



Springbrook Creek Wetland and Habitat Mitigation Bank Mitigation Bank Instrument



August 8, 2006 – Final



Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

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Executive Summary

Location: The Springbrook Creek Wetland and Habitat Mitigation Bank (Springbrook Bank) is located in the City of Renton, King County, Washington; Sections 25, 30, and 36, Township 23N, Ranges 4E and 5E; Lat 47° 27' 20" Long 122° 14' 24". Portions of the site are adjacent to Springbrook Creek. Springbrook Bank is located in the Green-Duwamish Watershed (Water Resources Inventory Area [WRIA] 9).

Service Area: The service area of Springbrook Bank includes portions of the Cedar-Sammamish Watershed (WRIA 8) and the Green-Duwamish Watershed (WRIA 9).

Size of Bank: Springbrook Bank is expected to generate 45.12 mitigation credits on the 129.37-acre site. One credit compensates for one acre of Category II wetland.

Land Owner: The City of Renton (City) owns the land within Springbrook Bank.

Bank Sponsors: The City and Washington State Department of Transportation (WSDOT) will operate and manage Springbrook Bank.

Type of Bank: Springbrook Bank will generate wetland mitigation credits through the re-establishment, rehabilitation, and enhancement of wetlands combined with the enhancement of upland and riparian areas.

Purpose: The purpose of Springbrook Bank is to provide compensation for unavoidable impacts to wetlands and other aquatic resources caused by WSDOT highway construction projects and City mitigation requirements within the service area.

Goal: The goal of Springbrook Bank is to increase wetland area and encourage improved hydrologic, water quality, and habitat functions, while facilitating environmental education opportunities.

Objectives: The objectives of Springbrook Bank are to re-establish 17.79 acres of wetland, rehabilitate 52.14 acres of wetland, enhance 32.54 acres of wetland, and enhance 7.80 acres of upland and 6.55 acres of riparian upland adjacent to Springbrook Creek for a total of 116.82 acres; the remaining acreage consists of non-credit generating buffers. The proposed restoration and enhancement activities will re-connect floodplain wetlands with Springbrook Creek, re-establish wetlands, and may improve water quality, hydrologic, floodplain, habitat, and riparian functions in a highly urbanized area.

Use of Credits: WSDOT anticipates using its credits from Springbrook Bank for transportation projects within the service area. The City will use its credits for projects within the service area.

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Appendix A: Springbrook Creek Wetland and Habitat Mitigation Bank Monitoring Plan

List of Acronyms and Abbreviations

AEMRA	Advanced Environmental Mitigation Revolving Account
BA	Biological Assessment
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe
BOC	Bank Oversight Committee
CBMOA	Wetland Compensation Bank Memorandum of Agreement
Corps	U.S. Army Corps of Engineers
CZMA	Coastal Zone Management Act
DAHP	Department of Archaeology and Historic Preservation
DPS	Distinct Population Segment
DNS	Determination of Non-Significance
Ecology	Washington State Department of Ecology
EEI	Early Environmental Investments
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
HGM	Hydrogeomorphic
HOV	High Occupant Vehicle
HPA	Hydraulic Project Approval
I	Interstate
IM	Medium Industrial
IP	Individual Permit
LWD	Large woody debris
MBI	Mitigation Bank Instrument
MBRT	Mitigation Bank Review Team
MOA	Memorandum of Agreement
NAVD88	North American Vertical Datum 1988
NE	no effect
NEPA	National Environmental Policy Act
NLAA	may affect, but is not likely to adversely affect
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resource Conservation Service
RC	Resource Conservation
RCG	Reed canarygrass
SEPA	State Environmental Policy Act
SR	State Route

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SSDP	Shoreline Substantial Development Permit
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WFAM	Washington State Wetland Function Assessment Methods
WQC	Water Quality Certification
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION AND BACKGROUND INFORMATION

The Mitigation Bank Instrument (Instrument) for the Springbrook Creek Wetland and Habitat Mitigation Bank (Springbrook Bank) contains information required for its approval. This document was prepared in accordance with the *Washington State Department of Transportation (WSDOT) Wetland Compensation Bank Program Memorandum of Agreement (CBMOA) (WSDOT 1994)*, the *Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks (US Army Corps of Engineers et al. 1995)*, and negotiations with state and federal wetland regulatory agencies.

This Mitigation Banking Instrument will serve as the detailed implementation plan for the establishment, maintenance, and management of the Springbrook Bank. The terms and provisions of this Instrument will be incorporated into the Memorandum of Agreement. The “Basic Agreement” portion of the Agreement governs the general relationship between WSDOT and the City of Renton (Sponsors) and the regulatory agencies having jurisdiction over, and/or substantial interest in, the Springbrook Bank. These regulatory agencies are referred to as the Bank Oversight Committee (BOC). Where the term “Agreement” is used in this document, it will refer collectively to the Memorandum of Agreement and this Instrument together.

1.1 PROJECT OVERVIEW

WSDOT and the City of Renton (City) will establish Springbrook Bank to provide compensatory mitigation in advance of unavoidable impacts to wetlands and other aquatic resources from future projects within portions of two watersheds: Cedar-Sammamish Watershed (Water Resource Inventory Area [WRIA] 8) and Green-Duwamish Watershed (WRIA 9). Springbrook Bank is being created as an Early Environmental Investments (EEI) project under the Interstate 405 (I-405) Congestion Relief and Bus Rapid Transit projects. Springbrook Bank consists of five units, totaling 129.37 acres, which represent some of the last remaining large tracts of undeveloped land in the Lower Green River Basin. All five units are located in the southwestern portion of the City of Renton, King County, Washington (Figures 1-1 and 1-2).

Portions of Springbrook Bank are adjacent to the lower reaches of Springbrook Creek. This proximity to the creek may allow the water quality and hydrologic functions provided in Units A, B, and E to benefit downstream aquatic habitat in Springbrook Creek, the Green River, and the Duwamish River and its estuary. Springbrook Creek is one of the few remaining tributary streams to the Lower Green River. In a landscape that is nearly completely developed, protecting and enhancing the last remaining natural areas is a high priority. This protection should improve habitat conditions for fish and wildlife in the Springbrook Creek and the Lower Green River. The location of Springbrook Bank adjacent to the habitat corridor of Springbrook Creek, other habitat corridors, and other mitigation sites increases its value within the surrounding landscape and complements existing restoration projects both upstream and downstream. These functions would be difficult to replicate at another location due to: urbanization of the surrounding landscape, lack of remaining natural areas in the vicinity, connectivity to surrounding habitat, and the potential to provide ecological benefits beyond site boundaries via this connectivity.

Construction and successful development of Springbrook Bank as described in this Instrument will establish 45.12 mitigation credits. These credits will become available for use by WSDOT and the City, in increments, as the performance standards specified in Section 3.3 of this document are met and approved by the Bank Oversight Committee (BOC). The BOC is analogous to the Mitigation Bank Review Team (MBRT) established by the State of Washington (2001) and Federal Banking Guidance (U.S. Army Corps of Engineers 1995) who oversees all other state and private mitigation banks.

Projects that may use the credits from Springbrook Bank include the *I-405 Congestion Relief and Bus Rapid Transit projects*, *State Route (SR) 518 improvement projects*, and the *SR 167 15th SW to 15th NW HOV Stage 3 project*, upon approval by the pertinent regulatory agencies. A portion of the credits will be administered by the City to meet mitigation requirements for other projects within the service area (Figure 1-3). Future WSDOT and City-approved projects within the service area are eligible to use mitigation credits, upon approval by the pertinent regulatory agencies.

1.1.1 General Mitigation Bank Goal and Objectives

The goal of Springbrook Bank is to increase wetland area and encourage improved hydrologic, water quality, and habitat functions, while facilitating environmental education opportunities.

Project objectives are to improve floodplain and riparian functions, water quality, flood storage capacity and other hydrologic functions, wildlife habitat, and establish site buffers to protect habitat. A proposed public access trail will also provide increased environmental educational opportunities for local residents and connect to the existing King County regional trail systems.

1.1.2 Project Setting

Springbrook Bank is located within the relatively flat Green River Valley (Valley). Springbrook Creek drains a watershed located on the east side of the Green River known as the Black River Basin and is defined as the “Springbrook, Mill, and Garrison Creek Watershed” (SMG watershed) (Harza 1995). The Black River Basin covers about 15,763 acres (24.6 square miles) and can be delineated into two distinct topographical areas: the valley floor and the foothill zone. Slope gradient in the watershed ranges from 0 to 70 percent. Elevation in the watershed ranges between 10 and 525 feet above mean sea level (Kerwin and Nelson 2000). All elevations referenced in this document are in the North American Vertical Datum 1988 (NAVD88).

Springbrook Creek is the main water conveyance channel in the SMG watershed, with its tributaries, Mill and Garrison Creeks, entering from the west (in Kent), and Panther and Rolling Hills Creeks originating on plateaus east of the Valley. Springbrook Creek is approximately 12 miles long (Kerwin and Nelson 2000). Downstream of SW 16th Street and I-405, Springbrook Creek enters the improved portion of the Creek, the P-1 Channel, which flows to the Black River Pump Station (Figure 1-1). In the forebay of the pump station, water is stored prior to its discharge into the Green River. The pump station and associated infrastructure prevents high flows in the Green River from backing water up into Springbrook Creek, reducing the risk of flooding in adjacent areas. The Black River

Pumping Station is a barrier to salmonids for up and downstream during certain seasons (Kerwin and Nelson 2000). The Black River Pumping Station (BRPS) allows upstream passage from mid-September through January 31 each year. The downstream passage facility is operated from early April through mid-June on an eight hour a day schedule Monday through Friday. Any early juvenile Chinook migrating before this time frame would be prevented from exiting the Springbrook system. Also the existing fish passage screens at the BRPS do not meet current NMFS screening criteria. Finally, adult salmonids cannot pass downstream via the downstream fish passage facility at the BRPS (Kerwin and Nelson 2000).

The lower reaches of Springbrook Creek have been historically straightened, deepened, and widened by farmers, local jurisdictions, the Natural Resources Conservation Service (NRCS), and King County Drainage District #1 (Kerwin and Nelson 2000). Springbrook Creek was originally channelized for agricultural drainage purposes. Later conveyance improvements were made to reduce flood hazards as part of the City of Renton and NRCS East Side Green River Watershed Project (R.W. Beck 1996). Figure 1-4 shows that Springbrook Creek was channelized by 1940 and the surrounding areas had previously been converted to agricultural use. Existing wetlands within the Valley provide several hundred acre-feet of flood storage during the most extreme events (R.W. Beck 1996).

1.1.2a Current Land Use and Zoning

Springbrook Bank is located in an area of the City referred to as the Employment Area Valley. According to the City of Renton *Comprehensive Plan* (Renton 2004), the Employment Area Valley is "...intended to provide a mix of employment-based uses, including commercial, office, and industrial development to support the economic development of the City of Renton." The comprehensive plan objectives and policies specific to the Employment Area Valley are intended to promote economic development.

Units A, B, C, and E are currently zoned as Resource Conservation (RC). Unit D (adjacent to the business park located north of SW 43rd Street) is zoned Industrial-Medium (IM). Urban development is allowed in accordance with the environmentally sensitive area regulations found in the City's *Critical Areas Ordinance* (Renton 2005).

The RC zoning provides for a very low-density residential land use in combination with environmentally sensitive areas or agriculture uses. Examples of RC-zoned land uses include manufactured homes, eating or drinking establishments, day care centers, medical institutions, and veterinary offices.

The IM zoning provides for medium-intensity industrial activities involving manufacturing, processing, assembly, and warehousing. Examples of IM-zoned land use include City government offices, schools, movie theaters, laboratories, power plants, airplane manufacturing, and vehicle service stations.

As with any zoned land, the City can change the zoning and re-designate the areas for other land uses. However, the establishment of Springbrook bank on these properties will protect the site in perpetuity through a conservation easement.

1.1.2b Easements and Existing Utilities

WSDOT and the City of Renton are working together to release all easements (without existing utilities in them) from the Springbrook bank site. All of the easements that contained existing utilities have already been removed from the credit generating area of the bank. Existing utility easements run through portions of Units D and E (see Figures 2-3 and 2-4). These easements contain City sewer lines. The width of these easements is 15 feet. However, 20 feet was taken out of the credit generating area to ensure enough space is available for any work related to these facilities. This work would be conducted using trenchless technology, if possible, or standard width track hoes and trench boxes. City utilities staff verified that 20 feet is adequate to perform any activity related to the maintenance or replacement of these facilities. In areas where existing easements and/or facilities run along the edge of a bank unit, the boundary of the bank was moved back to the edge of the easement to ensure that any work related to these facilities will not impact the mitigation area or its buffers.

Through a lot line adjustment the City will be able to release the majority of the vacant easements. WSDOT and Renton are also working with the local electric company to have them release their unused easements in Unit A and Unit B. All private property owners with an interest in a vacant easement have been contacted and asked to release their easements on the Units. The City's legal staff is working directly with these private property owners to expedite the process to the extent possible. WSDOT and the City anticipate that all vacant easements will be released from the bank parcels by the signing of this Instrument. However, if the vacant easements have not been released by the time the Year 0 (submittal of as-built plans) credits are scheduled to be released by the BOC, WSDOT and the City will remove any remaining vacant easement areas from the credit generating area within the bank. Updated maps, a new credit total, and new release schedule will be submitted to the BOC.

1.1.3 Site Selection Rationale

The 129.37-acre site provides one of the last opportunities to create and enhance natural habitat and encourage improved ecological functions within the rapidly developing Lower Green River Valley. Channelization of Springbrook Creek, past agricultural practices, and recent build-out of the area have dramatically altered hydrologic regimes, increased impervious surface, and removed native vegetation over the majority of the surrounding landscape. This will be one of the first urban mitigation banks in Washington State and upon certification will serve as a model project for establishing mitigation banks in similar urbanized areas.

Springbrook Bank meets the following site-selection criteria supported by the WSDOT CBMOA (1994), listed in order of preference:

1. A site where one or more of the three criteria used to determine if a site is a wetland (i.e., hydrophytic vegetation, hydric soils, and wetland hydrology), especially wetland hydrology, have been completely lost and can be restored (Units C and E).
2. A site where one or more wetland functions and values have been eliminated by prior human activity and can be restored to their previous type, size, and vigor (Units A, B, C, and E).

3. A site where wetland functions and values have been severely degraded by prior human activity and can be enhanced to their previous type, size, and vigor (Units A, B, C, and E).
4. A site that is not a wetland, but where a wetland can be created that is adjacent to and has high potential to complement existing wetlands. Examples include areas adjacent to existing riparian corridors, Washington Natural Heritage Sites, Washington State Wildlife Areas, and National Wildlife Refuges (Units C and E).
5. A site that is not wetland, but where a wetland can be created (Units C and E).
6. A site where development, management, and maintenance could appropriately enhance one or more existing wetland functions and values (Units A, B, C, and D).

Opportunities for successful restoration at Springbrook Bank are high for the following reasons:

1. The proposed restoration strategy proposes to re-establish some of the ecological conditions and functions that were historically provided at or near the site.
2. The Springbrook Creek riparian corridor, surrounding mitigation sites, and adjacent railroad tracks provide excellent “corridors” for wildlife movement.
3. Activities will improve fish and wildlife habitat in a watershed where it has been severely degraded.

1.1.4 Bank Site Description

1.1.4.1 Historic Condition

The five units, which make up Springbrook Bank, are located in the Eastern Puget Riverine Lowlands Ecoregion (EPA 2002) on a relatively level valley floor. The King County Soil Survey (Snyder et al. 1973) states that soil types on the Springbrook Bank site are associated with streams and river valleys that naturally support herbaceous species, such as grasses and sedges, and a variety of forest types, with dominant trees such as Douglas fir, western hemlock, Sitka spruce, western red cedar, red alder, big-leaf maple, black cottonwood, and willow. According to Collins and Sheik (2005), historically there were a series of wetlands that were fed by flood channels from upland areas to the east, the Cedar River fan (before it was diverted to Washington Lake) avulsion channels from Black River, and overbank flooding from the White River (before it was routed permanently to the Puyallup River). The authors continue to note that there was a system of creeks that fed and drained poorly constrained wetland complex that drained to the Black River just east of the present day location of Springbrook Creek. A 1940 aerial photo (Figure 1-4) shows Springbrook Creek being channelized by the mid-1930s with remnants of the original stream alignment present within the boundaries of Units C and E (Puget Sound River History Project 2005).

