures implemented must provide a net improvement in overall stream and buffer function and value. Due to the lack of suitable acreage on site and constraints of the surrounding urban landscape, the City proposes to mitigate buffer impacts off

site. The overall mitigation goals are to enhance 0.28 acre of stream/wetland buffer habitat to provide a net improvement in overall stream and buffer functions in the same drainage basin (the Sammamish River drainage basin) at a site along Little Bear Creek, approximately 0.36 mile to the northwest of the road and bridge project site. The proposed mitigation site would be monitored and maintained for a minimum of 5 years to determine whether the mitigation goals are being met.

1.4 WETLAND DELINEATION OVERVIEW

Shannon and Wilson (2007) conducted a wetland delineation in December of 2006 to determine the extent and categories of wetlands on and adjacent to the road and bridge project site. Wetlands were identified and delineated in accordance with the U.S. Army Corps of Engineers (Corps) 1987 Wetland Delineation Manual (Environmental Laboratory 1987) and the Washington State Department of Ecology (Ecology) 1997 Wetland Identification and Delineation Manual (Ecology 1997). Identified wetlands were classified according to Ecology's Washington State Wetland Rating System for Western Washington (Hruby 2004) and the WMC. Data points and wetland boundaries were flagged in the field and surveyed. One wetland (Wetland A) was identified in the study area within the floodway of the Sammamish River. Figure 1-3 (*Wetland A*) shows the wetland boundary in relation to the proposed project.

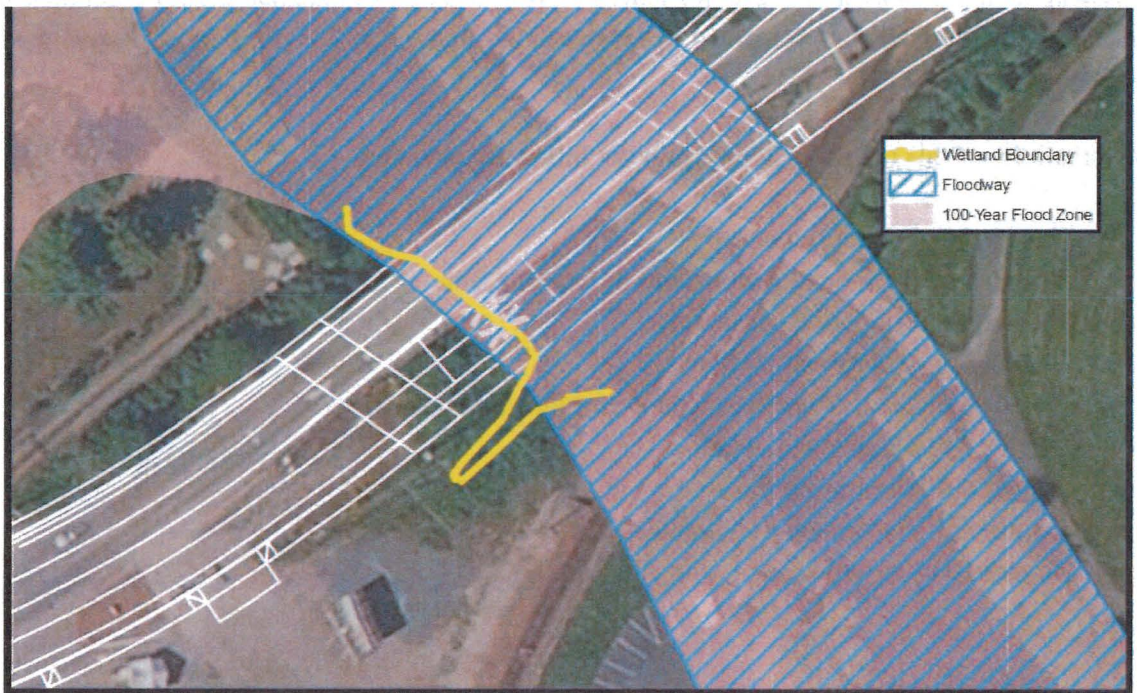


FIGURE 1-3. Wetland A

Wetland A is an 872-square feet wetland located in the center of the project study area, along the left (south) bank of the Sammamish River. Wetland A is a small, low-quality palustrine (freshwater) emergent (PEM) wetland as classified using the Cowardin classification system (Cowardin et al. 1979) and as a riverine wetland using the Hydrogeomorphic (HGM) classification system (Brinson 1993). Under Ecology's wetland rating system, it was rated as a

Category IV wetland due to its small size and low quality (described in further detail in Section 3.0, *Ecological Assessment of Existing Site*). However, due to its proximity and hydrological connection to the Sammamish River, a "Shoreline of the State" and Type 1 stream, Wetland A is considered a Class 1 wetland under the WMC.

During the last few years, the Corps updated and expanded their delineation manual with regional supplements. In 2008, the Corps required the use of its delineation manual and its interim regional supplements. The final regional supplements were released in 2010. During the interim period, Ecology accepted data forms from both the federal and state delineation manuals. Effective March 14, 2011, Ecology revised state law to repeal the use of the state delineation manual and require that state delineations be done according to the currently approved federal manual and supplements. While the wetland delineation in 2006 was conducted using the delineation manuals required at that time, AECOM ecologists visited the site in October 2011 to verify the current location, extent, and general character of Wetland A, as habitat conditions can change over time, and to gather information regarding the existing condition and potential functions of the surrounding stream and wetland 150-foot buffers. Based on the October 2011 field observations, Wetland A appears to be in the same location and cover the same area as it did in 2006. Visual observations of habitat conditions, including hydrology and vegetation, are consistent with the description provided in the 2007 wetland delineation report (Shannon and Wilson 2007). Wetland A is described in greater detail in Section 3.0 (*Ecological Assessment of the Existing Site*).

The remainder of this report is divided into the following chapters:

- Chapter 2.0, Project Impacts
- Chapter 3.0, Ecological Assessment of Existing Site
- Chapter 4.0, Mitigating Measures
- Chapter 5.0, Compensation Plan
- Chapter 6.0, Goal, Objectives, and Performance Standards
- Chapter 7.0, Maintenance Plan
- Chapter 8.0, Monitoring Plan
- Chapter 9.0, Performance Guarantees
- Chapter 10.0, References

2.0 PROJECT IMPACTS

The proposed project would affect 0.28 acre (12,286 square feet) of combined City-regulated stream and wetland buffer within the project corridor. Figure 2-1 (*Project Impacts*) illustrates the location of regulated areas (streams, wetlands, and buffers) on the project site, and the location, extent, and acreages of impacts that would occur as result of the proposed project.