1.1.4.2 Baseline Conditions

The baseline conditions for each mitigation unit at Springbrook Bank are described below. For purposes of this Instrument, Units A and B are described together because they are ecologically similar, and both adjacent to Springbrook Creek and one another.

Units A and B

Units A and B encompass 62.2 acres, of which 55.5 acres are currently wetland (WSDOT 2005a) (Figures 1-5 and 1-6).

Hydrology: Springbrook Creek flows within a straight, bermed corridor between Units A and B. Precipitation, groundwater, and surface water runoff from off-site tributary areas, adjacent roads, and developments are the primary sources of existing hydrology. The berms along Springbrook Creek disconnect the creek from its wetland floodplain, except during extreme flood events. A small ditch exists in the northeastern portion of Unit B and is the only existing connection between Unit B and Springbrook Creek. A ditch along the southern property line in Unit A collects stormwater from the development to the south and directs flows to Springbrook Creek. This is the only existing connection between Unit A and Springbrook Creek.

Vegetation: Areas closest to the creek have substantial native woody cover consisting primarily of Pacific willow (*Salix lucida*), Sitka willow (*Salix sitchensis*), some black cottonwood (*Populus balsamifera*), and red alder (*Alnus rubra*) in slightly drier areas. Areas farther from Springbrook Creek are dominated by reed canarygrass (*Phalaris arundinacea*) and cattail (*Typha latifolia* and *Typha angustifolia*) with patchy woody cover provided by willow species. Reed canarygrass dominates the riparian areas on the berms directly adjacent to Springbrook Creek. General vegetation communities are shown in Figure 1-10.

Unit C

Unit C encompasses 47.7 acres, of which 27.1 acres are currently wetland (WSDOT 2005a) (Figure 1-7).

Hydrology: Existing hydrology in Unit C is provided by a combination of precipitation and elevated groundwater. A conveyance ditch entering the site from the Burlington Northern Santa Fe (BNSF) property to the south does not currently provide direct surface hydrology to the majority of wetlands in Unit C but provides hydrology to a narrow corridor along the ditch.

Vegetation: Non-native grasses, common tansy (*Tanacetum vulgare*), and Himalayan blackberry (*Rubus armeniacus*) currently dominate the proposed Wetland Re-Establishment Area. Black cottonwood, red alder, Pacific willow, Sitka willow, and red-osier dogwood (*Cornus sericea*) mixed with Himalayan blackberry currently dominate portions of existing wetlands and uplands at the site. Large areas of reed canarygrass and patchy native shrub cover dominate the majority of the site closest to the BNSF right of way. Along the eastern edge of the site adjacent to Oakesdale Avenue, disturbance-tolerant grasses and forbs predominate including: common tansy, lance-leaf plantain (*Plantago lanceolata*), teasel (*Dipsacus sylvestris*), and bull thistle (*Cirsium vulgare*). General vegetation communities are shown on Figure 1-10.

Unit D

Unit D encompasses 4.6 acres, all of which is currently wetland (WSDOT 2005a) (Figure 1-8).

Hydrology: A shallow inundated area occurs on the northern portion of Unit D. The inundated emergent area and the forested wetland appear to be supported by precipitation, seasonally high groundwater, and surface water connections from wetlands west of the BNSF mainline. A culvert connects the wetlands west of the railroad track to the inundated area. The entire site discharges to the north, via a culvert under an existing BNSF rail line and an existing conveyance ditch to Unit C (see figure 2-4).

Vegetation: Red alder, black cottonwood, Pacific willow, and Oregon ash (*Fraxinus latifolia*) make up the forest canopy. The shrub layer includes salmonberry (*Rubus spectabilis*), red-osier dogwood, and hardhack (*Spirea douglasii*). A few minor patches of Himalayan blackberry are present in the upland and wetland forest understory and open areas in this unit. Reed canarygrass dominates several areas of the existing wetland. Cattails, reed canarygrass, and mild waterpepper (*Polygonum hydropiperoides* var. *hydropiperoides*) predominate in the inundated area at the northern end of the site. General vegetation communities are shown on Figure 1-10.

Unit E

Unit E encompasses 14.8 acres, none of which is currently wetland (WSDOT 2005a) (Figure 1-9).

Hydrology: No wetland hydrology currently exists at Unit E.

Vegetation: Sections of the site are dominated by black cottonwood forest with Himalayan blackberry in the understory. Large portions of the site have been impacted by off-road vehicle use and are dominated by non-native grasses, common tansy, and Himalayan blackberry. General vegetation communities are shown on Figure 1-10.

1.1.4.3 Soils

The King County Soil Survey maps four soil types at the Springbrook Bank site: Puget silty clay loam, Puyallup fine sandy loam, Snohomish silt loam, and Woodinville silt loam (Snyder et al. 1973). The Puget, Snohomish, and Woodinville series are listed as hydric soils (NRCS 2001).

In wetland re-establishment areas proposed in Units C and E, analysts examined soils taken from geotechnical borings. The soil samples consisted of sandy gravel and sand to silty sand (fill), interbedded sand and silt underneath the areas of fill, then lower permeability silts and silty sands, and poorly graded sand to silt at the bottom of the soil borings. Peat was also intermixed and discovered in many of the soil layers (Hart Crowser 2005a). Geotechnical borings were also conducted in Unit A along the proposed trail alignment to help inform trail design. These investigations found a top layer of silt to sandy silt with scattered organic material along the berm. Underneath the top layer along the berm and near the surface in other portions of the site lies a layer of organic silt and peat, which contains fibrous peat in the upper portion, a layer of soft gray plastic silt, underlain with a layer of silty sand at the bottom of the borings (Hart Crowser 2005b).

1.1.4.4 Wetlands

The Springbrook Bank site contains 88 acres of jurisdictional wetland (Figures 1-5 through 1-9). Each wetland was delineated using the *Washington State Wetlands Identification and Delineation Manual* (Washington State Department of Ecology 1997) and was subsequently rated using the City of Renton Wetland Rating System (Renton 2005). Category I wetlands are of the highest quality while Category IV wetlands are severely degraded and hydrologically isolated. Two wetlands - all of Unit D and portions of Unit C, totaling 26.8 acres - were rated as Category II. Six remaining wetlands - Units A and B and portions of Unit C, totaling 62.2 acres - were rated as Category III (WSDOT 2005a).

In fall and winter 2004, the *Method for Assessing Wetland Functions Volumes 1 and 2* (WFAM) (Hruby et al. 1999) was used to assess functions and values of the existing wetlands. The WFAM method measures on-site indicators of various wetland functions producing numerical indices. These indices only address a wetland's potential to provide assessed functions, and are therefore, only relevant when comparing wetlands of the same hydrogeomorphic (HGM) class that share similar opportunities to perform specific functions. This assessment method is based on the HGM approach, described by Brinson (1993) and Smith et al. (1995). An HGM class is determined primarily by landscape position, topography, and source of hydrology. The two HGM classes identified within the site are riverine and depressional. The riverine wetlands present in Units A and B currently function similarly to depressional wetlands, due to the berms isolating Springbrook Creek from its floodplain.

The principal functions of the riverine wetlands include; flow attenuation; reduction of downstream erosion; and removal of excess sediment, nutrients, and metals. The remaining depressional wetlands provide low levels of habitat functions and lack significant hydrologic and water quality functions due to their relative isolation from other wetlands/water sources. These wetlands also have an absence of vegetative and/or habitat diversity.

1.1.4.5 Habitat and Wildlife Use

There is no high quality stream habitat present on or adjacent to the Springbrook Bank site. Springbrook Creek runs parallel and adjacent to three of the five units (Units A, B, and E). Springbrook Creek is characterized by rapid short-duration responses to rainfall events, high sediment loads, high temperatures, and low dissolved oxygen levels. Additionally, riffles, pools, and large woody debris are absent from the creek, providing little habitat for salmonids. Woody riparian vegetation is particularly lacking in the reach of Springbrook creek adjacent to Units A and B. The lower reach of Springbrook Creek (north of the bank site) is suitable for juvenile salmonid rearing and migration. However, spawning is unlikely in the creek due to the low gradient and lack of appropriate gravel substrate. Steelhead (*Oncorhynchus mykiss*), cutthroat trout (*Salmo clarki*), Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*, and lamprey (*Lampetra* sp.) have been documented in Springbrook Creek (Kerwin and Nelson 2000; Harza 1995). Coho salmon were stocked in the creek from the mid 1970s until 2004 (WSDOT 2005d). The current configuration of the creek and adjacent berms in Units A and B creates a low potential for fish standing during flood events (WSDOT 2006).

Currently one small outlet is present in both Units A and B for fish to enter and/or escape from onsite wetlands.

The creek acts as a wildlife corridor connecting the various higher quality habitats along its length, such as the Black River Riparian Forest to the north (Figure 1-1). The railroad right of way also serves as a wildlife corridor, connecting habitats and wildlife south of Springbrook Bank (Units C and D are adjacent to the BNSF rail line). Coyote, red-tailed hawks, and other raptors have been observed at the bank. The bank is also used by great blue herons that nest at the Black River Riparian Forest. This heron nesting colony is one of the largest in the Puget Sound Area, with over 120 occupied nests being observed in recent years (Seattle Audubon 2005). No signs of deer or other large mammal use have been observed at the bank.

1.1.5 Unique Urban Setting and Public Access

This section describes the unique urban setting of Springbrook Bank that creates a basis for including a public access trail.

1.1.5.1 Reasons for Including a Trail at Springbrook Bank

The trail will provide the critical missing link that has been incorporated in the long-term planning for the local and regional trail systems:

- The City of Renton made formal commitments to the community to connect the trail system at this location long before the site was proposed as a mitigation bank. The City previously acquired an easement as part of a long-range trail linkage planning effort in the Springbrook Creek area through the City of Renton's Parks, Recreation, and Open Space Plan and Trails Master Plan (adopted June 1992).
- The proposed trail will connect to the existing trail that runs through the Green River Valley and then connects to a larger, regional trail system - King County's regional Interurban Trail and King County's regional Green River Trail.

Disturbances due to the urban setting and surrounding land uses will minimize wildlife impacts from the trail:

- Due to the densely urbanized setting and surrounding local land uses, wildlife that may use the bank site has adapted to an urban setting through the exposure to a high level of human activity in the project vicinity. Any disturbance related to the presence of the trail would be minor compared to existing disturbances from the surrounding urban landscape.

The public expects access to large publicly owned urban natural areas:

- Substantial state resources and City lands will be used to develop Springbrook Bank, which will be established in a highly urbanized ecosystem and develop connections between people and local natural resources.
- Springbrook Bank will conserve 129.37 acres of some of the last remaining large tracts of undeveloped green space in the Lower Green River Basin.

The trail will provide substantial environmental education opportunities to an urban community:

- The unique urban setting of Springbrook Bank, the City’s planned trail access, and the relative lack of natural areas in the project vicinity present a rare opportunity to integrate environmental education, public access, and wetland mitigation. Maximizing this opportunity will increase opportunities for awareness and understanding of the important ecosystem functions that wetlands, streams, and riparian areas provide within an urbanized setting.
- By placing the trail near Springbrook Creek, the public will see a diverse environment with connections to wetlands and streams.
- Educational opportunities provided by the trail will help maximize environmental benefits for the community through education, which may result in public support for funding environmental mitigation and stewardship activities in the region.
- Education and public involvement are vital parts of natural resource management. The importance of education and public involvement is demonstrated by its inclusion and emphasis in Green Infrastructure planning, Alternative Futures analysis, and the development of comprehensive plans. Education is essential because it provides the public with an accurate understanding of why natural resources are valuable to the community. Education and outreach efforts are also key factors to increasing enrollment in incentive programs that foster land conservation. Likewise, these efforts also encourage the public to get involved through voluntary actions either on their own property or by supporting local projects. Education and public involvement can also improve support for regulatory protection. (This text was adapted from *Wetlands in Washington State – Volume 2: Guidance for Protecting and Managing Wetlands* [Washington State Department of Ecology 2005]).

1.1.5.2 Selection of Proposed Trail Alignment

Selection of a trail alignment was a process that incorporated a number of environmental and social factors. The following criteria were used to select the proposed trail alignment:

- Align the trail as directly as possible on City-owned property.
- Minimize impacts to wetlands, woody vegetation, and riparian areas.
- Maximize alignment through existing invasive vegetation.
- Incorporate environmental education within a wetland setting.
- Complete the missing link of an existing trail as planned in accordance with the City’s Master Trail Plan and the King County Regional Trail System.

The trail alignment that best meets the selection criteria for Springbrook Bank includes an elevated, eight-foot-wide public boardwalk trail, limited to pedestrian use, located near the western edge of Unit A, and roughly parallel to Springbrook Creek. The elevated boardwalk will connect to the local and King County regional trail systems. Benches will be placed at two locations along the trail to promote passive recreation, such as bird watching (see Figure 2-2). The trail and a 40-foot-wide vegetated buffer on each side will not generate mitigation credits (see Section 2.6.1.4 “Trail Zone” for more details).

Advantages of the proposed trail alignment include:

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- No mitigation credits will be generated from an 88-foot “Trail Zone,” which encompasses the trail itself and 40 feet on both sides of the trail to account for any disturbance to the site and/or wildlife that may result from the trail presence and use. Removing invasive weeds and planting native trees and shrubs will rehabilitate wetlands within this zone.
- The footprint of the trail will be approximately 11,000 square feet (1,365 feet long by eight feet wide), which will affect approximately 0.25 acre of the 26 acres in Unit A. This footprint is much smaller than other City trails, which are typically 12 feet wide.
- Constructing the trail as part of Springbrook Bank will allow the remaining 23 acres of Unit A to be restored and protected in perpetuity. The trail will not affect the 103 acres of Springbrook Bank in Units B, C, D, or E.
- The City will convert the section of the trail running through the Springbrook bank from a mixed-use trail (as originally planned) to a pedestrian-only trail minimizing human disturbance to wildlife habitat, while offering higher quality birding and other educational opportunities to the pedestrian.
- The City will restrict bicycle use on the section of the trail within Springbrook Bank, limiting disturbance to wildlife. The City has existing bike routes established in the area. Adequate signage will be posted to direct cyclists to the established bike routes.
- Aligning the trail generally along the most direct route reduces the potential for unauthorized “shortcut” trails through Unit A. Users are likely to deviate from “authorized” circuitous routes if there is a more direct route.
- Impacts to existing wetlands and woody vegetation from a shorter, more direct trail route are estimated to be less than longer routes.

Several alternative trail alignments were also considered but were rejected because they did not satisfy the selection criteria for a trail alignment. These alternative trail options and the reasons for rejecting them are summarized below.

Unit A Perimeter Option—This option aligns the trail within the southern, eastern, and northern perimeter buffer of Unit A. This option was rejected because it created a longer alignment that would have resulted in substantially greater impacts to wetlands and woody vegetation than the selected trail alignment.

Unit A Interior Option—This option includes a trail that broadly bends through the interior of Unit A. This option was rejected because it created a longer alignment that would have resulted in substantially greater impacts to woody vegetation than the proposed trail alignment, and would essentially bisect Unit A and disturb the interior.

Unit A Berm Option—This option aligns the trail on the berm next to Springbrook Creek. This location was identified in the City of Renton Trails Master Plan (1992) and is consistent with the alignment of existing segments of the Springbrook Trail located adjacent to Springbrook Creek, and within the City’s existing Greenbelt easement. This option was rejected because it would directly affect riparian functions by disturbing some existing riparian trees and limit future establishment of riparian trees. Impacts to riparian conditions are undesirable because Springbrook Creek is limited by water quality problems, such as high water temperature and low dissolved oxygen.