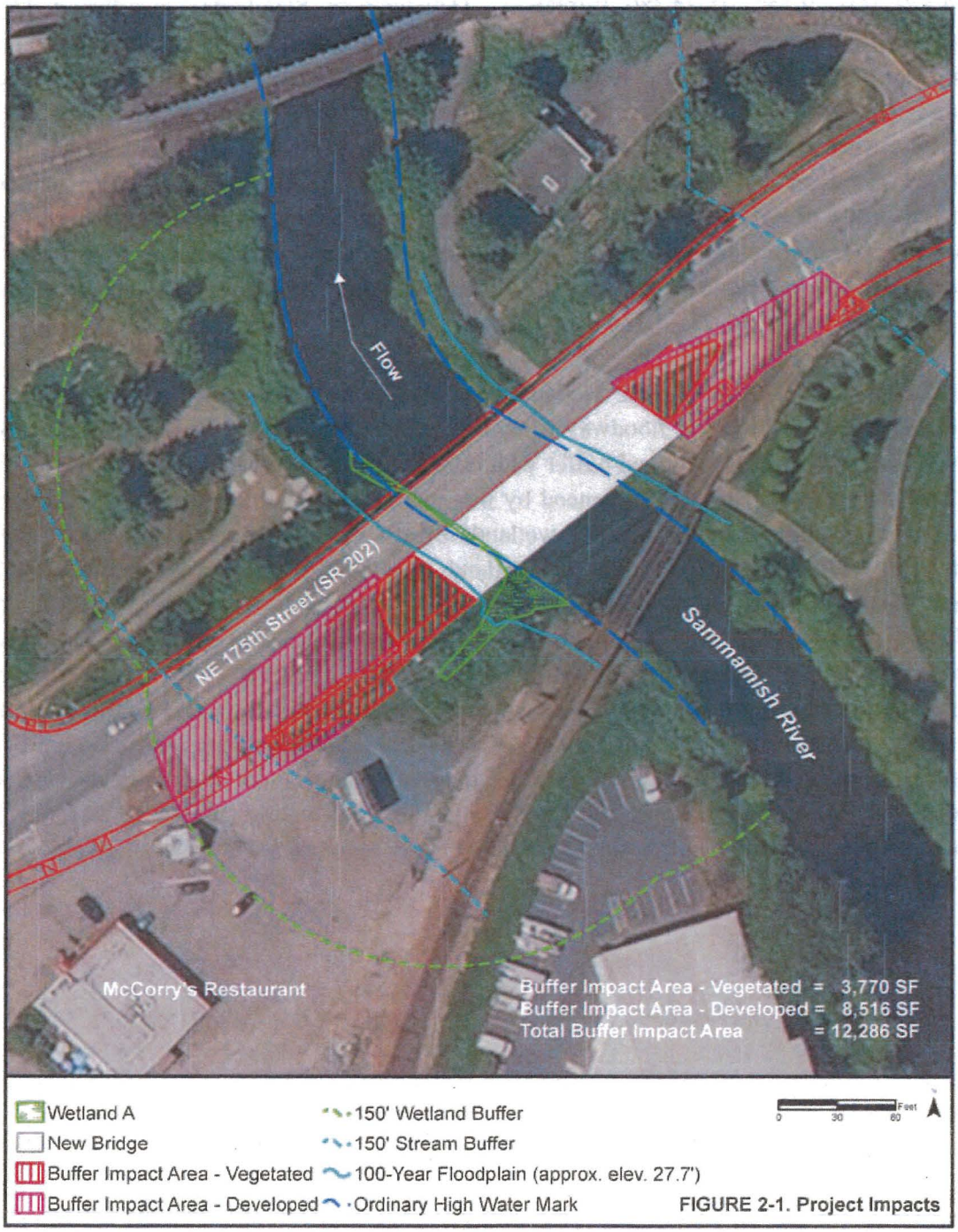


FIGURE 2-1. Project Impacts

The main stem Sammamish River, a perennial stream, flows through the project site to Lake Washington, which is hydrologically connected to Puget Sound. The City's CAO (WMC 21.24.380 to 400) specifies stream development standards, recommended buffer widths, and mitigation requirements. WMC 21.24.370 (Streams - Designation and Rating) designates the Sammamish River as a Type 1 stream. Type 1 streams are those that are identified as "Shorelines of the State" under Chapter 90.58 Revised Code of Washington (RCW) or that support significant anadromous salmonid use, including the Sammamish River and Little Bear Creek (WMC 21.24.370 [1]). WMC 21.24.380 (Streams - Development Standards) specifies a 150-foot standard buffer width for Type 1 streams. If the existing stream buffer is significantly degraded, the standard buffer width can be reduced to 115 feet with the implementation of enhancement measures to provide an overall stream and buffer function and value (WMC 21.24.380 [1]). Replacement or enhancement is required when a stream or buffer is altered pursuant to an approved development proposal (WMC 21.24.380 [5]). Replacement or enhancement for approved stream or buffer alterations must be accomplished on site unless it is demonstrated that enhancement or replacement on site is not possible; the proposed mitigation site is off site but in the same drainage sub-basin as the original stream, and greater biologic and hydrologic functions would be achieved (WMC 21.24.380 [7]).

An 872 square foot PEM, riverine wetland (Wetland A) is present on the south bank of the Sammamish River within the floodway (Shannon and Wilson 2007). The City's CAO (WCM 21.24.320 to 360) specifies wetland buffer widths and mitigation. WMC 21.24.320 (2)(a) species that "wetlands proximal to and influenced by the main stem of the Sammamish River or Little Bear Creek" are designated as Class 1 wetlands by the City and require a 150-foot standard buffer. The 150-foot standard buffer for Wetland A extends beyond (and therefore includes) several "non-conforming" uses, such as SR 202 and other impervious surfaces. WMC 21.24.330 (Wetlands - Development Standards) specifies that the 150-foot buffer for Class 1 wetlands can be reduced by 50 feet with enhancement of the buffer (WMC 21.24.330 (1)(a). The WMC defines enhancement in critical areas as "an action which increases the functions and values of a stream, wetland or other critical area or buffer" (WMC 21.06.208). If the existing buffer is significantly degraded, a reduced buffer may be used as long as enhancement measures provide a net improvement in overall wetland and buffer function and value (WMC 21.24.330 (1)(d). Reduction of the standard buffer for Class 1 wetlands requires a 1:1 mitigation ratio (WMC 21.24.350) (see Table 2-1).

Table 2-1. Summary of Stream and Wetland Buffer Impacts and Mitigation Ratios.

Water Body	Total Size (square feet)	State Rating Category	City Rating Category[1]	Standard Buffer Width (ft)[2]	Buffer Mitigation Ratio[3]
Sammamish River	n/a	Type S[4] (formerly Type 1)	Type 1	150	n/a[5]
Wetland A (PEM)[6]	872 sf	Category IV[7]	Class 1	150	1:1

[1] Rating system based on Woodinville Municipal Code.
[2] Standard buffer widths based on Woodinville Municipal Code.
[3] Buffer Mitigation Ratios based on Woodinville Municipal Code.
[4] Stream typing based on Washington Department of Natural Resources (DNR) classification system.
[5] Buffer reduction may be used as long as enhancement measures are implemented to provide a net improvement in overall stream and buffer function and value as determined by a qualified biologist and conducted in accordance with an approved plan (WMC 21.24.380 (1)(a).
[6] Cowardin Classification System: PEM=Palustrine Emergent.
[7] Rating system based on *Washington State Wetland Rating System for Western Washington* (Hruby 2004).

3.0 ECOLOGICAL ASSESSMENT OF EXISTING SITE

3.1 EXISTING HABITATS OVERVIEW

Existing wetland and upland habitats in the project vicinity are of low quality. Numerous non-conforming uses are present within stream and wetland buffers, and vegetated habitats have generally been reduced to narrow bands along the riverbanks.

3.2 WETLANDS

Wetland A is an 872 square foot PEM, riverine wetland (Shannon and Wilson 2007). Vegetation within Wetland A is dominated by native and non-native herbaceous species, such as climbing nightshade *(Solanum dulcamara)*, small-fruited bullrush *(Scirpus microcarpus)*, reed canarygrass *(Phalaris arundinacea)*, marsh speedwell *(Veronica scutellata)*, and creeping buttercup *(Ranunculus repens)*. In general, soils observed in Wetland A consist of a black (10YR 2/1) organic loam layer over very dark grayish (10YR 3/2) silty sand and gravelly silty sand layers. The two major hydrologic sources to Wetland A are over-bank flooding from the Sammamish River and stormwater from a created outfall channel (Shannon and Wilson 2007). During the 2006 field visit, soils were saturated to the surface and free water was observed in soil pits at approximately 16 inches from the surface. Based on the proximity of the wetland to the Sammamish River, water marks observed on the SR 202 bridge abutments, and other indirect observations, the wetland investigation (Shannon and Wilson 2007) concluded that the area is saturated for a sufficient duration during the growing season to satisfy wetland hydrology criteria.