Oakesdale Avenue Option—This option aligns the trail west along SW 34th Street, north along Oakesdale Avenue SW, and east along 27th Street SW. This option was rejected for a number of reasons. This alignment is indirect and much longer, it would expose the public to safety risks associated with street traffic, it would abandon a portion of Springbrook Trail that already extends to the southern boundary of Unit A, it would not provide suitable environmental education opportunities in a wetland setting, and it would be inconsistent with the City’s Trails Master Plan (1992).

No Trail Option—This option is rejected (if funding is available to build the trail) because it would not establish the missing link to the existing Springbrook Trail, and would be inconsistent with the City’s Trails Master Plan (1992). The City specifically acquired a portion of the property within Springbrook Bank for use as a trail.

1.2 LEGAL AUTHORITY AND RESPONSIBILITIES OF BANK SPONSOR AND PARTNERS

Springbrook Bank will be established in accordance with the following federal and state statutes, regulations, guidelines, and policies:

- Clean Water Act (33 USC 1251 et seq.)
- Rivers and Harbors Act of 1899 (33 USC 401, et seq.)
- Regulatory Programs of the Corps of Engineers (33 CFR Parts 320-330)
- Guidelines for the Specification of Disposal Sites for Dredged and Fill Material (404(b)(1) Guidelines, 40 CFR Part 230)
- Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (February 6, 1990)
- U.S. Army Corps of Engineers Regulatory Guidance Letter 05-1, *Guidance on the Use of Financial Assurances, and Suggested Language for Special Conditions for Department of Army Permits Requiring Performance Bonds*, (February 14, 2005)
- Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks (November 28, 1995)
- National Environmental Policy Act (42 USC 4321 et seq.)
- Magnuson-Stevens Fisheries Conservation and Management Act (16 USC §§ 1801 et seq.)
- Coastal Zone Management Act (16 USC 1451, et seq.)
- Council on Environmental Quality Procedures for Implementing the National Environmental Policy Act (40 CFR Part 1500-1508)
- Executive Order 11988 (Protection of Floodplains)
- Executive Order 11990 (Protection of Wetlands)
- Executive Order 13112 (Invasive Species)
- Fish and Wildlife Coordination Act (16 USC 661 et seq.)
- Fish and Wildlife Service Mitigation Policy (46 FR 7644-7663, 1981)
- Endangered Species Act (16 USC 1531 et seq.)
- National Historic Preservation Act, as amended (16 USC 470)

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- Washington State Environmental Policy Act ('SEPA' RCW 43.21C and WAC 197-11)
- Growth Management Act (RCW 36.70A) and Critical Areas Regulations "Best Available Science" (WAC 365-195-900 to 925)
- Washington State Water Pollution Control Act (RCW 90.48)
- Washington State Hydraulic Code (RCW 75.20)
- Washington State Shoreline Management Act (RCW 90.58, WAC 173-200) as amended
- Washington State Salmon Recovery Act (RCW 75.46)
- Washington State Aquatic Resources Act (RCW 79.90, RCW 90.74)
- Washington State Alternative Mitigation Policy, developed by Ecology, Washington State Department of Transportation, Washington State Department of Fish and Wildlife, and the Office of Community Development, 2000
- Wetland Mitigation Banking (RCW 90.84)
- Washington State Draft Rule on Wetland Mitigation Banking (WAC 173-700)
- City of Renton Critical Areas Ordinance (Ordinance number 5137)
- Washington State Department of Transportation Executive Order E1025.00 Tribal Consultation
- Washington State Department of Transportation Environmental Procedures Manual M 31-11

Nothing in the Instrument shall be construed as altering the requirements and agency responsibilities as specified in existing law, regulation, and policy.

1.2.1 WSDOT Memorandum of Agreement and the Bank Oversight Committee

WSDOT entered into a Memorandum of Agreement for wetland banking with state and federal wetland regulatory agencies in 1994. The *Washington State Department of Transportation Wetland Compensation Bank Program Memorandum of Agreement* (CBMOA) (WSDOT 1994) provides the principles and procedures for establishing, implementing, and managing WSDOT wetland mitigation banks. Signatories to the WSDOT CBMOA include U.S. Army Corps of Engineers (Corps), U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), U.S. National Marine Fisheries Service (NMFS), Federal Highway Administration (FHWA), Washington State Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), and WSDOT.

The WSDOT CBMOA establishes a Bank Oversight Committee (BOC) to review and approve WSDOT mitigation bank proposals. WSDOT is responsible for convening and facilitating meetings of the committee. The BOC members for Springbrook Bank are comprised of representatives from the Corps (Chair), EPA, USFWS, and Ecology (Chair). The sponsors of the bank are the City of Renton and WSDOT. The BOC member agencies and sponsors are the signatories of the Springbrook Bank Instrument. The BOC meetings provide a venue for project review and coordination between WSDOT and the various state, federal, and local governments. The BOC members review and comment on all phases of WSDOT bank site development. The Corps, Ecology, and various local governments are the potential permitting agencies with

jurisdictional authority. When credits are to be withdrawn from the bank, the agencies with jurisdiction will coordinate the debiting of credits and the BOC members will see these debits reflected in the annual ledger.

1.2.2 Responsibility of WSDOT and City of Renton

As between the two Sponsors, WSDOT is responsible for development, design, permitting, and construction of the Springbrook Bank. The City is providing the land for the Bank in perpetuity and the funding for trail design and construction. WSDOT will be the lead agency for the establishment phase of the Bank. The City will be the lead agency for the long-term management phase of the Bank, which will commence at the termination of the establishment phase. WSDOT will prepare and distribute monitoring reports required during the establishment phase, and maintain and submit the primary accounting ledger to satisfy the BOC's requirements and comply with the CBMOA. The City may maintain its own separate concurrent ledger to track its portion of the credits, but WSDOT will retain responsibility for the master ledger detailing all debits and credits associated with Springbrook Bank. The City and WSDOT will notify the Fisheries Division of the Muckleshoot Tribe as soon as a project is identified that intends to use the bank for mitigation.

1.3 SERVICE AREA

The service area of Springbrook Bank includes portions of WRIAs 8 and 9, which includes the Lower Green River, Black River, West Lake Washington, East Lake Washington, May Creek, Mill Creek Basins, and the Lower Cedar River Basin to SR 18 (Figure 1-3). Portions of the Lower Cedar River Basin southeast of SR 18 have been excluded from the service area because it extends over 7 miles into less urbanized areas. The Lake Washington shoreline ("shoreline" defined in WAC- 173-22-030 #11) within the Renton city limits is excluded from the service area only in such cases that impacts will harden the shoreline. The following listed criteria were taken into account in defining the service area of Springbrook Bank and are based on criteria outlined in the CBMOA (WSDOT 1994), *Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks* (US Army Corps of Engineers 1995), and the *Washington State Draft Rule on Wetland Mitigation Banking* (Washington State 2001).

1. **Springbrook Bank will improve wetland and stream functions.** The bank will restore, enhance, and protect watershed processes that create improved wildlife habitat, riparian and floodplain functions, and water quality in an area with little natural space left.
2. **Springbrook Bank is very low in the watershed.** By including sub-basins lower in WRIAs 8 and 9, Springbrook Bank will serve as mitigation for wetland impacts much closer to the project areas of proposed projects and within Renton city limits rather than farther away, but within the same WRIA.
3. **Similar Ecoregion.** The service area includes basins in a similar ecoregion, in which the remaining ecological systems are relatively uniform within a nearly built-out urban area. Springbrook Bank is designed to function at full watershed build-out to increase its sustainability in a highly urbanized watershed.

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4. **Watershed-Based Mitigation.** The overall ecological benefit of an urban bank exceeds the value of alternatives, which would likely involve the creation of small wetland fragments along the highway right of way as compensation for impacts to small Category II, III, and IV wetlands.
5. **WSDOT and City of Renton.** The credits available to WSDOT from the bank will be used for mitigation of transportation projects in the service area as approved by the pertinent regulatory agencies. The credits available to the City will be used for City-approved projects within the service area, as approved by the pertinent regulatory agencies.
6. **WSDOT's Water Resources Program.** Springbrook Bank and the Early Environmental Investments (EEI) Program are components of a larger water resources program that includes avoiding and minimizing water resource impacts, onsite stream mitigation where feasible, and other watershed solutions. Springbrook Bank is one of several alternatives for water resource improvement opportunities for WSDOT.

Projects located within the service area (Figure 1-3) are eligible for use of credits from Springbrook Bank for mitigation according to the terms of this Instrument. The bank may be used to compensate for permitted impacts in adjoining WRIsAs if specifically approved by the appropriate agencies requiring mitigation and the BOC, provided that such mitigation would be practicable and environmentally preferable to other mitigation alternatives. As such, out of-service-area impacts will only be allowed in special circumstances, following evaluation on a case-by-case basis (e.g., projects that span multiple basins such as transportation and utility corridors and pipelines, and settlement of enforcement actions).

1.4 REQUIRED PERMITS AND APPROVALS

Environmental documentation and permits required for this project are summarized in Table 1-1 and described below. WSDOT and the City commit to receiving the required approvals prior to the release of any mitigation credits, and cannot proceed without receiving the approvals listed below.

Table 1-1. Permit Activities and Environmental Documentation

Permit/Concurrence Letter	Agency
Section 404 Individual Permit (IP)	Corps
Section 401 Individual Water Quality Cert.	Ecology
Section 402 NPDES Permit	Ecology
CZMA Consistency Determination Letter	Ecology
Hydraulic Project Approval (HPA)	WDFW
ESA Concurrence Letter	USFWS
ESA Concurrence Letter	NMFS
EFH Concurrence Letter	NMFS
Shoreline Substantial Development Permit	City of Renton
Critical Areas Approval	City of Renton
King County Drainage District (KCDD) #1 Permit/Temp. Construction Easement	KCDD #1
Floodplain Permit	City of Renton
Public Works Construction Permit	City of Renton
Section 106 Concurrence Letter	DAHP
Environmental Documentation	Date Completed
Wetland Biology Report	May 2005
SEPA Determination of Non Significance (DNS)	January 2006
Biological Assessment	March 2006
Section 106 Cultural Resources Concurrence	January 2006
Springbrook Bank Prospectus	February 2006
Joint Aquatic Resources Permit Application (JARPA)	January 2006
Public Notification	Date Issued
SEPA Public Notice	January 2006
General Construction NPDES Permit	April 2006
Corps 404, Ecology 401, and CZMA Joint Public Notice	March 2006
SMA Public Notice – local governments	March 2006

1.4.1 Section 404 Permit

The Corps will require a Section 404 Individual Permit (IP) for this project. As part of the Section 404 permit process, the project will obtain approvals for or demonstrate

compliance with the Endangered Species Act, Magnuson-Stevens Act, National Historic Preservation Act, Clean Water Act, Coastal Zone Management Act, and the National Environmental Policy Act. The Section 404 IP will contain permit conditions specific to the Springbrook Bank project.

1.4.2 Section 401 Water Quality Certification

A Section 401 Individual Water Quality Certification (WQC) will be required for this project by the Washington State Department of Ecology (Ecology).

1.4.3 Section 402 NPDES Permit

A Section 402 General National Pollutant Discharge Elimination System (NPDES) Construction Permit was issued for this project on May 30, 2006 by the Washington State Department of Ecology (Ecology).

1.4.4 CZMA Consistency Determination

A Coastal Zone Management Act (CZMA) Consistency Determination Letter will be required for this project by the Washington State Department of Ecology (Ecology).

1.4.5 Hydraulic Project Approval

A Hydraulic Project Approval (HPA) for this project was issued by the Washington Department of Fish and Wildlife (WDFW) on April 24, 2006.

1.4.6 Endangered Species Act Biological Assessment

WSDOT prepared a Biological Assessment (BA) to address the potential effects of the Springbrook Bank project on species listed under the Endangered Species Act (ESA). Listed species in the vicinity of the project include Coastal-Puget Sound bull trout (*Salvelinus confluentus*), designated bull trout critical habitat, bald eagle (*Haliaeetus leucocephalus*), Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), and designated Chinook salmon critical habitat. After a thorough species effects analysis, WSDOT has determined that the project *may affect, but is not likely to adversely affect* (NLAA) bull trout, designated bull trout critical habitat, Chinook salmon, and designated Chinook salmon critical habitat. The determination for bald eagles is *no effect* (NE). The potential effects to listed species will be minimized through the use of specific best management practices and conservation measures identified in the BA (WSDOT 2006). The project received Concurrence Letters from the National Marine Fisheries Service (NMFS) on March 20, 2006 and from USFWS on May 5, 2006.

Every six months during construction, WSDOT will review the project activities as described in the Biological Assessment and review the updated WDFW Priority Habitat and Species data to ensure that the original consultation is still valid. If, prior to project completion, new species are listed or new listed species move into the project area, WSDOT is prepared to reinitiate consultation with USFWS and/or NMFS.

WSDOT also evaluated potential project impacts to Essential Fish Habitat (EFH) as required by the Magnuson-Stevens Act. After a thorough effects analysis, WSDOT has determined the Springbrook Bank project will have *no adverse effect* on EFH. NMFS has concurred with this determination as outlined in their Concurrence Letter dated March 20, 2006.

1.4.7 Shoreline Substantial Development Permit

As required by the Shoreline Management Act (SMA), a Shoreline Substantial Development Permit (SSDP) will be required by the City of Renton for this project. As part of the SSDP review process, which includes a critical areas and land use review, the City of Renton, issued its regulatory approval of Springbrook Bank on March 23, 2006.

1.4.8 National Historic Preservation Act, Section 106 Compliance

A cultural resources survey was conducted to identify and determine the probability of archaeological resources and traditional cultural places in the project area. The survey revealed that there is a low probability for historic period archaeological deposits to occur and that no traditional cultural places exist at the bank site (HRA Cultural Resources 2005). However, excavation will be monitored, especially within the vicinity of an isolated find that included a hunter-fisher-gatherer artifact recovered during a field visit. Construction monitoring will occur in accordance with the *Springbrook Creek Habitat and Wetland Mitigation Bank Project, Cultural Resources Discipline Report* (HRA Cultural Resources 2005). WSDOT received a Concurrence Letter from the Department of Archaeology and Historic Preservation (DAHP).

1.4.9 Other Approvals

As required by the State Environmental Policy Act (SEPA), a Determination of Non-Significance (DNS) was issued by WSDOT on January 10, 2006. A permit/temporary construction easement for this project was issued by the King County Drainage District (KCDD) #1 on June 28, 2006 to allow the portion of project construction work along Springbrook Creek that is located on KCDD #1 property.

The Corps will review the project for compliance with NEPA as documented within the Corps federal decision document for Individual Permits.

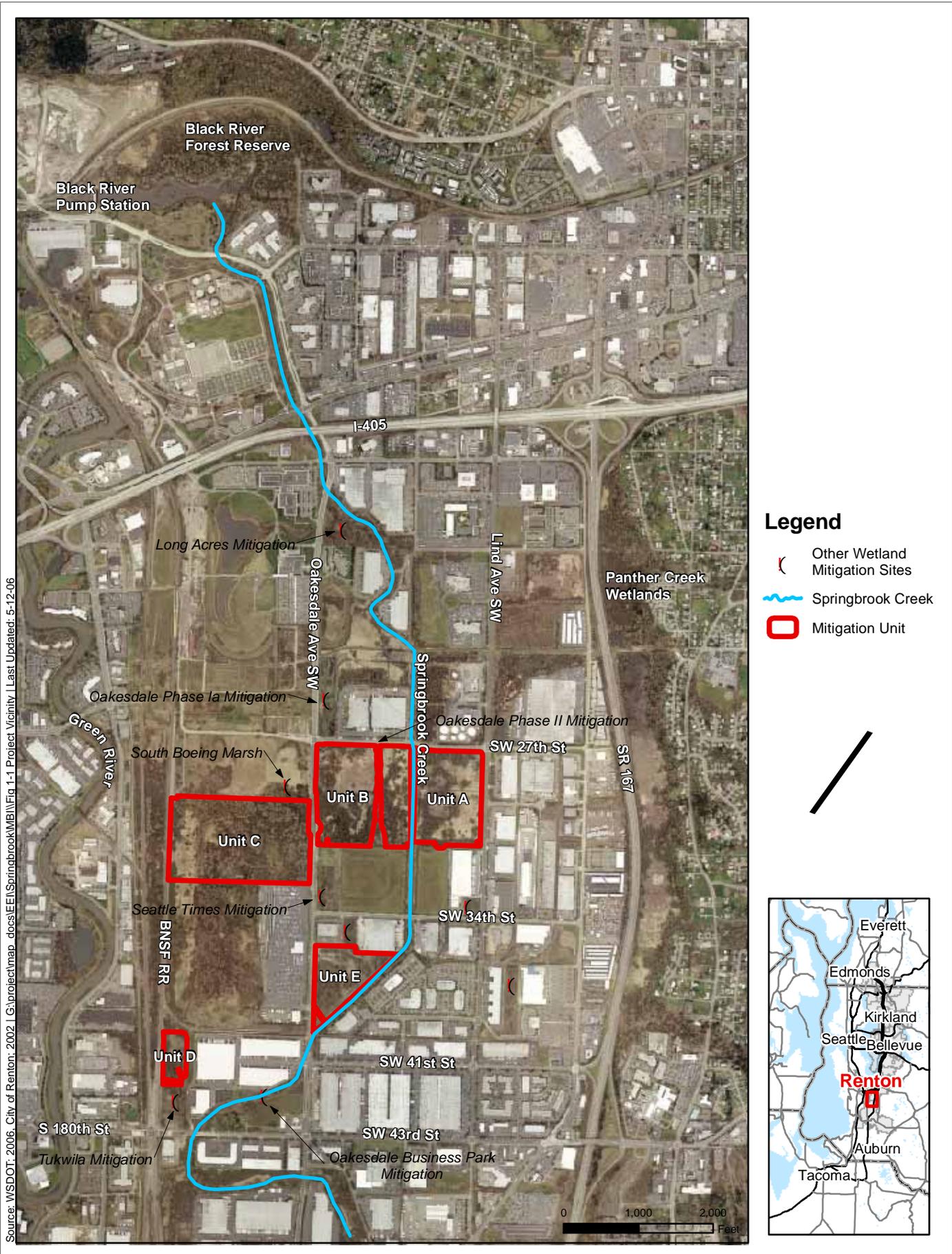


Photo Date: Winter 2002 (City of Renton)

Project Vicinity Figure 1-1

Source: WSDOT, 2006, City of Renton, 2002 | C:\project\map_docs\EEI\Springbrook\MB\Fig 1-2 Springbrook Bank Site.mxd | Last Updated: 5-12-06



- Legend**
-  Mitigation Unit
 -  Existing Trail
 -  Existing Trail Easement

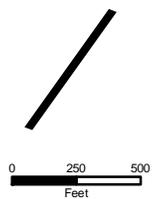


Photo Date: Winter 2002 (City of Renton)

Springbrook Bank Site

Figure 1-2

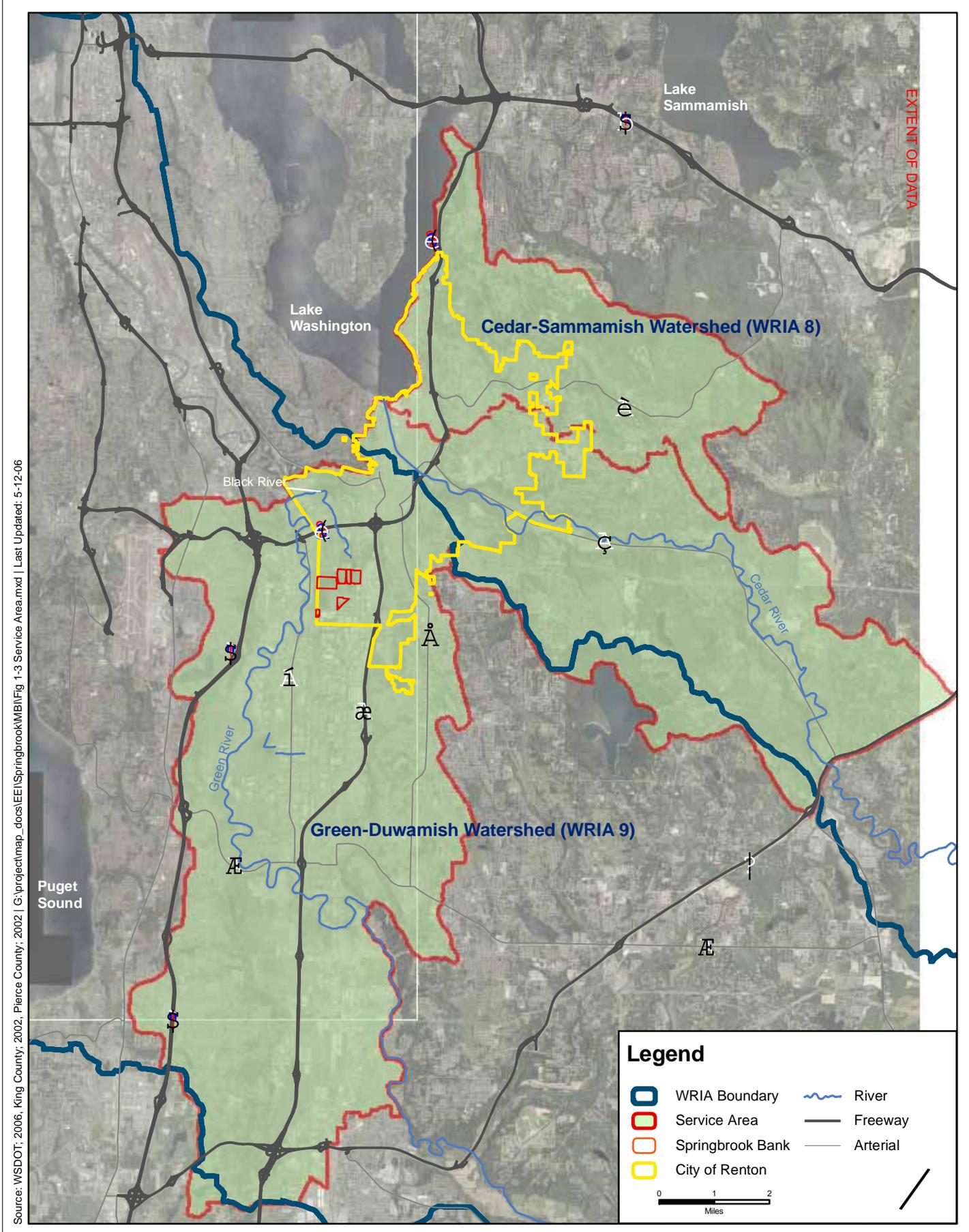


Photo Date: 2002 (King County and Pierce County)

Service Area

Figure 1-3

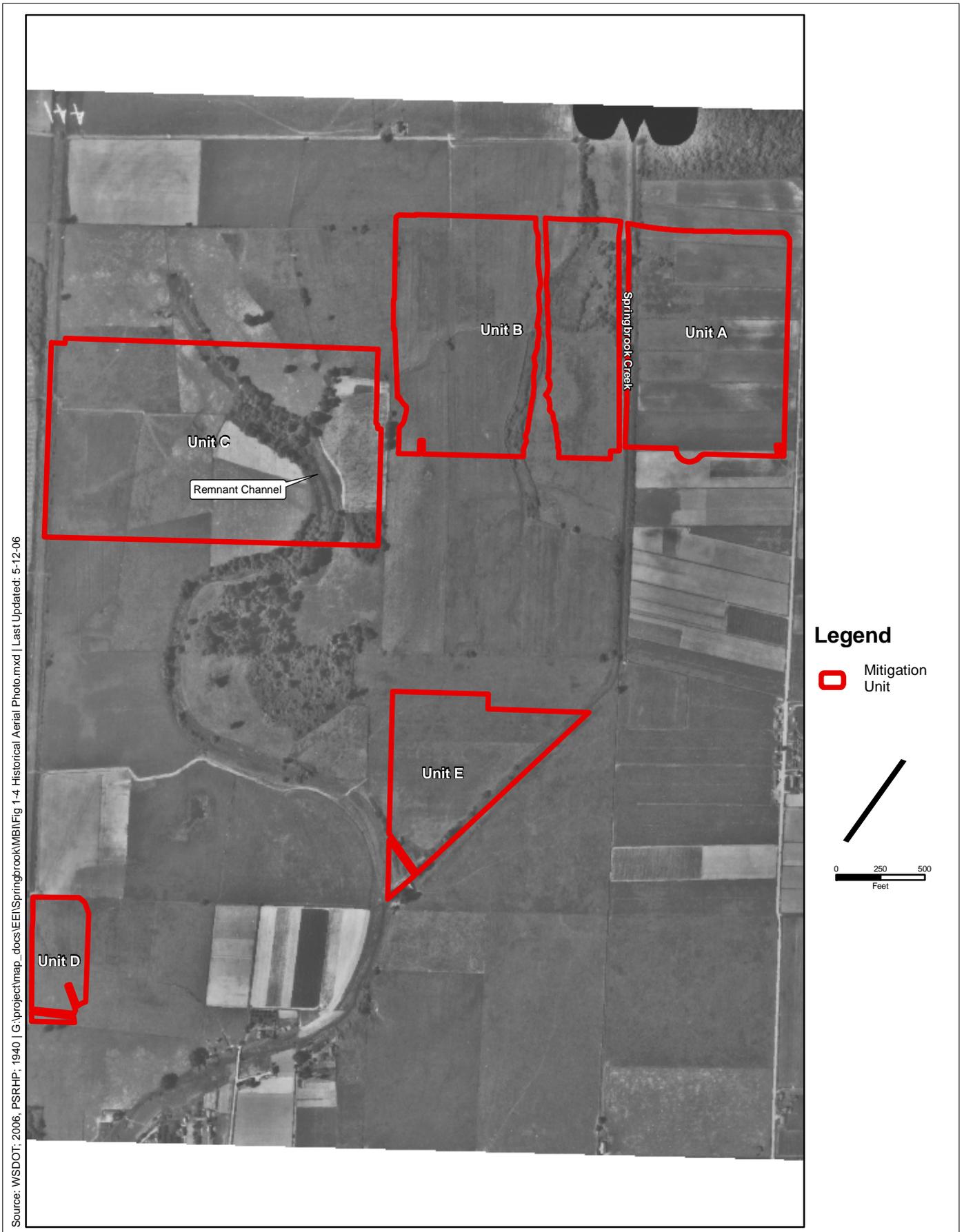


Photo Date: 1940 (Puget Sound River History Project)

Historical Aerial Photo
Figure 1-4

Source: WSDOT, 2006, City of Renton, 2002 | G:\project\map_docs\EEI\Springbrook\MBI\Fig 1-5 Unit A Existing Conditions.mxd | Last Updated: 5-12-06



Photo Date: Winter 2002 (City of Renton)

Unit A Existing Conditions
Figure 1-5

Source: WSDOT, 2006, City of Renton, 2002 | G:\project\map_docs\EEI\Springbrook\MBI\Fig 1-6 Unit B Existing Conditions.mxd | Last Updated: 5-12-06



Photo Date: Winter 2002 (City of Renton)

Unit B Existing Conditions
Figure 1-6

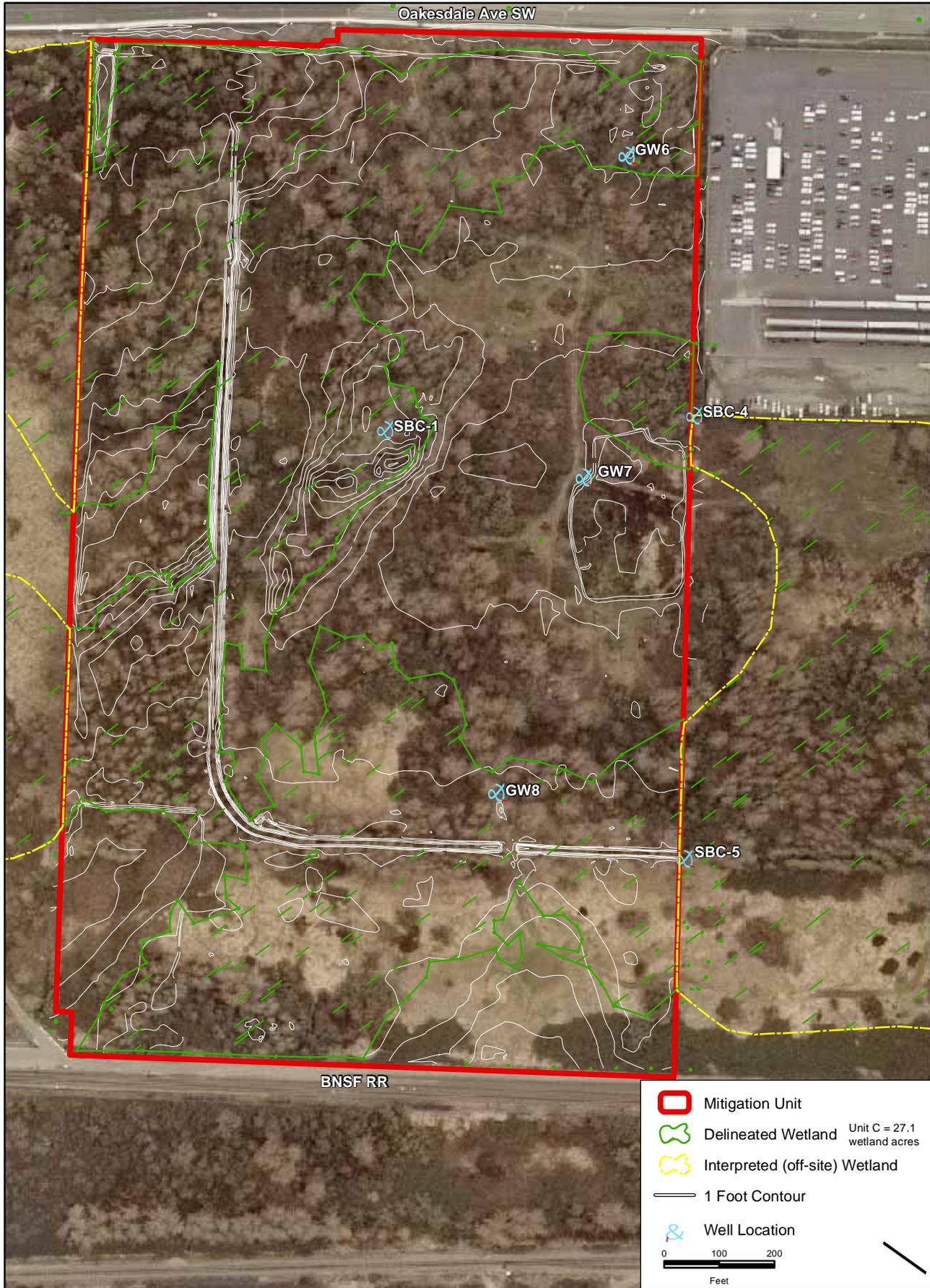


Photo Date: Winter 2002 (City of Renton)

Unit C Existing Conditions
Figure 1-7

Source: WSDOT, 2006, City of Renton; 2002 | G:\project\map_docs\EEI\Springbrook\MBI\Figure 1-8 Unit D Existing Conditions.mxd | Last Updated: 5-12-06



Photo Date: Winter 2002 (City of Renton)

Unit D Existing Conditions
Figure 1-8

Source: WSDOT, 2006, City of Renton, 2002 | G:\project\map_docs\EEI\Springbrook\MBI\Fig 1-9 Unit E Existing Conditions.mxd | Last Updated: 5-12-06