Wetland A

Using Ecology's Washington State Wetland Rating System for Western Washington (Hruby 2004), Shannon and Wilson (2007) evaluated the potential for Wetland A, a riverine wetland, to provide water quality, hydrologic, and habitat functions. Wetland A rated low for all of these functional categories. For water quality functions, Wetland A received a score of 10 out of a possible 32 points. Although Wetland A provides considerable opportunity to improve water quality due to pollutant sources present in the surrounding landscape (e.g., untreated stormwater, sediment, nutrients, etc.), the wetland has low potential to improve water quality due to a lack of surface depressions to trap sediments during flood events and low structural diversity of the

vegetation community. For hydrologic functions, Wetland A received a score of 10 out of a possible 32 points. Although Wetland A provides considerable opportunity to reduce flooding and erosion due to the presence of built and natural resources downstream that can be damaged by flooding (e.g., roads, buildings, farms, salmon redds), the wetland has low potential to reduce flooding and erosion due to its small size and low structural diversity of the vegetation community. For habitat functions, Wetland A received a score of 5 out of a possible 32 points. Wetland A has low potential to provide habitat for a variety of species due to its low plant species richness and structural diversity, limited hydroperiod (only occasionally flooded or inundated), low habitat interspersion, lack of habitat features (e.g., large downed wood, standing snags, stable steep banks, amphibian breeding habitat, etc.), disturbed buffer habitat, and limited habitat connectivity. Overall, Wetland A received only 25 points out of a possible 96 points. Under Ecology's wetland rating system, wetlands that received fewer than 30 points are considered Category IV wetlands and generally considered to be low quality. However, as described in Section 1.4 (*Wetland Delineation Overview*), Wetland A is nonetheless considered to be a Class 1 wetland under WMC 21.24.320 [2][a]) due to its proximity and hydrologic connectivity to the Sammamish River.

3.3 UPLANDS

Uplands on the project site (within the project footprint) include both the existing roadway and immediately adjacent areas. Much of this area consists of impervious surfaces (e.g., pavement, gravel) within the Washington State Department of Transportation (WSDOT) right-of-way and Port of Seattle railroad right-of-way to the south of SR 202 on both sides of the river.

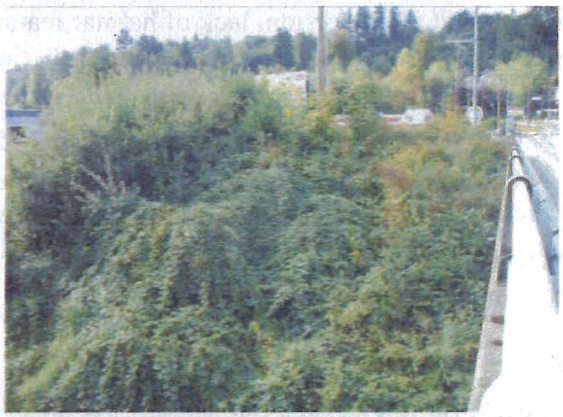
WSDOT right-of-way

Port of Seattle railway right-of-way

On the north side of the river, vegetated buffer within the project footprint is predominantly covered with Himalayan blackberry (*Rubus armeniacus*). Vegetated buffer within the project footprint on the south side of the river includes a mix of native plants that were installed along the perimeter of much of Wetland A as part of a 2003 WSDOT mitigation project to compensate for riprap placed in the Sammamish River to address scour problems around the pilings of the existing Sammamish River Bridge. The native plantings included red-osier dogwood *(Cornus sericea)*, snowberry *(Symphoricarpos albus)*, nootka rose *(Rosa nutkana)*, oceanspray *(Holodiscus discolor)*, salmonberry *(Rubus spectabilis)*, red elderberry *(Sambucus racemosa)*, and Douglas-fir *(Pseudotsuga menziesii)*. A few bigleaf maple (*Acer macrophylum*) and red alder

(*Alnus rubra*) saplings are also present; these may have been part of the mitigation plantings or self-recruited from abundant nearby seed sources. Much of this vegetation is overgrown with Himalayan blackberry. Just north and outside of the project footprint, numerous willow (*Salix* sp.) cuttings had been planted within and adjacent to the incised stormwater outfall channel that cuts perpendicularly into the slope of the riverbank in this area and feeds Wetland A. Downstream of Wetland A, along the banks of the Sammamish River, vegetation is dominated by Himalayan blackberry, with patches of reed canarygrass and creeping buttercup.

Vegetated buffer on north side of river



Vegetated buffer on south side of river

These upland habitats, which are located within the 150-foot buffers for the Sammamish River and Wetland A, have the capacity to provide some function as songbird and small mammal habitat and, along the south bank of the river, may also intercept some stormwater runoff and provide some sediment and erosion control on the steep riverbanks.

4.0 MITIGATING MEASURES

This section describes measures to avoid and minimize potential effects of the project on regulated areas (stream, wetlands, and buffers).

4.1 IMPACT AVOIDANCE AND MINIMIZATION

The proposed project has been designed to avoid direct effects on the Sammamish River and Wetland A. The new bridge abutments and road embankments would be located outside of the OHWM and the 100-year floodplain of the river, and outside of Wetland A (refer to Figure 2-1, *Project Impacts*). Road and bridge construction activities will not require any fill or dredge materials to be placed in or removed from surface waters or wetlands.

To minimize potential effects on the Sammamish River, Wetland A, and their buffers during and after project construction, the contractor would comply with standard Best Management Practices (BMPs) contained in the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT 2010). A project-specific Temporary Erosion and Sediment Control (TESC) plan would be developed and implemented. Erosion and sediment control specifications would focus on soil and slope protection and stabilization measures, followed by site restoration measures (including planting materials). Specific measures would include (but not be limited to) the following:

- Construction activities will be confined to the minimum area necessary to complete the project.
- The boundary of clearing limits associated with site access and construction limits will be flagged to prevent ground disturbance outside the limits.
- Erosion control measures (e.g., silt fences) will be installed to protect the Sammamish River and Wetland A.
- Removal of riparian vegetation, if needed, will be limited to the minimum necessary to install the drilled shafts and abutments for the bridge.
- Exposed soils will be stabilized during the first available period and will not be allowed to sit idle for more than 2 to 7 days without being treated as specified in the TESC plan. In the Puget Sound region, no soils can remain unstabilized for more than 2 days from October 1 to April 30, and no more than 7 days from May 1 to September 30.
- Standard roadside landscaping will be installed along the north and south sides of SR 202.

Working over the Sammamish River, and creating new permanent shade over the river from the new bridge, would require a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW). To compensate for these effects, WDFW has indicated that the HPA for this project will require non-native invasive species (primarily Himalayan blackberry) to be eradicated from beneath the new bridge structure and the area to be planted with native species such as those present in shade under the existing bridge — nootka rose, oceanspray, and

salmonberry. A detailed planting plan will be developed as part of the landscape design for the project.

4.2 UNAVOIDABLE IMPACTS

The proposed project would permanently alter 0.28 acre (12,286 square feet) of combined stream and wetland buffer (see Figure 2-1). A large proportion (8,516 square feet out of a total 12,286 square feet) of the stream and wetland buffer habitat that would be affected by the proposed project is currently in non-conforming uses, including the existing roadway and other impervious surfaces associated with surrounding urban development (see Figure 2-1). Only about 3,770 square feet of the affected buffer area is currently vegetated.