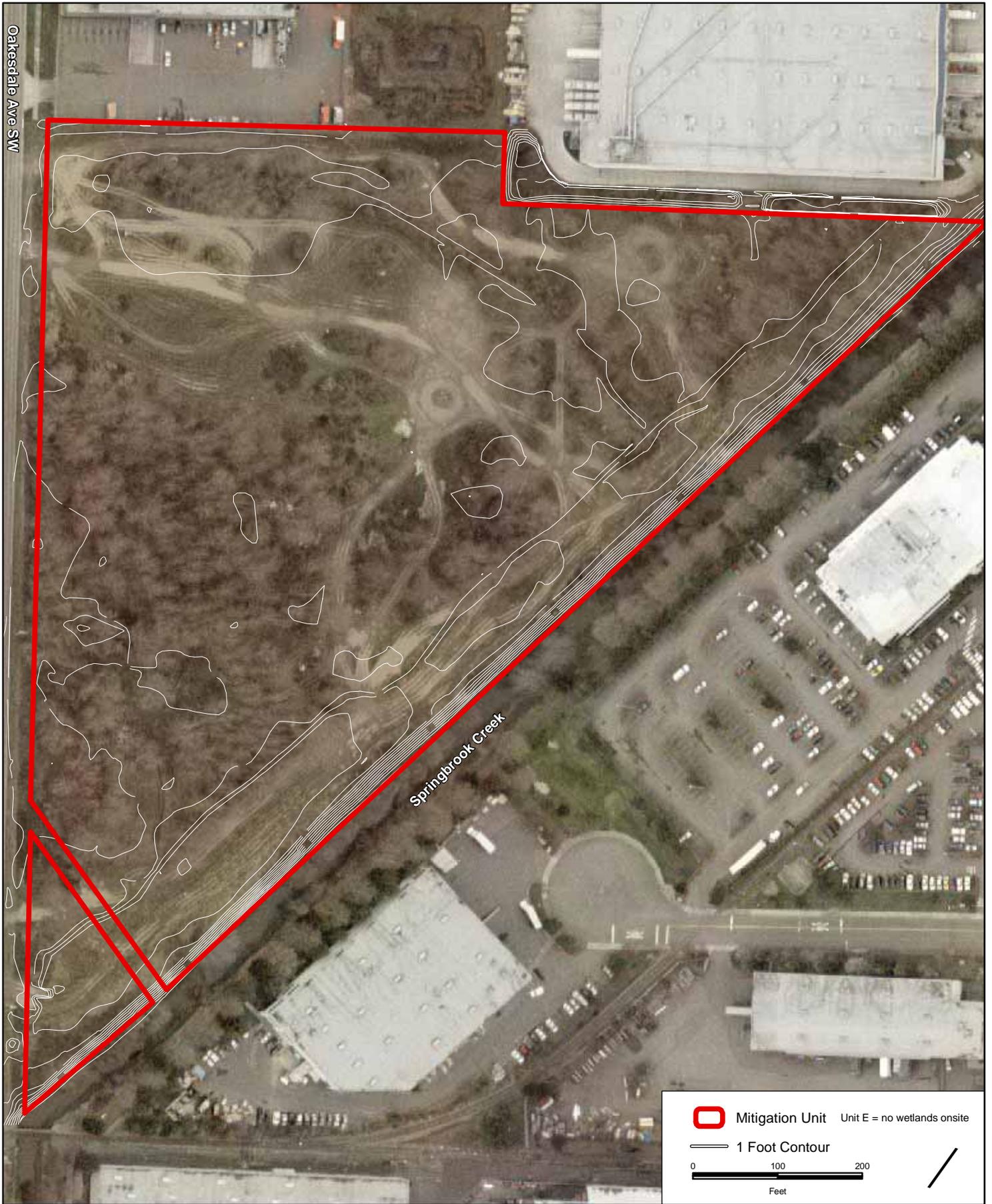
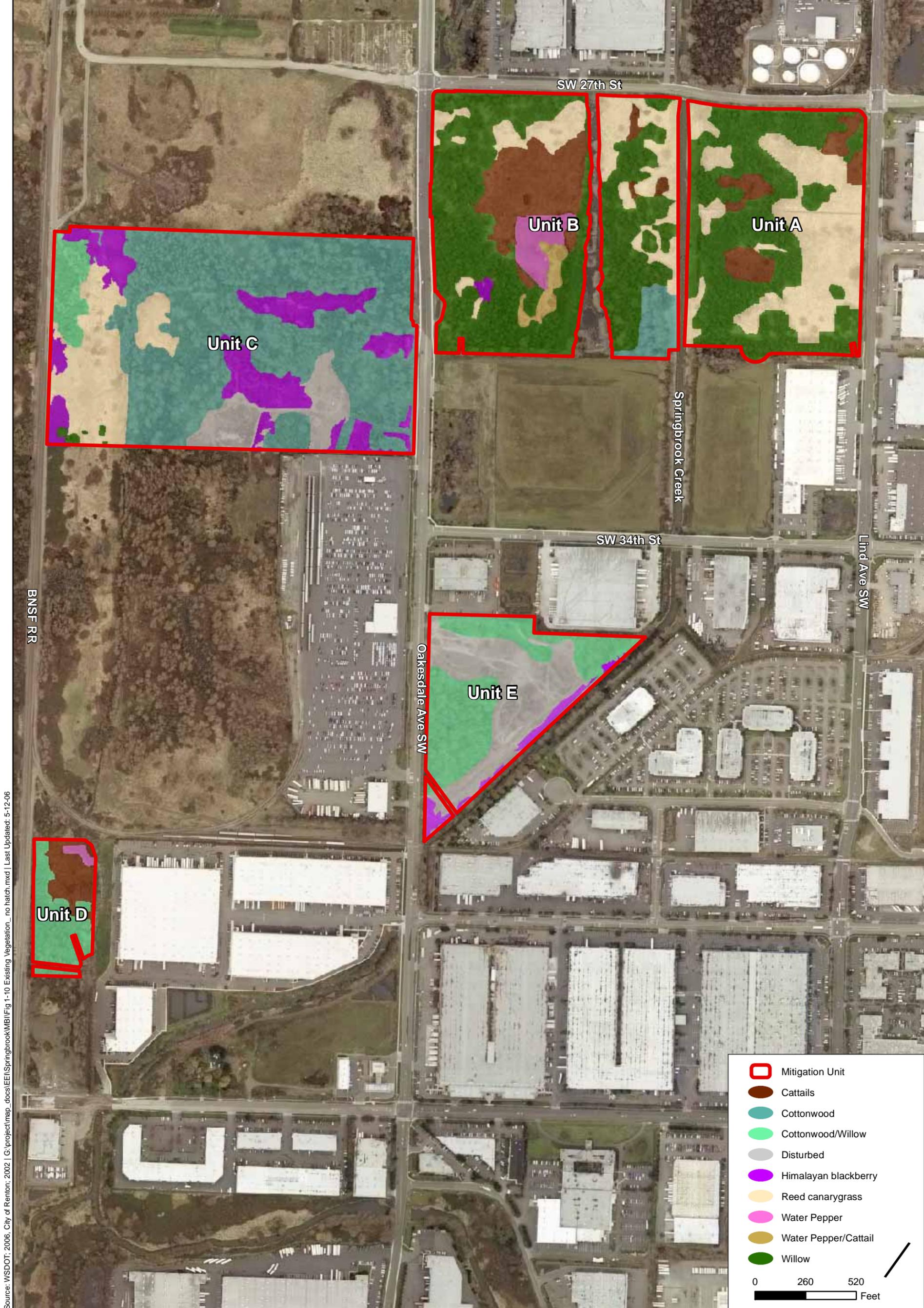


Photo Date: Winter 2002 (City of Renton)

Unit E Existing Conditions
Figure 1-9



Source: WSDOT, 2006, City of Renton, 2002 | G:\project\map_docs\EEI\Springbrook\MB\Fig 1-10 Existing Vegetation_no hatch.mxd | Last Updated: 5-12-06

Photo Date: Winter 2002 (City of Renton)

Existing Vegetation
Figure 1-10

2.0 ESTABLISHMENT OF THE BANK

2.1 MITIGATION BANK PLAN OVERVIEW

The mitigation bank plan focuses on improving wetland functions within all five units of Springbrook Bank and improving riparian functions in the three units adjacent to Springbrook Creek (Figure 2-1). Mitigation construction work will include extensive site grading in Units C and E; breaching the berms adjacent to Springbrook Creek in Units A, B, and E; treating reed canarygrass and blackberry in Units A, B, and C; and installing habitat structures and planting woody vegetation in all units. This work will improve a broad range of ecological functions to increase wetland habitat, water quality, and hydrologic functions.

The mitigation plan is based on activities that occur in specific areas as shown in Figures 2-1 through 2-5 and defined as follows.

Wetland Re-Establishment Areas: Removal of historic fill material will facilitate the re-establishment of former wetlands in Units A, B, C, and E. The excavation in Units A, B, and E will remove sections of an existing berm in order to connect re-established wetlands in these units with Springbrook Creek. Native trees, shrubs, and habitat structures (vertical snags, brush piles, and/or large woody debris [LWD]) will be installed at Units C and E. These activities are intended to restore wetland area, function, and value where it is likely that wetlands historically existed.

Wetland Rehabilitation Areas: Improving the hydrologic regime of existing wetlands will facilitate the rehabilitation of existing wetlands in Units A, B, and C. Reed canarygrass monocultures will be mowed and treated with herbicide. Planting hummocks will be installed in Units A and B to facilitate tree establishment, and provide additional habitat niches and hydrologic regimes. Biologists concluded that breaching the berms in Units A and B is expected to reduce the risk of fish stranding (WSDOT 2006). Native trees, shrubs, and habitat structures will be installed in Units A, B, and C to increase species diversity, habitat structure and habitat complexity.

Wetland Enhancement Type I Areas: Existing wetlands in Unit C will be enhanced by increasing plant and habitat diversity in large areas of invasive non-native vegetation (reed canarygrass and Himalayan blackberry) through a combination of several activities: implementation of aggressive reed canarygrass and blackberry control measures; dense planting of native trees and shrubs; and placement of habitat structures. These activities will increase species diversity and habitat structure and complexity.

Wetland Enhancement Type II Areas: Supplemental hydrology will be provided to existing seasonally inundated areas in the northern portion of Unit D. The additional water will be redirected from a stormwater/groundwater management facility (constructed as part of the South 180th Grade Separation Project) at the southern edge of Unit D and then transported via a new conveyance pipe from a treatment pond to the northern end of the unit. Additional hydrology will extend existing hydrologic regimes.

Forested Wetland Enhancement Areas: Native coniferous trees will be under-planted in the existing forested wetland portions of Units C and D. This will require the removal of invasive non-native vegetation from the understory in portions of Springbrook Bank. Under-planting conifers will enhance species and structural diversity in both units.

Upland Habitat Enhancement Areas: Removing invasive non-native vegetation, installing habitat structures, under-planting upland deciduous forests with native coniferous trees, and densely planting native woody species will enhance upland habitats in Units C.

Riparian Upland Enhancement Areas: Establishing riparian vegetation through a combination of mowing and herbicide treatment of reed canarygrass, selectively removing other invasive non-native vegetation, and planting native trees and shrubs is expected to increase riparian functions along Springbrook Creek in Units A, B, and E. This treatment is limited to berms adjacent to Springbrook Creek in Units A, B, and E and uplands adjacent to the wetland re-establishment areas in Unit E.

Protection Setback (Buffer): Portions of all units, except Unit D, will include 40-foot-wide “buffers” to be planted with native trees and shrubs in both wetlands and uplands. This will promote structural diversity and protect habitat from disturbance from adjacent land uses. This area will not generate wetland mitigation credits.

Trail Zone: A Trail Zone in Unit A will include an 8-foot-wide trail and a 40-foot-wide protection setback area on both sides of the proposed trail. This will create a 2.66-acre area (88-foot wide by 1,365-foot long) that will not generate mitigation credits. In order to construct the trail, existing vegetation within an 18-foot-wide temporary construction corridor will be cleared, the 8-foot-wide trail constructed, and all the areas not occupied by the trail replanted with native woody vegetation. Areas within the Trail Zone dominated by reed canarygrass will be mowed, treated with herbicide, and planted as part of the overall wetland rehabilitation treatment in Unit A.

2.2 CONSTRUCTION SCHEDULE

The wetland re-establishment areas in Units C and E, berm breaches in Units A and B, and a small portion of the wetland rehabilitation area in Unit C (to match existing topography) will be excavated and soils amended during the first construction season. Control of reed canarygrass will also begin during the first construction season. Woody plantings in all units, except portions of Unit E, will be installed during the first fall and winter planting season. If necessary, planting of flood-prone areas with containerized plant materials may be delayed until early spring. Large woody debris, snags, and brush piles will be installed during and/or after site grading has been completed.

A phased construction schedule will be implemented at Unit E. In the first year of construction, the site preparations and erosion control measures will be installed, and all of the area behind the 30-foot-wide berm will be excavated and planted. In the following summer, the breaches in the berm will be excavated, and the entire berm and breaches will be planted. Springbrook Creek will be allowed to enter Unit E in the fall of the second construction season.

Once project construction has been completed, an as-built report and/or drawings must be delivered by certified mail to the BOC members.

An "as-built" report provides documentation of what actually occurred onsite during construction and serves as a baseline from which to manage and monitor the site. This report identifies the date on which construction at the bank site was completed and if there were any changes from the plan approved by the BOC and reflected in the Agreement. Although these changes may

improve the project, it may appear as if the project is out of compliance with the original approved plans if the changes are not documented in the report.

An As-built report should include the following:

- The responsible parties (designer, construction contractors, planting contractors)
- Dates of implementation (including completion date).
- Description of any changes to the original plan(s).
- Description of any problems encountered during construction and what was done to correct them.
- A list of any follow-up actions needed, with a schedule.
- Plan sheets/drawings showing the as-built conditions.
- Photos to document baseline conditions.

As-Built drawings documenting post-construction site conditions will be submitted to the BOC members within 90 days of project completion and will describe in detail any material deviation from the applicable portion of the site plan.

2.3 GRADING PLAN

Site grading will primarily be conducted to breach the berms in Units A, B, and E; re-establish former wetlands in Units C and E; plug the existing conveyance ditch in Unit C; and install a stormwater pipe to supplement hydrology to Units D and C. Grading work is shown on the Grading Plans (Figures 2-10 through 2-13).

2.4 PLANTING PLAN

Vegetation species selection was based on native species known to occur in the project area that will provide cover and value to wildlife, are flood-tolerant, and produce the greatest likelihood of successful establishment. Tree plantings will include 18- to 36-inch containerized conifers and a combination of 18- to 36-inch bare-root plants and/or containerized deciduous trees. Shrub plantings will include a combination of 12- to 18-inch bare-root plants and/or containerized stock, or 36-inch live-stakes for willow species. Table 2-1 provides a list of plant materials. The Planting Plans (Figures 2-14 through 2-17) indicate the location of each area to be planted.

FINAL
Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 2-1. Master Plant Materials List

Wetland Tree/Shrub #1 (wetter)	Riparian Upland Plantings
Oregon ash (<i>Fraxinus latifolia</i>)	big-leaf maple (<i>Acer macrophyllum</i>)
black twinberry (<i>Lonicera involucrata</i>)	red alder (<i>Alnus rubra</i>)
Pacific ninebark (<i>Physocarpus capitatus</i>)	Sitka spruce (<i>Picea sitchensis</i>)
black cottonwood (<i>Populus balsamifera</i>)	Douglas-fir (<i>Pseudotsuga menziesii</i>)
Nootka rose (<i>Rosa nutkana</i>)	Scouler's willow (<i>Salix scouleriana</i>)
Sitka willow (<i>Salix sitchensis</i>)	snowberry (<i>Symphoricarpos albus</i>)
Wetland Tree/Shrub #2 (wettest)	Upland Plantings
red-osier dogwood (<i>Cornus sericea</i>)	big-leaf maple (<i>Acer macrophyllum</i>)
Oregon ash (<i>Fraxinus latifolia</i>)	serviceberry (<i>Amelanchier alnifolia</i>)
peafruit wild rose (<i>Rosa pisocarpa</i>)	beaked hazel (<i>Corylus cornuta</i>)
Pacific willow (<i>Salix lucida</i>)	oceanspray (<i>Holodiscus discolor</i>)
Sitka willow (<i>Salix sitchensis</i>)	Douglas-fir (<i>Pseudotsuga menziesii</i>)
	snowberry (<i>Symphoricarpos albus</i>)
Wetland Tree/Shrub #3 (wet)	Hummock Plantings
red-osier dogwood (<i>Cornus sericea</i>)	Oregon ash (<i>Fraxinus latifolia</i>)
Sitka spruce (<i>Picea sitchensis</i>)	Pacific ninebark (<i>Physocarpus capitatus</i>)
black cottonwood (<i>Populus balsamifera</i>)	Sitka spruce (<i>Picea sitchensis</i>)
Nootka rose (<i>Rosa nutkana</i>)	black cottonwood (<i>Populus balsamifera</i>)
Scouler's willow (<i>Salix scouleriana</i>)	western red cedar (<i>Thuja plicata</i>)
western red cedar (<i>Thuja plicata</i>)	
Wetland Forest Under-Plantings	
Sitka spruce (<i>Picea sitchensis</i>)	
western red cedar (<i>Thuja plicata</i>)	
western hemlock (<i>Tsuga heterophylla</i>)	

2.5 WEED MANAGEMENT

A management strategy that promotes the long-term establishment of woody vegetation will be applied at Springbrook Bank (Soll 2004). Weeds will be managed at Springbrook Bank in accordance with King County Noxious Weed Law (King County 2005) and the Washington State Noxious Weed List (Washington State Noxious Weed Control Board 2005) with additional emphasis focused on reducing existing reed canarygrass (RCG), limiting additional RCG establishment, and reducing the influence of Himalayan blackberry at the site. Estimated cover of class A and B noxious weeds, RCG, and Himalayan blackberry will be reported during formal monitoring, along with a record of management activities. Reed canarygrass cover will be limited by high-density planting of native trees and shrubs, mulching immediately following soil disturbance, and mowing and spraying RCG colonies to reduce competition and aid woody plant establishment. In the long term, shade and competition from woody vegetation will act as a natural RCG control. Himalayan blackberry will be controlled during initial construction, actively managed over the establishment phase of the bank, and prevented from out-competing planted native vegetation or dominating the site.

2.5.1 Existing Site Conditions Favor Reed Canarygrass

Eradication of reed canarygrass at Springbrook Bank is not practical. Variable hydrology, high nutrient and sediment loads, and abundant upstream seed sources in the Springbrook Creek Basin favor RCG colonization. These conditions will favor RCG growth regardless of the short-term effectiveness of control efforts (Reinhardt and Galatowitsch 2004).

- **Variable Hydrology** - The hydrology in the Springbrook Creek Basin is highly variable, which is driven by the high percentage of impervious surface in the basin. This results in rapid high-stage, short-duration responses to rainfall events, large flood events, and low base flows at varying times of year. Variable hydrology creates disturbance that favors RCG growth (Kercher et al. 2004).
- **High Nutrient and Sediment Loads** - Flood events deliver large amounts of nutrients and sediment to the sites because of the prevalence of urbanized landscapes upstream (Maurer et al. 2003). High nutrient and sediment loads encourage rapid colonization and growth of RCG (Miller and Zedler 2002; Mauer et al. 2003).
- **Abundant Upstream Seed Sources** - RCG is prevalent in wetlands and riparian areas throughout the Springbrook Creek Basin where dense cover of woody vegetation is lacking. Within the Bank site, RCG is dominant in the emergent portions of Units A and B, along Springbrook Creek, and in the BNSF right of way in Unit C. Grading in Units C and E may create conditions favoring RCG colonization in some areas.

2.5.2 Reed Canarygrass Offers Some Understory Functions

Reed canarygrass will likely be an understory component at Springbrook Bank, where it can provide functional benefits. RCG provides several beneficial functions, including:

- **Hydrologic Functions**
 - **Surface roughness.** The large size and dense growth habit of RCG slows surface water velocities during flood events, decreases downstream erosion, and increases sediment deposition.
 - **Stream bank stability.** The dense root system of RCG resists erosion and develops overhanging banks that provide habitat for fish and other aquatic species.

- **Water Quality Improvement Functions**

- **Surface roughness.** The large size and dense growth habit of RCG slow surface water velocities during flood events, and encourages sediment deposition.
- **Nutrient and toxicant uptake.** RCG takes up large amounts of dissolved nutrients and toxicants due to its high annual biomass production compared to other herbaceous species, and its tolerance of long duration inundation where it is exposed to high levels of nutrients and toxicants in solution (Mauer et al. 2003).

- **Fish Habitat**

- **Cover for juvenile coho.** The growth habit of RCG provides cover and refugia for juvenile coho during flood events. The ability of RCG to persist in standing water allows it to provide coho rearing habitat in stream channels, backwaters, or ponded areas. Malcom (1998) reported that the densities and sizes of over-wintering juvenile coho in a reed canarygrass-dominated low-gradient stream (Mill Creek, King County, Washington) were comparable to, and at times exceeded, those found in streams rated as having superior habitat.

2.5.3 Strategy to Manage Reed Canarygrass

Because site conditions favor establishment of RCG and its presence is not entirely detrimental to habitat, a management strategy that promotes the long-term establishment of woody vegetation will be applied at Springbrook Bank. The strategy for managing RCG involves mowing, herbicide treatment, and dense woody plantings. This strategy initially involves mowing and spraying herbicide to suppress the existing RCG colonies in Units A, B, C, and E. This approach is designed to create a window of opportunity and capture the site quickly to prevent RCG from re-establishing. Long-term control of RCG at all the units will involve densely planting native trees and shrubs, and spot-spraying RCG colonies with herbicides during the monitoring period to ensure long-term success in establishing the desired woody plant community. A short discussion of each phase of this process is provided below.

Mowing and Herbicide Treatment

- Mowing will occur as soon as the site is dry enough to allow access, but before seeds are formed to decrease RCG height, reducing herbicide use and making herbicide treatment more effective and efficient.
- Herbicide treatment, with chemicals specifically approved for aquatic use, will be conducted in August and again in September while carbohydrates are being translocated from the aboveground parts to the roots. This will provide the best possible control of belowground roots and rhizomes (Antieau 1998; Tu 2004; Reinhardt and Galatowitsch 2004).
- Mowing and herbicide treatment will minimize soil disturbance. Both the available literature and personal communications with experts have discouraged soil disturbance as a method of RCG control because it exposes the existing seed bank to light triggering seed germination (Clay Antieau 1998 and 2005; Susan Buis 2005; Monica Hoover 2005).

Mulch and Dense Woody Planting

- The herbicide treated RCG thatch will act as mulch in the short-term in the RCG removal areas. Woody mulch will be used in areas of soil disturbance to deter the establishment of RCG and other weeds and increase woody plant vigor.

- Plantings will consist of deciduous woody species that are flood tolerant, native to the project area, and fast growing. A total of 2,500 stems per acre will be planted in these areas. Dense planting has proven effective in competing with RCG (Celedonia 2002).
- The installation of planting hummocks at a density of two per acre within RCG removal areas will provide microtopography and locations to establish trees. The hummocks will have approximately a ten-foot diameter. Hummocks will be underlain with a weed-barrier layer (preferably cardboard or other biodegradable material), covered by 18 to 24 inches of imported weed-free compost-amended soil, and planted with two native coniferous trees, two native deciduous trees, and six native shrubs. Establishing trees in the RCG removal areas should discourage RCG in the long-term.

Post-Planting RCG Management

Post-planting management will consist of spot-spraying any new RCG growth in the treatment areas and replacing dead woody plantings as needed to achieve performance standards for woody cover (see Chapter 3). Spot-spraying and replanting activities will be a direct result of adaptive-management recommendations generated from quarterly and annual site visits conducted by WSDOT. Control will be triggered when it appears that RCG is preventing woody plant establishment or dominating large portions of the site. In the long-term, deciduous and coniferous woody plantings will limit light penetration to the understory, greatly reducing the potential for future RCG colonization.

Establishing Woody Vegetation

Establishing woody vegetation is critical to improving wetland functions. Woody vegetation provides shade, surface roughness, habitat structure, nutrient uptake, organic matter production, and a source for woody debris. Its establishment will be facilitated in the following ways:

- **Reducing competition.** In treatment areas, RCG control will be accomplished as described above, allowing a window of opportunity for woody plants to establish in these areas.
- **Creating variable topography.** Planting hummocks will create varied growing conditions for plant establishment. Creating slightly drier areas will increase the likelihood that tree plantings will have proper growing conditions in these areas and reduce RCG re-establishment.
- **Densely planting competitive native woody vegetation.** Dense planting has proven effective in competing with RCG (Celedonia 2002). Plantings will primarily consist of deciduous woody species that are flood tolerant, native to the project area, and fast growing.
- **Replacing dead plants.** Failed plantings will be replaced with species from the planting plan if performance standards are not being met or monitoring results indicate that replanting may be necessary to meet future standards. Replacement plantings may be relocated or substituted with other species from the planting plan to improve success.
- **Monitoring for and minimizing RCG establishment.** RCG will be controlled so that woody vegetation performance standards can be met. Direct controls, both mechanical and/or chemical, will be used to reduce RCG competition with new plantings and to limit expansion of RCG colonies.

2.5.4 Strategy to Manage Himalayan Blackberry

Himalayan blackberry is not listed as a noxious weed in Washington, but this invasive non-native species poses an ecological threat. It readily invades riparian areas, forest edges,

meadows, roadsides, and relatively open areas, including all open forest types. Once it becomes well established, Himalayan blackberry out-competes understory native vegetation and prevents native plant communities from establishing. It is currently present in many of the uplands and riparian areas in the various units and as an understory species in Units C and E.

The strategy for managing Himalayan blackberry involves an initial mechanical and chemical treatment, monitoring, and ongoing management.

- **Initial Treatment.** During site construction, all areas of Himalayan blackberry will be treated. In large monotypic stands, treatment will involve mowing the aboveground vegetation and applying herbicide. In areas where blackberry is mixed with native vegetation, treatment will involve targeted spot-spraying or cut-and-treat methods of control.
- **Monitoring.** During the establishment phase of Springbrook Bank, both formal and informal assessments of Himalayan blackberry cover will be conducted. The effects of the blackberry identified during these site visits will be assessed and management actions recommended.
- **Ongoing Management.** During the establishment phase of Springbrook Bank, Himalayan blackberry will be controlled as often as necessary to ensure that the performance standards are met.

2.5.5 Strategy to Manage other Invasive Non-Native Vegetation

Other invasive non-native vegetation occurring at Springbrook Bank will be managed according to King County Noxious Weed Law (King County 2005) and the Washington State Noxious Weed List (Washington State Noxious Weed Control Board 2005). Additional measures will be taken to control the establishment of Japanese knotweed, purple loosestrife, and English ivy at the site.

- **Initial Treatment.** All Japanese knotweed, purple loosestrife, and/or English ivy identified at the site prior to or during construction will be removed using methods appropriate to the species found. Any Class A or Class B noxious weeds designated for control in King County that are identified onsite will also be removed.
- **Monitoring.** During the establishment phase of Springbrook Bank, yearly site visits will be conducted to identify any of the target species. If identified, locations will be documented and/or flagged and appropriate staff notified to schedule weed control activities.
- **Ongoing Management.** If and when any of the targeted species are found, they will be managed during the same calendar year using control and removal methods appropriate for the particular species. Early season control to prevent seed-set and removal of seed heads may also be implemented to prevent future establishment.

2.6 MITIGATION BANK PLAN

Mitigation treatments for each unit are described below and in Table 2-2. All elevations referenced in this chapter are in the North American Vertical Datum 1998 (NAVD88). Elements of the mitigation bank plan are also shown on the following figures:

Mitigation Types — (Figures 2-1 to 2-5);

Mitigation Treatment Activities — (Figures 2-6 to 2-9);

Grading Plans — (Figures 2-10 to 2-13); and
Planting Plans — (Figures 2-14 to 2-17).

Table 2-2. Mitigation Treatment Type and Acreage Summary by Unit

Mitigation Treatment Type	Acreage					
	Unit A	Unit B	Unit C	Unit D	Unit E	Total
Wetland Re-Establishment	0.05	0.12	9.27	--	8.35	17.79
Wetland Rehabilitation	19.92	31.16	1.06	--	--	52.14
Wetland Enhancement – Type I	--	--	4.69	--	--	4.69
Wetland Enhancement – Type II	--	--	--	2.63	--	2.63
Forested Wetland Enhancement	--	--	23.21	2.01	--	25.23
Riparian Upland Enhancement	0.65	1.48	--	--	4.42	6.55
Upland Habitat Enhancement	--	--	7.80	--	--	7.80
Protection Setback (Buffer)	2.63	3.55	1.64	--	2.07	9.89
Trail Zone	2.66	--	--	--	--	2.66
Totals	25.91	36.31	47.67	4.64	14.84	129.37

2.6.1 Units A and B (62.22 acres)

2.6.1.1 Wetland Rehabilitation Area (51.08 acres)

Wetland rehabilitation is the dominant mitigation treatment within Units A and B. The creation of hydrologic connections through the existing berms in Unit A and B will reconnect Springbrook Creek to floodplain wetlands and their functions at stream elevations greater than the 12-foot contour. Areas dominated by reed canarygrass will be treated and replaced with native woody vegetation. Habitat structures and planting hummocks for tree establishment will also be installed.

When the water surface elevation of Springbrook Creek rises above the 12-foot contour, the berm breaches will allow for water to enter Units A and B more frequently and at lower flows than the two-year storm event. This will occur roughly five days (114 hours) annually, and one day (23 hours) during the growing season (based on modeling of full build-out watershed conditions). Floodwaters from Springbrook Creek will disperse across Units A and B, which are relatively flat, and extend inundation and/or saturation during the growing season. Occasional over-bank flooding from Springbrook Creek is not expected to adversely affect existing vegetation classes or types in Units A and B. For detailed hydrologic analysis, see *Springbrook Wetland and Habitat Mitigation Bank: Springbrook Creek Hydrological Analysis* (WSDOT 2005b).

2.6.1.1a Construction Elements – Site preparation within 15.6 acres dominated by reed canarygrass, including the riparian area next to Springbrook Creek, will involve mowing and herbicide treatment. The wetland re-establishment areas in the berm breaches will be cleared and grubbed, graded, and planted (see section 2.6.1.2 for more details on breaches). Three habitat structures per acre (vertical snags, brush piles, and/or LWD) will be placed in reed

canarygrass treatment areas and the cattail area in Unit B. Two planting hummocks per acre will be installed in the areas where reed canarygrass is removed. Figure 2-6 shows all treatment activities for Unit A and B.

2.6.1.1b Planting – A total of 2,500 native trees and shrubs per acre will be installed within planting areas. Woody species appropriate for the various hydroperiods will be planted as containerized and/or bare-root stock including: Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2). Containerized Sitka spruce, western red cedar, Oregon Ash, black cottonwood, and Pacific ninebark will be planted on the constructed hummocks (Hummock Plantings).

2.6.1.1c Functional Gain – Springbrook Creek is one of the few remaining tributary streams in the Lower Green River Basin. In a landscape that is nearly completely developed enhancing and protecting the last remaining natural areas is a high priority. The location of Units A and B along the habitat corridor of Springbrook Creek increases their value within the surrounding landscape and complements existing restoration projects both up and downstream.