5.0 COMPENSATION PLAN

This section describes the location and existing condition of the proposed mitigation site, and the proposed mitigation approach to compensate for unavoidable impacts on wetland and stream buffers from the Sammamish Bridge and Road (SR 202) Project.

5.1 OVERVIEW OF PROPOSED COMPENSATION

The proposal to compensate for the unavoidable effects on stream and wetland buffer habitat from the proposed project is to enhance approximately 0.28 acre (12,286 square feet) of combined stream and wetland buffer habitat along Little Bear Creek on City of Woodinville property located north of 134th Street and east of SR 522, northeast of the project site.

5.2 PROPOSED MITIGATION SITE

The proposed mitigation site is located on a 7-acre City owned property (parcel no. 9517100250) located at NE 134th Street (Figure 5-1, *Proposed Mitigation Site*).

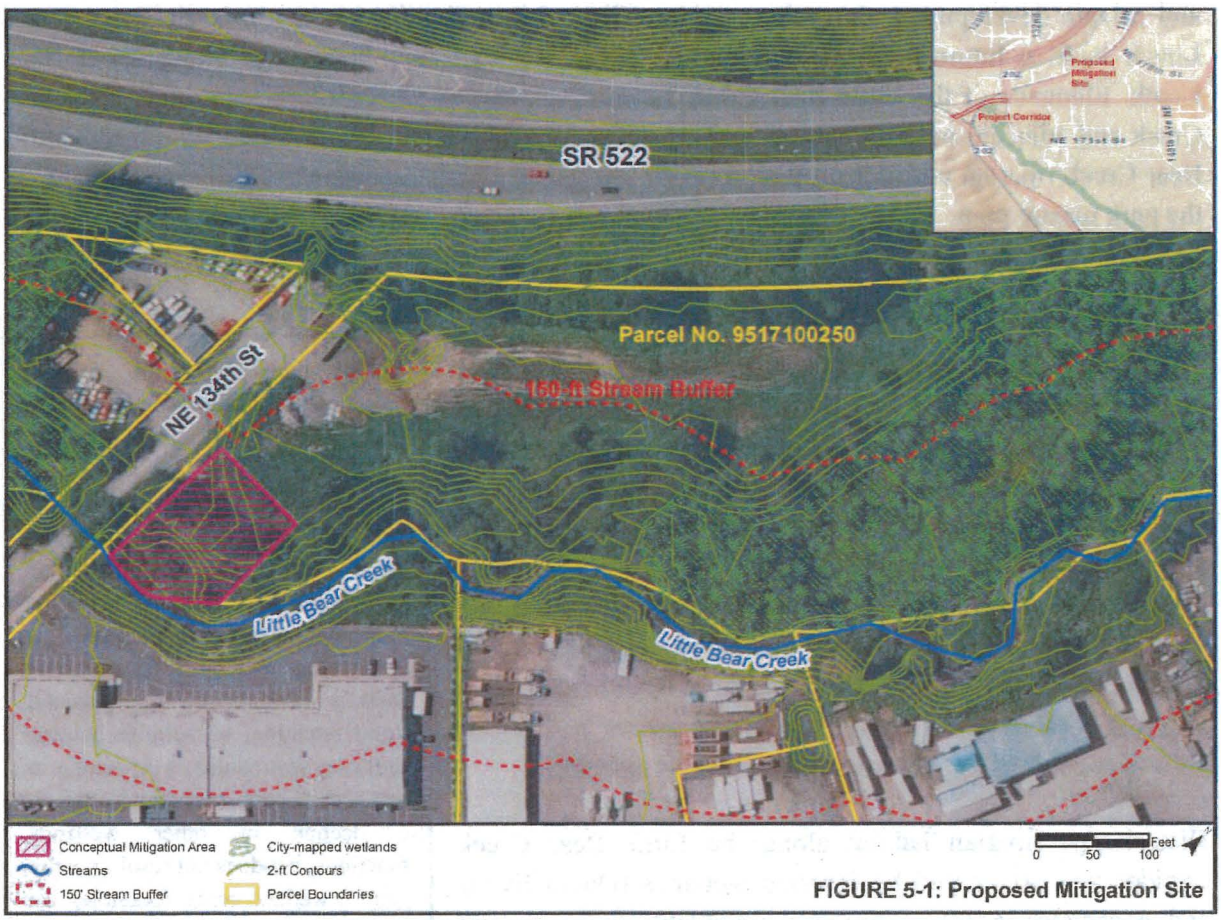


FIGURE 5-1: Proposed Mitigation Site

Little Bear Creek, which flows through the parcel, is the largest natural surface drainage for the City of Woodinville. The entire Little Bear Creek watershed drains about 15 square miles, of which about 1,920 acres is within the City of Woodinville. The main stem of the creek is

approximately 7.7 miles long, 2.2 miles of which are within the City of Woodinville. The creek's overall gradient is very gradual with an average slope of 0.8%. The drainage basin was originally dominated by forested wetlands and still contains many riparian wetlands despite considerable development pressure within urban areas. The proposed mitigation site is located in the lower main stem of the creek, which flows roughly parallel to SR 522. Within the mitigation site, the creek is bordered by a poor quality riparian corridor and nearby commercial development. South of the proposed mitigation site, Little Bear Creek flows through commercial portions of downtown Woodinville before flowing into the Sammamish River. Nine species of resident and anadromous fish use Little Bear Creek. Six salmonid species, including the endangered Chinook salmon (*Oncorhynchus tshawytscha*) use Little Bear Creek for spawning and migration (David Evans and Associates 2002; City of Woodinville 2004).

The City of Woodinville 2001–2005 Recreation Plan includes future plans for a linear park along Little Bear Creek (Little Bear Creek Linear Park) on the same property as the mitigation site, which is intended to be a focal point for downtown development, protect valuable salmon habitat, and provide passive trails and interpretive facilities in conjunction with stormwater improvements and private development along the corridor (City of Woodinville Undated). Little Bear Creek Linear Park, a future 6.48-acre community park, will include a linear trail along Little Bear Creek. Elements of the Little Bear Creek Linear Park master plan include restoring Little Bear Creek and adjacent wildlife habitat. Enhancement of wetland and stream buffer within the Little Bear Creek riparian corridor on the proposed mitigation site is consistent with these elements of the park master plan.

5.3 Mitigation Approach

The general mitigation approach is to **enhance** 0.28 acre of riparian habitat along Little Bear Creek by planting native vegetation and controlling invasive non-native species to move the composition of the vegetation community closer to its historical condition (described below), increase native species richness and habitat structural diversity, and improve overall riparian function. The mitigation approach would not involve alterations to the overall topography or hydrology of the site, but could potentially include minor localized grading in some locations and would include measures to stabilize soils disturbed during the removal of invasive species.

> Within the context of wetland mitigation, **enhancement** is the manipulation of the physical, chemical, or biological characteristics of a wetland to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood retention, or wildlife habitat. Enhancement results in a change in wetland functions(s) and can lead to a decline in other wetlands functions, but does not result in a net gain in wetland acres. Examples are planting vegetation, controlling non-native or invasive species, and modifying site elevations to alter hydroperiods. (Ecology et al. 2006)

Historically, riparian habitat along the Little Bear Creek corridor was dominated by forested wetlands (David Evans and Associates 2002). A review of available literature and exploratory field investigations of existing soils, hydrology, and vegetation communities adjacent to Little Bear Creek indicate that the proposed mitigation site, located at the downstream edge of the property, is non-wetland. However,

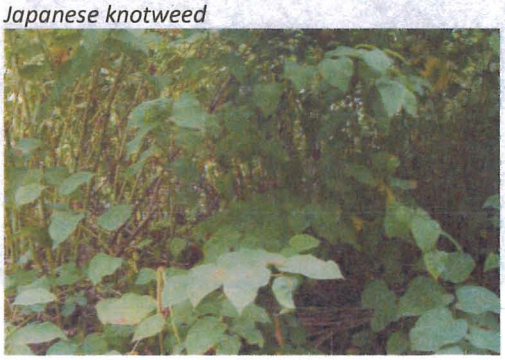
riparian habitat upstream of the proposed mitigation site on the same property is mapped as wetland by the City of Woodinville (City of Woodinville 2011a) (see Figure 5-1). If the location and/or configuration of the mitigation site on the property were altered during final design of the mitigation project, it may be necessary to delineate wetland boundaries to determine their location relative to the proposed mitigation site.

The proposed mitigation site includes two general zones differentiated by position in the landscape and existing vegetation community (see Figure 5-2, *Proposed Planting Zones*). Zone 1 includes the relatively small floodplain terraces of varying widths that occur lowest in the landscape immediately adjacent to Little Bear Creek. The area of Zone 1 is 2,835 square feet (23%) of the total 12,286 square foot mitigation site. Vegetation in Zone 1 includes an overstory of native deciduous riparian trees (predominantly black cottonwood [*Populus balsamifera* ssp. *trichocarpa*] and red alder) and is lacking in native conifers; an understory shrub layer that includes native willows, pacific ninebark (*Physocarpus capitatus*), and some indian plum (*Oemleria cerasiformus*), but is dominated Himalayan blackberry throughout and large patches of Japanese knotweed (*Polygonum cuspidatum*) in several areas; and an herbaceous layer that is dominated by the native common touch-me-not (a.k.a. western touch-me-not or jewelweed) (*Impatiens noli-tangere*), non-native creeping buttercup and morning glory (*Convulvulus* sp.), with some native horsetail (*Equisetum* sp.) and lady fern (*Athyrium felix-femina*). Willows and pacific ninebark are commonly rooted at the stream edge and overhang the stream channel. Relatively large cottonwood and red alder are rooted throughout the floodplain terrace and form a relatively closed canopy over the stream channel. Large downed (live) willow trees are present both over and adjacent to the stream channel.

Representative tree canopy above floodplain terrace

Representative stream valley bank covered in Himalayan blackberry, reed canarygrass, and Japanese knotweed

Representative understory on floodplain terrace



Japanese knotweed adjacent to stream

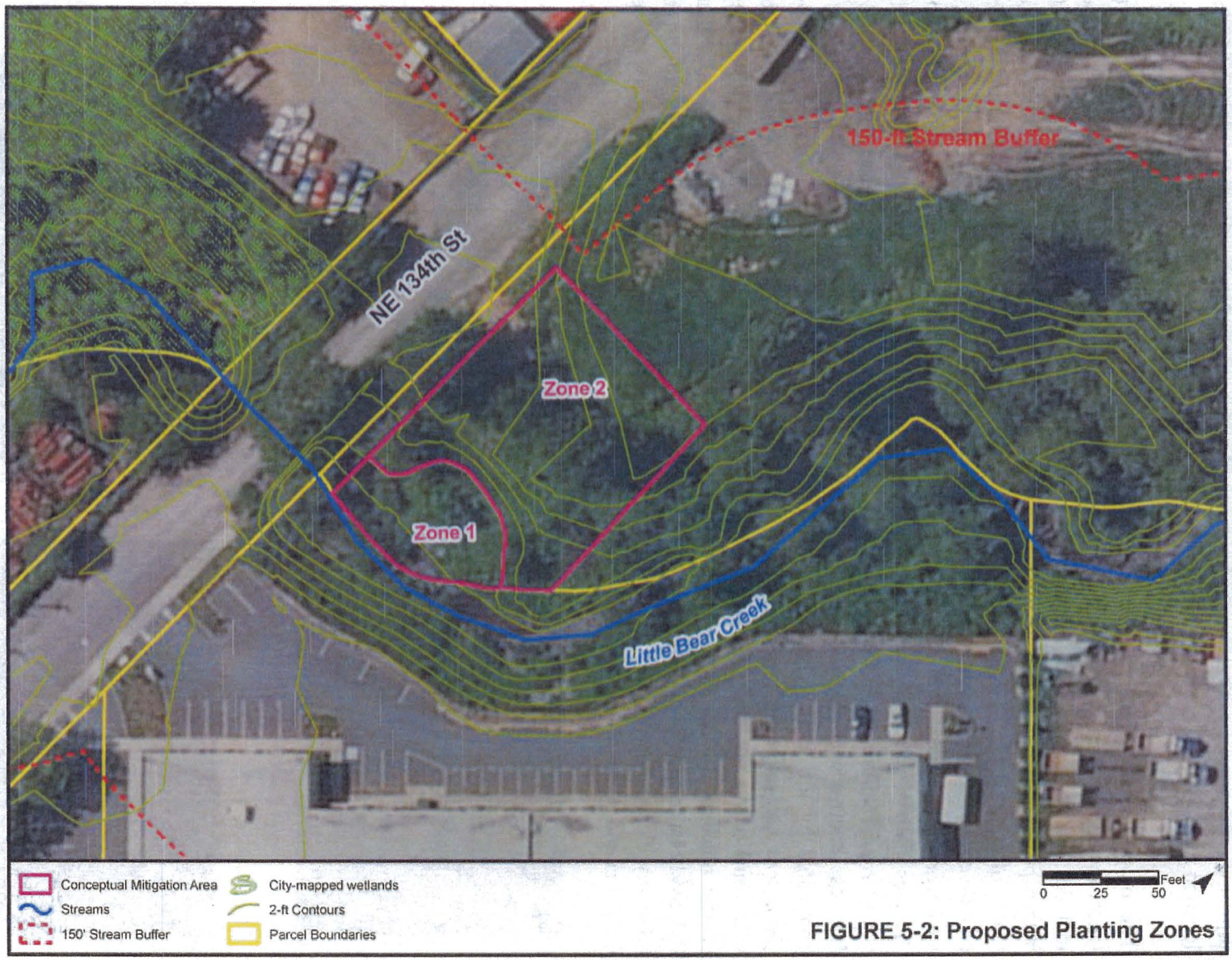


FIGURE 5-2: Proposed Planting Zones

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Previous studies of the Little Bear Creek riparian corridor have identified a lack of large conifers in this watershed (David Evans and Associates 2002). Observations made in the field of vegetation communities within and in the vicinity of the proposed mitigation site confirm this.

The proposed mitigation approach for Zone 1 includes eradicating and/or controlling non-native invasive species, planting native conifer trees within the existing riparian habitat to improve tree species richness, and planting native understory shrubs (including small trees) and ferns to improve species richness and structural diversity in the understory.

Discretely rooted non-native invasive species, such as Himalayan blackberry, would be removed from the mitigation area prior to implementation of the planting plan detailed in Section 5.4; regular maintenance would be conducted to discourage re-establishment. Because Himalayan blackberry is prevalent throughout the property, not just within the proposed mitigation area, intensive and long-term maintenance will be required to ensure that adjacent populations do not re-establish within the mitigation site itself, thereby jeopardizing the success of the mitigation. Initial strategies to eradicate Himalayan blackberry prior to implementation of the planting plan could include a combination of: (1) mowing the aboveground vegetation and applying herbicide in large monotypic stands; and (2) where mixed with native vegetation, hand-cutting and targeted spot spraying.