Re-establishing the hydrologic connection between Springbrook Creek and Units A and B will restore the floodplain wetlands to fully functioning riverine Hydrogeomorphic class wetlands (see Section 1.4.4 *Wetlands*) while increasing floodplain function. Establishing additional woody vegetation and creating microtopography with planting hummocks will increase surface roughness, and may slow water velocities during flood events and increase residence time of floodwater at the site. The connectivity will also improve the creek's access to available flood storage and potentially reduce peak flow elevations and duration during high-flow events, which would provide downstream benefits. The increased interaction between Springbrook Creek and Units A and B should improve the removal of sediments, nutrients, and toxicants from the creek during flood events. The increase in vegetation classes over portions of Units A and B will provide additional capacity to uptake nutrients and toxicant, which will potentially improve water quality in the creek. Breaching the berm, adding planting hummocks, installing approximately three habitat structures per acre (vertical snags, brush piles, and/or logs), and establishing trees on planting hummocks will increase habitat complexity and result in more diverse habitat niches (Table 2-3).

Units A and B are located adjacent to a lower reach of Springbrook Creek. This proximity to the creek and the increased connectivity provided by the berm breaches may allow the improvements to water quality, hydrologic, floodplain, and riparian functions provided in these units to benefit downstream aquatic habitat in Springbrook Creek and the Lower Green River. Allowing areas of cattail (*Typha latifolia*) to remain in portions of Unit B will allow for greater habitat diversity and may encourage habitat utilization by great blue heron from the nesting colony located in the nearby Black River Riparian Forest. The cattail area will maintain a third vegetation class (emergent) and habitat interspersions in Unit B. Cattails also provide high quality feeding, breeding, and nesting habitat for red-winged blackbirds and marsh wrens. Cattail seeds are an important food source for waterfowl, and the rhizomes and leaves provide food and shelter for muskrats. Cattails are very efficient at removing excess nutrients and toxicants from aquatic systems due to their high annual productivity and tolerance of inundation. Preserving the cattails will allow their contribution to water quality improvement in Springbrook Creek to continue. Adding a minimum of thirteen pieces of LWD, snags, and/or brush piles in the cattail area will provide additional habitat niches where they are currently lacking. Placement of a minimum of five snags may allow for increased raptor use by increasing the

number of locations available for perching, foraging, and nest building. These snags may also encourage woodpecker foraging for invertebrates and potential nesting in the future. The addition of brush piles and LWD will increase the number and diversity of refuge and foraging locations for amphibians, invertebrates, and small mammals.

2.6.1.2 Wetland Re-Establishment Area (0.17 acre)

The 0.17-acre Wetland Re-Establishment Area is located where seven sections of the berm next to Springbrook Creek will be removed. A fisheries biologist reviewed the design for Units A and B to evaluate the effects on fish related to breaching the berms. This evaluation concluded that the proposed site alteration would improve floodplain connectivity for Springbrook Creek, while minimizing the potential for fish stranding (WSDOT 2006). Springbrook Bank will result in net improvements to fish habitat.

2.6.1.2a Construction – Three 20-foot long by 2- to 3-foot-deep breaches will be excavated in the berm in Unit A, and four in Unit B. Soils will be amended with incorporated compost to improve soil fertility and organic matter content. Disturbed soils will be protected from erosion with coir or jute fabric.

2.6.1.2b Planting – Native trees and shrubs will be installed at a density of 2,500 stems per acre including: Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2).

2.6.1.1c Functional Gain – Increasing wetland area and allowing Springbrook Creek increased access to the floodplain will provide substantial increases in wetland function. Replacing existing reed canarygrass with dense native woody vegetation will increase canopy closure over time. Woody plantings will increase the number of vegetation strata in portions of the site, eventually increase vertical stratification over time, and increase the number of native species present onsite (Table 2-3).

2.6.1.3 Riparian Upland Enhancement Area (2.13 acres)

The 2.13-acre riparian upland enhancement area includes the unexcavated area of the berm and embankment next to Springbrook Creek. Existing reed canarygrass will be replaced with native woody vegetation, which may improve riparian habitat and over time shade the stream channel.

2.6.1.3a Construction – Reed canarygrass will be mowed and treated with herbicide.

2.6.1.3b Planting – Scouler's willow, big-leaf maple, red alder, Sitka spruce, Douglas-fir, and snowberry will be planted at a density of 1,500 stems per acre (Riparian Upland Plantings).

2.6.1.3c Functional Gain – Leaf litter from deciduous trees and shrubs will increase organic matter export to the stream providing aquatic food-chain support (Table 2-3). As woody vegetation matures over time at the Bank, the amount of shading of Springbrook Creek may increase.

2.6.1.4 Protection Setback Area (6.18 acres)

A 6.18-acre 40-foot-wide protection setback area will be created around the outer perimeter of Units A and B to protect the wetland from disturbance related to adjacent roads and developments (Oakesdale Avenue SW, SW 27th Street, and Lind Avenue SW). The protection setback includes both existing wetlands and uplands. Native woody plantings will be established in areas where woody cover is lacking or invasive non-native vegetation is removed.

2.6.1.4a Construction – Himalayan blackberry and other invasive non-native vegetation present within the buffer will be selectively removed prior to planting native woody species.

2.6.1.4b Plantings – Protection setback plantings in uplands will include Douglas fir, big-leaf maple, serviceberry, oceanspray, beaked hazel and snowberry (Upland Plantings) at 1,500 stems per acre. Protection setback plantings in wetlands will include Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2) at 2,500 stems per acre.

2.6.1.4c Functional Gain – Planting dense woody vegetation in the buffer areas will protect habitat functions over the larger site from disturbance related to surrounding land use. Units A and B will primarily provide habitat for small mammals, aquatic mammals, invertebrates, and various species of birds.

2.6.1.5 Trail Zone (2.66 acres)

A 2.66-acre non-credit-generating Trail Zone will be established around the boardwalk running north-south in Unit A to serve as a buffer between the trail and portions of Unit A (see Figure 2-2). All mitigation treatment activities within the trail zone will be applied accordingly. This includes reed canarygrass removal and native woody plantings.

The Trail Zone includes the 8-foot-wide trail footprint and a 40-foot-wide protection setback area on both sides of the proposed trail. This will create an approximately 88-foot-wide by 1,365-foot long area that will not generate mitigation credits. By removing the 88-foot-wide Trail Zone (2.66 acres) from Springbrook Bank, approximately 0.90 credit will not be generated. Wetland rehabilitation will be performed within the Trail Zone as proposed throughout Unit A. In order to construct the trail, existing vegetation within an 18-foot-wide temporary construction corridor will be cleared, the 8-foot-wide trail will be constructed, and all areas not occupied by the trail will be planted with woody vegetation. Areas dominated by reed canarygrass will be mowed and treated with herbicide as part of the wetland rehabilitation treatment in Unit A.

The trail will provide a significant environmental education opportunity in an urban area under intense development pressure. The trail design and construction will utilize all available best management practices (BMPs) to minimize disturbance to adjacent habitat within Unit A. Within the Trail Zone, a net increase of 1.17 acres of woody vegetation will result after trail construction and re-vegetation work. This increase of woody vegetation is nearly 100% compared to existing conditions. The completed Trail Zone will offset the impacts to woody vegetation and wetlands from trail construction, and should provide an increase in wetland function and vegetative structure. It is expected that the efforts to minimize impacts and enhance vegetation within the non-credit-generating Trail Zone will mitigate the impacts from constructing the trail.

Construction of the trail has been carefully designed to minimize environmental impacts. The design team has considered the potential environmental impacts of the trail to Unit A and has incorporated appropriate design features to minimize these impacts as follows.

Alignment Change: The City owns an easement along Springbrook Creek for the trail connection. To improve and protect riparian habitat and functions, the City is revising the trail footprint further away from the stream than originally planned for in the easement. This alignment will minimize impacts to established shrubs and trees by aligning the trail to the

greatest extent practicable through existing patches of reed canarygrass. The trail will run roughly parallel with the creek on the west side of Unit A.

Elevated Boardwalk: The trail will be built as a boardwalk, elevated an average of 3 feet above the existing ground surface, except at the ends where it will connect to the existing trail system. The elevation will minimize impacts to the wetland, allow some vegetation to grow under the trail, and maintain connectivity of wildlife and hydrology. WDFW has indicated that they do not expect deer to be present in the area, and site visits by project biologists have noted the lack of any existing game trails on the site. Without the presence of deer onsite, the 3-foot vertical clearance should be adequate to allow passage of other wildlife species that may be present. Elevating the trail will minimize flooding of the trail from Springbrook Creek to the greatest degree possible and minimize impacts to sensitive wetland areas.

Narrower Trail: By narrowing the trail footprint to 8 feet, the construction impacts and footprint will be minimized. The typical width for City of Renton trails is 12 feet. Benches will be located in two designated areas with interpretive signage at one of the two locations. At these locations the trail may be widened 5 additional feet to 13 feet in width for sections up to 15 feet in length.

Handrails: Handrails will be installed along both sides of the entire boardwalk and be designed to prevent pedestrians from leaving the designated trail.

Materials: A pre-cast concrete diamond-pier pin foundation system will be used. This low-impact foundation system eliminates the need for pouring concrete footings and consequently will greatly reduce the extent of impacts to wetlands. Also, plastic wood will be used to construct the posts and beams, which will be exposed to occasional flooding. Plastic wood, cedar timber, or other nontoxic materials will be used to construct the decking and railings.

Pet Control: Plastic-coated fencing will be incorporated as part of the handrail design along the boardwalk to prevent pet access into the wetland area. Pet stations will also be installed at the northern and southern trail ends to collect pet waste.

Dense Vegetation: Dense vegetation will be established and/or existing vegetation will be supplemented adjacent to the trail to deter people from entering the wetland from the trail.

Limited Access: Bollards at each end of the trail will deter bicycle and other unauthorized vehicular access.

Instructive Signage: Signs posted at each end of the trail will identify the trail for pedestrian use only and include a posting of the City's adopted Park Rules and Regulations. All users must remain on the trail. Dogs must be on a leash (Council-adopted Park Rules and Regulations). Additional signage directing bicyclists to the appropriate alternate routes will also be placed at both ends of the trail and at logical points prior to the restricted use section of the trail.

Educational Signage: Benches will be placed at two locations along the trail to facilitate passive recreation, such as bird watching. In addition, interpretive signs at the designated seating areas will describe the unique natural features and environmental benefits of the Springbrook Creek wetlands.

Minimized Construction Impacts: Clearing the minimum amount of desirable vegetation necessary to construct the trail using an 18-foot-wide temporary construction corridor, narrowing the trail footprint, and implementing all available BMPs will minimize construction impacts.

Undesirable vegetation immediately adjacent to the trail will be removed and disposed of appropriately. Disturbed areas will be re-vegetated with native plant materials.

2.6.2 Unit C (47.67 acres)

2.6.2.1 Wetland Re-Establishment Area (9.27 acres)

The 9.27-acre Wetland Re-Establishment Area is the second largest treatment area in Unit C. Excavation of up to 7 feet of existing fill will place the lowest finish grade at the 16-foot elevation. The bottom of the created wetland will interface with seasonal groundwater. In order to ensure positive drainage and provide the potential for groundwater interaction, the 16-foot elevation was chosen to mesh with existing topography of the site, match up with the bottom of the existing conveyance ditch from which water is being diverted onto the Wetland Re-Establishment Area, and match the existing grade below the downstream outlet structure. Additional treated surface and ground water (average of 45,000 cubic feet of water per month) will also be redirected from the South 180th Street grade separation project to the north end of Unit D via a new pipe, then via the conveyance ditch through BNSF property to the south of Unit C and into the Wetland Re-Establishment Area (currently the water from this project is routed to Springbrook Creek). The conveyance ditch will be plugged near its entrance to Unit C and flows will be directed into this area. Wetland hydrology will be established below the 17-foot elevation. An adjustable-height weir will be installed at the outflow point in the northeast corner of the Wetland Re-Establishment Area to ensure saturation and up to 2 inches of seasonal inundation at the 16.2-foot elevation. This supplemental water will extend the hydrology up to five weeks in the late spring and three weeks in the late summer. For detailed hydrologic analysis, see *Springbrook Wetland and Habitat Mitigation Bank: Unit C Water Balance Memorandum* (WSDOT 2005c).

Analysts examined soils from geotechnical borings at the proposed excavation depth. The soils range from sandy gravel and sand to silty sand (fill), to interbedded sand and silt underneath the areas of fill, and poorly graded sand to silt at the bottom of the soil borings. Peat was also discovered intermixed in many of the soil layers (Hart Crowser 2005a).

2.6.2.1a Construction – Approximately 100,000 cubic yards of fill will be excavated and removed from historic wetlands with heavy equipment. This area will be fully cleared and grubbed prior to grading. The lowest finish grade in this area will be at the 15-foot contour, in a small area directly in front of the adjustable-height weir in the northeast corner of the excavated area. The entire Wetland Re-Establishment Area will be rough-graded to allow for microtopographic variation. After grading, a minimum of 3 inches of compost will be incorporated to a depth of 12 inches within the excavated area. The existing conveyance ditch will be plugged at several locations below the diversion point. Three habitat structures per acre (vertical snags, brush piles, and/or LWD) will be placed throughout the re-establishment area. (Figure 2-7 shows all treatment activities for Unit C.)

2.6.2.1b Planting – This area will be planted with native trees and shrubs at 2,500 stems per acre. The wetter bottom area (below the 16-foot contour) will be planted with Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2). Fringe wetland areas (between the 16-foot and 20-foot contours) will be planted with Pacific ninebark, black twinberry, Oregon ash, black cottonwood, Sitka willow, and Nootka rose (Wetland Tree/Shrub #1). Disturbed soils will be mulched with a minimum of 3 inches of woody mulch to deter reed canarygrass and other weed establishment and control erosion.

2.6.2.1c Functional Gain – Removal of fill material in the wetland re-establishment area will increase storage capacity for water delivered to the site from the existing conveyance ditch running from Unit D to the south edge of Unit C. Planting dense woody vegetation will increase surface roughness and may decrease water velocities, which has the potential to reduce erosion and delay surface water flows from leaving the site. The Wetland Re-Establishment Area will provide soil saturation for extended periods, allowing the uptake of dissolved nutrients and toxicants from solution. Increasing the number of vegetation classes throughout Unit C will allow greater uptake of nutrients and toxicants. Re-establishment of additional wetland area will also increase wetland functions (Table 2-4) and increase available wetland habitat for wetland-dependent and wetland associated birds, mammals, and invertebrates.

2.6.2.2 Wetland Rehabilitation Area (1.06 acres)

A 1.19-acre wetland rehabilitation area is associated with portions of the existing conveyance ditch and new drainage path. This area is dominated by existing native trees and shrubs, which will be protected. Native coniferous trees will be under-planted in these areas.

2.6.2.2a Construction – All areas of invasive non-native vegetation will be selectively removed to protect existing woody vegetation. Three habitat structures per acre (vertical snags, brush piles, and/or LWD) will be placed throughout the wetland rehabilitation area.

2.6.2.2b Planting – Conifer under-plantings will include Sitka spruce, western hemlock, and western red cedar (Wetland Forest Under-Plantings) at a density of 100 stems per acre.

2.6.2.2c Functional Gain – Coniferous woody vegetation will increase the quantity and quality of habitat niches. Woody plantings will increase canopy closure, the number of vegetation strata, and provide additional buffering from adjacent land uses. Under-planted conifers will increase native species richness and habitat structural diversity (Table 2-4).

2.6.2.3 Forested Wetland Enhancement Area (23.21 acres)

The 23.21 acres of wetland enhancement is the largest treatment area in Unit C. Areas dominated by existing native trees and shrubs will be under-planted with native conifers.

2.6.2.3a Construction – Areas of existing Himalayan blackberry will be selectively removed.

2.6.2.3b Planting – Sitka spruce, western hemlock, and western red cedar (Wetland Forest Under-Plantings) will be planted in existing forested wetland areas at a density of 100 trees per acre.

2.6.2.3c Functional Gain – Native conifer plantings will increase species diversity, the number of vegetation strata, and the structural complexity of these areas (Table 2-4).