Japanese knotweed is present in several dense monoculture patches adjacent to Little Bear Creek on floodplain terraces, and numerous populations also occur upstream. Given its extensive root system and sprouting ability, along with its ability to spread easily downstream, successful eradication even on a patch-by-patch basis could take several years and multiple treatments. Populations upstream of the mitigation site contribute to a high risk of re-infestation, even if it is successfully eradicated from the site initially. Strategies to eradicate Japanese knotweed from the mitigation site would be developed following more detailed evaluation of the extent of site infestation, using King County BMPs for the control of this species (King County 2008). Manual methods to remove Japanese knotweed may be appropriate if access is easy, and populations are isolated and reasonably small (50 stems or less). However, manual methods will require an intensive control regimen. Use of herbicide as a control measure would need to comply with applicable restrictions in critical areas. Due to the intensive measures and long-timeframe typically necessary to control Japanese knotweed, understory shrubs and ferns would not be planted in areas currently infested by this species on the site as part of this mitigation approach. However, native shrubs, ferns, and herbaceous species and management activities could be added in the future. Zone 1 would be planted with native conifer trees, shrubs, and ferns according to the planting plan in Section 5.4.

Zone 2 includes the moderately steep floodplain terrace slopes and adjacent flat open areas. The area of Zone 2 is 9,466 square feet (77%) of the total 12,286 square foot mitigation site. The steep floodplain terrace slopes in Zone 2 are dominated by dense Himalayan blackberry and reed canarygrass, except at the downstream end of the property where Japanese knotweed also extends up a portion of the slope. The flat, open areas in Zone 2 are dominated by reed canarygrass with Himalayan blackberry along most of the border.

The proposed mitigation approach for Zone 2 includes eradicating and/or controlling non-native invasive species, and planting native trees and shrubs according to the planting plan detailed in Section 5.4. Measures would be taken to control reed canarygrass in the mitigation area prior to implementation of the planting plan, and regular maintenance would be needed to allow the installed native woody plants to establish. Because reed canarygrass is present in a dense monoculture throughout the property adjacent to the proposed mitigation site, and this species spreads both by seed and rhizomatous growth, it will not be possible to completely eliminate it from the site. Strategies for controlling reed canarygrass could include a combination of: (1) preconstruction mowing and herbicide applications; (2) leaving herbicide-treated reed canarygrass thatch in place to act as a mulch in the short term and installing woody mulch in other areas where soils are disturbed (or otherwise exposed); and (3) installing dense plantings of woody species per the planting plan. Himalayan blackberry and Japanese knotweed in Zone 2 would be addressed in the same manner as described above for Zone 1.

Representative flat, open, reed canarygrass-dominated meadow

Plantings in Zone 2 would focus on establishing native deciduous and coniferous canopy trees to move these areas toward a mixed deciduous-conifer riparian forest habitat. Understory plantings in Zone 2 would focus on native shrubs (and small trees) that are tolerant of open to partially open conditions to expedite the establishment of a native understory shrub layer, which is currently almost completely lacking. Due to the need for frequent and long-term management activities to reduce reed canarygrass cover on the site, herbaceous species would not be planted in Zone 2 as part of this mitigation approach.

5.4 PLANTING PLAN

The proposed mitigation approach involves planting locally dominant (western Washington lowland riparian) plant species with the goals of: (1) increasing native plant species richness and structure in existing riparian forest habitat that lacks large conifers and native understory, and is also infested with Himalayan blackberry and Japanese knotweed (Zone 1); and (2) establishing mixed deciduous-coniferous riparian forest and shrub canopy in an existing reed canarygrass and Himalayan blackberry infested meadow (Zone 2).

The proposed mitigation site would be planted with native species as detailed in Tables 5-1 and 5-2 below and as illustrated in Figure 5-2. All native trees growing within the proposed mitigation site would remain. All native understory vegetation (e.g., shrubs and herbs) growing within the proposed mitigation site would be retained to the extent possible. Since it is not known exactly where there are openings in the existing riparian forest for new plantings in Zone 1, or precisely where intensive long-term management of Japanese knotweed might be necessary, specific planting locations in Zone 1 would be determined in the field. Final selection of plant

locations would be coordinated between the biologist/wetland specialist implementing the Mitigation Plan and the City.

Plant material would be obtained, when possible, from local native plant nurseries growing stock from the local region. Native plant species have been selected based on their suitability for the site conditions. If the indicated species is not available, then a qualified biologist/wetland specialist would need to approve substitutions. The preferred period for installing container native plant stock is in the fall. Following installation, all planting holes would be backfilled with topsoil and bark mulch applied 3 inches deep over the entire mitigation site. New vegetation would be irrigated from June 1 to September 30 for the first 2 years of the 5-year monitoring period.

Installation of native plants within the mitigation area would be conducted under the supervision of a qualified biologist experienced in native habitat restoration and native plant installation. The supervising biologist would be present during various stages in the implementation of the Mitigation Plan. The on-site biologist should be present during planting to inspect plant materials, ensure that specific plant species are located in appropriate habitats, and ensure that plants are protected from animal browse. Field visits by the on-site biologist would be conducted: (1) for approval of all plant materials and their locations; (2) following installation of trees and protection measures; and (3) at final inspection.

Implementation of the proposed Mitigation Plan would begin prior to the start of construction of the proposed Sammamish River Bridge and Road (SR 202) Project, and would be completed no later than 1 year after the completion of the proposed bridge and road project.

Table 5-1. Sammamish River Bridge and Road Project, Mitigation Site, Zone 1 Plant List.

Common Name	Scientific Name	Indicator Status[1]	Light Needs[2]	Site Placement[3]	Planting Pattern[4]	Plant Spacing[5]	Proportion in Strata	Plant Density (2,835 sq ft)[6]	Type of Plant Material
TREES									
Sitka spruce	*Picea sitchensis*	FAC	SI	SS, WE, WB	Clustered	6' OC	20	9	1 gallon
Western red cedar	*Thuja plicata*	FAC	SD	SS, WE, WB	Clustered	6' OC	20	9	1 gallon
SHRUBS									
Red osier dogwood	*Cornus sericea (stolonifera)*	FACW	ST	WE, SS, WB	Clustered	4' OC	20	41	1 gallon
Black twinberry	*Lonicera involucrata*	FAC	SI-ST	WE, SS, WB	Clustered	4' OC	20	41	1 gallon
Indian plum	*Oemleria cerasiformus*	FACU	SD	WB, DB	Clustered	4' OC	20	41	1 gallon
Nootka/Wild-clustered rose	*Rosa nutkana/R. pisocarpa*	FAC	ST	WE, SS, WB	Clustered	4' OC	20	41	1 gallon
Salmonberry	*Rubus spectabilis*	FAC	HA	WE, WB, DB	Clustered	4' OC	20	41	1 gallon
FERNS									
Lady fern	*Athryium felix-femina*	FAC	ST	SW, WB	Clustered	4' OC	20	41	1 gallon

[1] OBL=Obligate Wetland (Occurs almost always in wetlands under natural conditions; estimated probability 99%). FACW=Facultative Wetland (Usually occurs in wetlands; estimated probability 67% - 99%, but occasionally found in non-wetlands). FAC=Facultative (Equally likely to occur in wetlands or non-wetlands; estimated probability 34% - 66%). FACU=Facultative Upland (Usually occurs in non-wetlands; estimated probability 67% - 99%, but occasionally found on wetlands; estimated probability 1% - 33%). UPL=Obligate Upland (Occurs almost always in non-wetlands under natural conditions; estimated probability 99%, but may occur in wetlands in other regions).

[2] SI=Shade Intolerant. ST=Shade Tolerant. SD=Shade Dependent. HA=Highly Adaptable.

[3] DB=Drier Buffer. WB=Wetter Buffer. WE=Water's Edge. SS=Saturated Soils. SW=Shallow Water.

[4] Plants to be placed in random, naturalized clusters.

[5] OC=On Center. Plant spacing is based on planting specifications contained in City of Woodinville Wetland and Stream Mitigation Guidelines (City of Woodinville 2007).

[6] Plant Density = Total number of plants per area.

Table 5-2. Sammamish River Bridge and Road Project, Mitigation Site, Zone 2 Plant List.

Common Name	Scientific Name	Indicator Status[1]	Light Needs[2]	Site Placement[3]	Planting Pattern[4]	Plant Spacing[5]	Proportion in Strata (%)	Plant Density (9,466 sq ft)[6]	Type of Plant Material
TREES									
Grand fir	*Abies grandis*	FACU	SI-ST	DB	Clustered	6' OC	15	45	1 gallon
Bigleaf maple	*Acer macrophyllum*	FACU (FAC)	SI-ST	WB, DB	Clustered	6' OC	20	61	1 gallon
Red alder	*Alnus rubra*	FAC	SI-ST	WB, DB	Clustered	6' OC	20	61	1 gallon
Douglas-fir	*Pseudotsuga menziesii*	FACU	SI	WB, DB	Clustered	6' OC	15	45	1 gallon
Western red cedar	*Thuja plicata*	FAC	SD	SS, WE, WB	Clustered	6' OC	15	45	1 gallon
Western hemlock	*Tsuga heterophylla*	FACU	SD	DB	Clustered	6' OC	15	45	1 gallon
SHRUBS									
Vine maple	*Acer circinatum*	FAC	SD	WB, DB	Clustered	4' OC	20	137	1 gallon
Serviceberry	*Amelanchier alnifolia*	FACU	SI	DB	Clustered	4' OC	10	69	1 gallon
Beaked hazelnut	*Corylus cornuta*	FACU	ST	DB	Clustered	4' OC	10	69	1 gallon
Ocean spray	*Holodiscus discolor*	NI	SI-ST	DB	Clustered	4' OC	10	69	1 gallon
Nootka/wild-clustered rose	*Rosa nutkana/R. pisocarpa*	FAC (OBL)	ST	WE, SS, WB	Clustered	4' OC	20	137	1 gallon
Red elderberry	*Sambucus racemosa*	FACU	HA	WB, DB	Clustered	4' OC	10	69	1 gallon
Western snowberry	*Symphoricarpos albus*	FACU	SI	WB, DB	Clustered	4' OC	20	137	1 gallon

[1] OBL=Obligate Wetland (Occurs almost always in wetlands under natural conditions; estimated probability 99%). FACW=Facultative Wetland (Usually occurs in wetlands; estimated probability 67% - 99%, but occasionally found in non-wetlands). FAC=Facultative (Equally likely to occur in wetlands or non-wetlands; estimated probability 34% - 66%). FACU=Facultative Upland (Usually occurs in non-wetlands; estimated probability 67% - 99%, but occasionally found on wetlands; estimated probability 1% - 33%). UPL=Obligate Upland (Occurs almost always in non-wetlands under natural conditions; estimated probability 99%, but may occur in wetlands in other regions).

[2] SI=Shade Intolerant. ST=Shade Tolerant. SD=Shade Dependent. HA=Highly Adaptable.

[3] DB=Drier Buffer. WB=Wetter Buffer. WE=Water's Edge. SS=Saturated Soils. SW=Shallow Water.

[4] Plants to be placed in random, naturalized clusters.

[5] OC=On Center. Plant spacing is based on planting specifications contained in City of Woodinville Wetland and Stream Mitigation Guidelines (City of Woodinville 2007).

[6] Plant Density = Total number of plants per area.

6.0 GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

This section describes the overall goals of the proposed mitigation project, specific actions (objectives) proposed to achieve the mitigation goals, and quantifiable performance standards to determine if the goals are being met. Performance standards are based on the City of Woodinville Wetland and Stream Mitigation Guidelines (City of Woodinville 2007), interagency guidance on wetland mitigation in Washington State (Ecology et al. 2006), and best professional judgment; and are designed specifically to measure whether the mitigation objectives are achieved.

6.1 GOALS AND OBJECTIVES

The overall goal of this mitigation plan is to **enhance 0.28 acre of riparian stream buffer habitat**.

The specific objectives of the proposed Mitigation Plan are to:

Objective #1: For Zone 1, establish native conifers in existing deciduous riparian forest where they are lacking.

Objective #2: For Zone 1, establish a native understory in existing deciduous riparian forest where the understory is currently dominated by Himalayan blackberry and Japanese knotweed.

Objective #3: For Zone 2, establish native tree and shrub canopy in disturbed open areas currently dominated by reed canarygrass and Himalayan blackberry.

Objective #4: For Zones 1 and 2, reduce the percent cover of non-native invasive species, predominantly reed canarygrass, Himalayan blackberry, and Japanese knotweed, from within the Little Bear Creek riparian buffer.

Achievement of these objectives is expected to improve water quality and habitat functions of the riparian buffer.

6.2 PERFORMANCE STANDARDS

The success of the proposed mitigation would be based on meeting the following performance standards. Successfully meeting the performance standards for installed native vegetation survival and plant establishment would ensure that species richness, species diversity, and structural diversity on the mitigation site are substantially increased.

Performance Standards for Objective #1

For Zone 1, establish native conifers in existing deciduous riparian forest where they are lacking.

Survival of Installed Native Vegetation:

- Survival of 100% of installed native plantings in Years 1 and 2.
- Survival of 90% of installed native plantings in Years 3 and 4.
- Survival of 80% of installed native plantings in Year 5.

Performance Standards for Objective #2

For Zone 1, establish a native understory in existing deciduous riparian forest where the understory is currently dominated by Himalayan blackberry and Japanese knotweed.

Survival of Installed Native Vegetation:

- Survival of 100% of installed native plantings in Years 1 and 2.

Plant Establishment (Density and Percent Area Cover):

- Native woody species (planted and volunteer) will achieve an average density of at least 4 plants per 100 square feet in Year 3.
- Aerial cover of native woody species (planted and volunteer) will be a minimum of 20% in Year 5.

Native plants that recruit naturally into the site may be counted toward the Plant Establishment performance standard.

Performance Standards for Objective #3

For Zone 2, establish native tree and shrub canopy in disturbed open areas currently dominated by reed canarygrass and Himalayan blackberry.

Survival of Installed Native Vegetation:

- Survival of 100% of installed native plantings in Years 1 and 2.

Plant Establishment (Density and Percent Area Cover):

- Native woody species (planted and volunteer) will achieve an average density of at least 4 plants per 100 square feet in Year 3.
- Aerial cover of native woody species (planted and volunteer) will be a minimum of 20% in Year 5.

Performance Standards for Objective #4

For Zones 1 and 2, reduce the percent cover of non-native invasive species, predominantly reed canarygrass, Himalayan blackberry, and Japanese knotweed, from within the Little Bear Creek riparian buffer.

Non-Native and Invasive Species:

- Yearly maintenance activities shall include 100% removal of discretely rooted plants (e.g., Himalayan blackberry) within the mitigation site.

- A reduction in the overall vigor and density of rhizomatous colonizing invasive species (e.g., reed canarygrass, Japanese knotweed) within the mitigation site by the end of the 5-year monitoring period.
- 10% aerial cover or less of non-native and invasive species in each stratum within the mitigation site in Years 3–5 of the 5-year monitoring period, except for reed canarygrass.
- 25–30% aerial cover or less of reed canarygrass within the mitigation site in years 3–5 of the 5-year monitoring period.

The City's Wetland and Stream Mitigation Guidelines (City of Woodinville 2007) state that "Non-native and other invasives - Himalayan blackberry, Japanese knotweed, evergreen blackberry, reed canarygrass, Scots broom, English ivy, morning glory, etc. - may only comprise up to 10% cover in any given stratum (e.g., tree, shrub, herbaceous)." However, given the dense reed canarygrass monoculture that currently dominates Zone 2 of the mitigation site and the widespread failure of mitigation sites in achieving this performance standard for reed canarygrass, this performance standard is not considered appropriate for this Mitigation Plan. Joint guidance issued by the Washington State Department of Ecology (Ecology), the Environmental Protection Agency (EPA) Region 10, and the Corps Seattle District (Ecology et al. 2006) suggests that a 10% threshold for reed canarygrass is not appropriate unless the site contains little or no reed canarygrass. Regulators have recently been allowing more realistic, higher reed canarygrass thresholds (25–30%) on mitigation sites where it is widespread (WSDOT 2008). Therefore, a 25–30% cover threshold for reed canarygrass is recommended in the performance standards for this Mitigation Plan.

6.3 Adaptive Management Actions / Contingency Plan

If monitoring (described in Section 8) indicates that a performance standard is not met within the time specified in the performance standards, the causes of the failure will be analyzed and corrective actions and a time for implementing these actions will be proposed. Corrective actions include (but are not limited to) the following:

- Install fencing, if there is evidence of extensive vandalism or repeated theft of mitigation plantings.
- Replace all dead or diseased installed native plants observed within the planting area during monitoring Years 1 and 2.
- Replace all plants that die during Years 3–5 to meet the performance standards outlined in Section 6.2. If greater than 50% of the individuals of any species die, changes to species composition, locations, and/or proportions will be considered.
- If the percent cover of reed canarygrass exceeds 30% within the mitigation site after Year 3 of the monitoring period, develop a custom-designed reed canary-grass maintenance plan to include appropriate control measures.
- If the percent cover of any other non-native invasive or designated noxious weed (e.g., Himalayan blackberry, Japanese knotweed) exceeds 10% within the mitigation site in any monitoring period, develop a custom-designed maintenance plan to include appropriate control measures.

- If the mitigation project fails to meet any of the performance standards, a qualified biologist will prepare a contingency mitigation plan to be submitted to the appropriate regulatory authorities for approval.

7.0 MAINTENANCE PLAN

Maintenance of the installed plant material would be the responsibility of the City or its contractor during the 5-year monitoring period. Ongoing maintenance activities would include removal or control of unwanted plant species, weeding trees and shrubs to the drip line, installing and maintaining temporary irrigation, replacing dead plants, mulching, removing litter, and addressing any herbivory or vandalism issues.

7.1 NON-NATIVE AND INVASIVE PLANT CONTROL

Maintenance activities to control reed canarygrass on the mitigation site could include frequent mowing, weed-wacking, and hand weeding. If manual control measures prove insufficient to meet the performance standards for the control of reed canarygrass, spot-spraying of any new growth should be considered as a contingency measure.

Maintenance activities to control Himalayan blackberry could include manual removal or targeted cut-and-treat methods. Other invasive non-native vegetation occurring on the proposed mitigation site would be managed according to Washington State Noxious Weed Law (Chapter 17.10 RCW), administered by the King County Noxious Weed Control Board in King County, and the King County Noxious Weed List (King County 2011), using methods appropriate to the species found.

Unwanted grasses or weeds should be removed around installed trees and shrubs to the drip line on a regular basis by mowing, cutting, raking, or hand-pulling to reduce competition for the first 2 years or until plantings are well established.

7.2 TEMPORARY IRRIGATION

Installed vegetation would be irrigated from June 1 to September 30 for the first 2 years of the 5-year monitoring period. Use of a mobile watering truck and hand watering are recommended for this site.

7.3 REPLACEMENT OF PLANT MATERIAL

All dead or diseased installed native plants observed during the monitoring period in Years 1 and 2 would be replaced. All plants that die during Years 3–5 would be replaced to meet the performance standards outlined in Section 6.2.

8.0 MONITORING PLAN

In accordance with WMC 21.24.400 (Streams - Mitigation Requirements), the proposed mitigation project would be monitored each year for a period of 5 years following plant installation. An approved monitoring protocol would be implemented to assess the performance of the Mitigation Plan following construction. Monitoring results would be compared to performance standards to evaluate the success of the mitigation effort, and annual monitoring reports would be submitted to the appropriate City agency by September 1st of each monitoring year.

An as-built plan will be completed for use as a reference for subsequent performance monitoring within the mitigation site. Baseline monitoring would be conducted immediately following planting. Year 1 monitoring would occur the first year after completion of installation. Subsequent monitoring would be conducted during the growing season (generally during the spring) of Years 2, 3, 4, and 5. Invasive species monitoring would occur two times per year (in the spring and fall) during Years 1, 2, and 3, and reduced to one time per year (in the spring) in subsequent years if performance standards are being met.

The following data would be collected to monitor the success of the mitigation:

- Photos from nine established permanent photo points.
- Counts of surviving installed plants by species in nine established permanent sampling plots.
- Density and percent aerial cover of all species in nine established permanent sampling plots.
- General observations of all plantings, including size, new growth, presence of disease, harmful insects and yellowed leaves, browsing effects, etc. to determine the general condition of all plantings.
- General observations regarding wildlife presence and habitat use.

Photos will be taken of the mitigation site from nine established permanent photo points. To aid identification of photo points in future years, they will be marked with steel stakes and their location recorded using global positioning system (GPS) during baseline monitoring (immediately following planting).

Monitoring will take place at three established permanent sampling plots in Zone 1 and at six established permanent sampling plots in Zone 2. In Zone 1, one permanent sampling plot will be established to monitor existing patches of Japanese knotweed, one plot will be established to monitor shrubs, and one plot will be established to monitor ferns. Trees planted in Zone 1 will be evaluated individually. In Zone 2, two shrub monitoring plots, two tree monitoring plots, one reed canarygrass monitoring plot, and one Himalayan blackberry monitoring plot will be established. Except for the sample plots for Japanese knotweed and Himalayan blackberry, sample plots will

be randomly located. Each permanent sampling plot and photo point will be marked with a steel stake and its location recorded using GPS during baseline monitoring. Emergent species will be monitored in 1-meter plots, shrubs will be monitored in 5-meter plots, and trees will be monitored in 10-meter plots. Within each sampling plot, surviving installed plants will be counted by species to determine percent survival for Years 1 and 2, density and percent aerial cover of each species in each stratum will be recorded, and other observations regarding the general condition of all plantings will be noted. General observations regarding wildlife presence and habitat use will be noted for the entire site.

9.0 PERFORMANCE GUARANTEES

A performance and maintenance security will be established to ensure compliance with the terms of this Mitigation Plan. In accordance with City of Woodinville requirements, the amount of the performance security will be equivalent to 150% of the cost of all elements of the mitigation project for the duration of the monitoring period (City of Woodinville 2007). A worksheet detailing the calculation of the performance and maintenance security will be provided to the City's Permit Center for review and approval prior to issuance of the development permit.

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APPENDIX A

Conceptual Mitigation Design