2.6.2.4 Wetland Enhancement Type I (4.69 acres)

Existing reed canarygrass will be removed and native woody plants established.

2.6.2.4a Construction – Site preparation within areas dominated by reed canarygrass will include mowing and herbicide treatment. Three habitat structures per acre (vertical snags, brush piles, and/or LWD) will be placed throughout the Wetland Enhancement Area.

2.6.2.4b Planting – Nootka rose, red-osier dogwood, Sitka spruce, black cottonwood, red alder, Scouler's willow, and western red cedar (Wetland Tree/Shrub #3) will be installed at 2,500 stems per acre.

2.6.2.4c Functional Gain – Establishing woody vegetation in reed canarygrass removal areas will provide an increase in vegetation classes, which may provide additional uptake of nutrients and toxicants, and increase habitat structure. Installing habitat structures (snags, brush piles, and/or LWD) and establishing conifers will increase habitat niches, species diversity, and structural diversity (Table 2-4).

2.6.2.5 Upland Habitat Enhancement Area (7.80 acres)

The 7.80-acre upland habitat enhancement area will be located in the northern and western portions of Unit C. Enhancement of these areas will consist of replacing invasive non-native vegetation with native trees and shrubs.

2.6.2.5a Construction – Areas of existing Himalayan blackberry will be removed. Mowing and herbicide treatment will be used to remove reed canarygrass. Three habitat structures per acre (vertical snags, brush piles, and/or LWD) will be placed throughout the upland habitat enhancement area.

2.6.2.5b Planting – Douglas fir, big-leaf maple, serviceberry, oceanspray, beaked hazel, and snowberry (Upland Plantings) will be planted at 1,500 stems per acre in upland areas.

2.6.2.5c Functional Gain – Woody vegetation and habitat structures (vertical snags, brush piles, and/or LWD) will provide vertical habitat stratification that further increases the quantity and quality of habitat niches. Woody plantings will increase canopy closure, the number of vegetation strata over time, and provide additional buffering from adjacent land uses.

2.6.2.6 Protection Setback Area (1.64 acres)

A 1.64-acre non-credit-generating 40-foot-wide buffer will be created to protect the wetland from Oakesdale Avenue SW and development to the south. The buffer includes existing wetlands and uplands. Native woody plantings will replace invasive non-native vegetation.

2.6.2.6a Construction – Invasive non-native vegetation will be selectively removed within the 40-foot-wide buffer area along Oakesdale Avenue SW.

2.6.2.6b Planting – Plantings in upland areas will include Douglas fir, big-leaf maple, serviceberry, oceanspray, beaked hazel, and snowberry (Upland Plantings) planted at 1,500 stems per acre. Plantings in wetland areas will include Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2) planted at 2,500 stems per acre.

2.6.2.6c Functional Gain – Woody plantings will increase canopy closure, the number of vegetation strata over time, and provide additional buffering from adjacent land uses. The addition of native woody species may also provide increased habitat functions within the protection setback areas.

2.6.3 Unit D (4.64 acres)

2.6.3.1 Wetland Enhancement Type II Area (2.63 acres)

A 2.63-acre Wetland Enhancement Type II Area is located at the north end of Unit D. Hydrology in this area will be augmented with an average of approximately 45,000 cubic feet of water per month, which will be conveyed from a stormwater treatment pond directly south of the unit, via a new pipe, to the inundated area at the north end of Unit D. The stormwater treatment pond is a combined detention and water quality treatment facility designed to detain and treat surface runoff and groundwater from the Tukwila South 180th Street Grade Separation Project.

The pond was sized for water quality treatment in accordance with the requirements of 1998 King County Surface Water Design Manual (King County 1998). Surface runoff that collects in the roadway, and groundwater seepage that collects under the concrete roadway slab, is collected and drained to a wet well. The water is then pumped to a gravity system before discharging to the detention/water quality pond. The pond discharges to a pipe system that currently discharges to Springbrook Creek to the east of the pond. The new diversion pipe from the treatment pond will be buried in an existing roadbed. This will provide additional water to the Unit C Wetland Re-Establishment Area and extend the hydroperiod in the northern portion of Unit D.

A permanent easement was granted to the City of Tukwila by the City of Renton allowing all stormwater facilities to be owned and maintained by the City of Tukwila. The City of Renton is the original owner of the property, and has the authority to require the City of Tukwila to maintain the stormwater facilities in a working condition at all times and in perpetuity.

2.6.3.1a Construction – Installation of a new diversion structure and conveyance pipe from the pump station treatment/detention pond to inundated area at north end of the unit. (Figure 2-8 shows all treatment activities for Unit D.)

2.6.3.1b Planting – No plantings are planned for this area.

2.6.3.1c Functional Gain – Providing additional water to this area will create additional hydrologic regimes (water depth classes and durations of inundation) and/or extend the period of inundation in this area providing an increase in habitat niches (Table 2-5).

2.6.3.2 Forested Wetland Enhancement Area (2.01 acres)

A 2.01-acre Forested Wetland Enhancement Area is located in the south portion of Unit D. Invasive non-native vegetation will be removed from the understory of the existing forested wetlands. All other existing native trees and shrubs will be undisturbed. Native conifer trees will be under-planted in existing forested wetlands. The 0.25-acre area disturbed in constructing the storm sewer will be planted with native trees and shrubs.

2.6.3.2a Construction – Clearing, grubbing, and grading will be limited to approximately a 0.25-acre wetland area needed to construct the new pipe that will convey supplemental water to the Wetland Enhancement Type II Area. Brush piles will be placed within the disturbed area.

2.6.2.4b Planting – Sitka spruce, western hemlock, and western red cedar (Wetland Forest Under-plantings, Table 2-1) will be used for under-planting in the forested wetlands, at a density of 100 trees per acre. The area disturbed in constructing the storm sewer pipe will be planted with 2,500 stems per acre of Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2). Three inches of woody mulch will be placed in this area.

2.6.2.4c Functional Gain – Under-planting will increase habitat complexity in wetland enhancement areas by improving vegetation strata over time and native plant diversity. Woody vegetation and habitat structures, such as brush piles, will increase the quantity and quality of habitat niches (Table 2-5).

2.6.4 Unit E (14.84acres)

2.6.4.1 Wetland Re-Establishment Area (8.35 acres)

The 8.37-acre Wetland Re-Establishment Area includes creating riverine flow-through wetland conditions at Unit E by removing existing fill materials and connecting these wetlands to the

creek. The low-flow channels will be the lowest elevation in the unit at the 9-foot contour (just above summer base-flow of Springbrook Creek), which will be inundated for the majority of the year. The low-flow channels have been designed to direct floodwater from the wetland back into Springbrook Creek as it recedes. These channels will prevent any isolated pools of standing water from forming and prevent fish stranding. Three sections of the existing berm will be removed to connect Unit E to Springbrook Creek. Elevations below the 11.5-foot contour will be saturated at least ten percent and inundated approximately one percent of the growing season. Wetlands are not expected to re-establish at elevations above the 11.5-foot contour. The majority of the Wetland Re-Establishment Area's final grade, between the 9-foot and 11.5-foot elevations, will be located in a low-permeability silt layer. These elevations were selected based on the number of hours of inundation and saturation in the growing season estimated using a continuous time series model of Springbrook Creek combined with geotechnical information on soil conditions at the proposed elevations and regional groundwater inputs during the early growing season (WSDOT 2005b, Hart Crowser 2005a). The remainder of the Wetland Re-Establishment Area will be seasonally inundated. This area will be planted with native trees and shrubs.

Analysts examined soils taken from geotechnical borings of soils to be exposed through excavation. The soils range from sandy gravel and sand to silty sand (fill) on top, to interbedded sand and silt underneath the fill, then soft to medium stiff dark gray silt to sandy silt (low-permeability layer) and poorly graded sand to silt at the bottom of the soil borings. Peat was also intermixed and discovered in many of the soil layers (Hart Crowser 2005a).

Surface water inundation and inputs of groundwater from the more permeable sand/silty sand layers above and below the low-permeability layer will be important to the hydrology of the Wetland Re-Establishment Area. Surface water flooding will provide periodic inundation relatively frequently during the early growing season. The upper sand/silty sand layer will provide water to the site via seepage from the excavated slopes after infiltration from rainfall and flood events. A portion of the seepage will re-infiltrate into the bottom terrace of the excavated area and help maintain saturated conditions. The lower sand/silty-sand layer will provide a steady source of water via "leakage" into the silt layer from below, as the aquifer in this layer appears to be under pressure during the winter and through the early growing season. These sources of hydrology will maintain saturation in the Wetland Re-Establishment Area during time periods that surface water inundation is not present. For a more detailed surface water hydrology analysis, see *Springbrook Wetland and Habitat Mitigation Bank: Springbrook Creek Hydrological Analysis* (WSDOT 2005b).

2.6.4.1a Construction – Approximately 149,716 cubic yards of existing fill will be excavated in Unit E. The Wetland Re-Establishment Area will be fully cleared and grubbed prior to grading. Three habitat structures per acre (vertical snags, brush piles, and/or logs) will be placed throughout this area. The lowest elevations will be rough-graded to allow for microtopographic and water regime variation. A minimum of 3 inches of compost will be incorporated to a depth of 12 inches in excavated areas. All disturbed soils will be covered with a minimum of 3 inches of woody mulch to deter reed canarygrass growth and promote woody plant establishment. Disturbed areas adjacent to the creek will be protected with coir or jute fabric and/or quarry spalls to prevent erosion. Construction in Unit E will likely be phased over two construction seasons to minimize impacts to fish in Springbrook Creek. The majority of the site behind the berm will be excavated and planted in the first season. In the second construction season any

remaining areas will be planted after the berm is breached, allowing the creek access to off-channel habitat in Unit E. (Figure 2-9 shows all treatment activities for Unit E.)

2.6.4.1b Planting – The wetter bottom area (below the 10-foot contour) will be planted with Oregon ash, red-osier dogwood, Sitka and Pacific willows, and peafruit wild rose (Wetland Tree/Shrub #2). Fringe wetland areas (between the 10- and 12-foot contours) will be planted with Pacific ninebark, black twinberry, Oregon ash, black cottonwood, Sitka willow, and Nootka rose (Wetland Tree/Shrub #1). Areas above the 12-foot contour will be planted with red-osier dogwood, Sitka spruce, black cottonwood, Nootka rose, Scouler’s willow, and western red cedar (Wetland Tree/Shrub #3). Woody plants will be installed as live stakes, bare-root, and/or containerized stock at a density of 2,500 woody stems per acre.

2.6.4.1c Functional Gain – Re-establishing the hydrologic connection between Springbrook Creek and Unit E will provide an opportunity for increased functions and processes of the wetland floodplain. The re-established wetland hydrology will provide soil saturation for extended periods, allowing the uptake of dissolved nutrients and toxicants. Increasing the area available for treatment by increasing the ratio of the wetland to stream width will increase the likelihood of water quality improvement. Establishing woody vegetation and creating microtopography will increase surface roughness, which may slow water velocities during flood events, and increase residence time of floodwater at the site.

Unit E is located adjacent to one of the lower reaches of Springbrook Creek. This proximity to the creek will provide an opportunity for the potential improvements to water quality, hydrologic, floodplain, and riparian functions provided in Unit E to benefit downstream aquatic habitat in Springbrook Creek, the Green River, and Duwamish River and its estuary. Springbrook Creek is one of the few remaining tributary streams to the Green River. In a highly urbanized landscape, enhancing and protecting the last remaining natural areas is a high priority. The location of Unit E along the habitat corridor of Springbrook Creek greatly increases its value within the surrounding landscape and complements existing restoration projects both up and downstream.

2.6.4.2 Riparian Upland Enhancement Area (4.42 acres)

The 4.42-acre Riparian Upland Enhancement Area includes the remaining sections (islands and peninsulas) of the berm next to Springbrook Creek and upland areas surrounding the Wetland Re-Establishment Area. A portion of the existing cottonwood stand will be protected and under-planted with native trees and shrubs. Native woody plantings will be established in areas where woody cover is lacking.

2.6.4.2a Construction – Areas of existing Himalayan blackberry and other invasive non-native vegetation will be selectively removed. Three habitat structures per acre (vertical snags and/or LWD) will be placed in portions of the riparian enhancement area.

2.6.4.2b Planting – Scouler’s willow, big-leaf maple, red alder, Sitka spruce, Douglas-fir, and snowberry (Riparian Upland Plantings) will be installed in areas lacking woody vegetation in the Riparian Enhancement area at 1,500 plants per acre. Under-plantings in existing deciduous forest will include Sitka spruce, western hemlock, and western red cedar (Wetland Forest Under-Plantings). A total of 100 plants per acre will be installed in those areas.

2.6.4.2c Functional Gain – Increased organic matter in the form of leaf litter would increase organic matter export to the creek, which provides food-chain support. As they mature, woody riparian plantings should provide increased shade over the creek. Establishing dense woody

vegetation will increase canopy closure, the number of vegetation strata, and vegetative species diversity (Table 2-6).

2.6.4.3 Protection Setback Area (2.07 acres)

A 2.11-acre non-credit-generating 40-foot-wide buffer will be created to protect the wetlands in Unit E from Oakesdale Avenue SW and development to the north. The buffer will include existing uplands. Native woody plantings will be established to increase plant diversity, habitat structural diversity, and cover of woody plants. Existing native trees will not be removed. These areas will be under-planted with native conifer species.

2.6.4.4a Construction – All non-native invasive vegetation will be selectively removed within areas dominated by reed canarygrass. Existing Himalayan blackberry within the 40-foot buffer area along Oakesdale Avenue SW and the northern edge of the property will be selectively removed.

2.6.4.4b Planting – Native woody plantings will be installed at a density of 1,500 stems per acre. Species to be planted include Douglas fir, big-leaf maple, serviceberry, oceanspray, beaked hazel, and snowberry (Upland Plantings).

2.6.4.4c Functional Gain – Establishing dense woody vegetation will increase canopy closure, the number of vegetation strata, and provide buffering from surrounding land uses.

2.7 FUNCTIONAL IMPROVEMENT

Substantial functional improvements are expected from Springbrook Bank at various scales: watershed, mitigation bank unit, and treatment type. Functional gains for each treatment type were summarized in the previous sections. Functional gains at the watershed scale and at the mitigation bank scale are described in the following sections.

2.7.1 Watershed Scale

Substantial functional improvements are expected at the watershed level as a result of establishing Springbrook Bank. The proximity of Springbrook Bank to the lower reaches of Springbrook Creek provides an opportunity for potential improvements to water quality, hydrologic, floodplain, and riparian functions that may be provided in these units to benefit downstream aquatic habitat in Springbrook Creek and the Lower Green River. Springbrook Creek is one of the few remaining tributary streams to the Green River. The habitat value of associated natural areas may be difficult to replicate due to landscape position, water supply availability, urbanization of the surrounding area, and historic hydrologic manipulation of natural hydrologic systems in the Lower Green River Basin.

2.7.2 Mitigation Bank Unit Scale

Significant increases to wetland, stream, riparian, and floodplain functions will result at Springbrook Bank by: re-establishing, rehabilitating, and enhancing wetlands; enhancing upland habitat; and improving riparian conditions along Springbrook Creek. Water quality, hydrologic, and habitat functions are expected to increase significantly at Springbrook Bank. Tables 2-3 through 2-6 summarize the expected functional improvements for each unit, and list the attributes that contribute to wetland function in existing and future conditions. The site attributes examined were taken from *Method for Assessing Wetland Functions* (Hruby et al. 1999) and the *Wetland Rating System for Western Washington* (Hruby 2004). These methods include

comprehensive lists of attributes that contribute to wetland function. Existing and proposed conditions are rated qualitatively using three categories (Poor, Moderate, and High).

Work performed at Springbrook Bank will increase the variety of hydrologic regimes, number and structure of vegetation communities, number and diversity of physical structures, and wetland size. Therefore, improvements will result for many attributes used in Hruby et al. (1999) and Hruby (2004).

- **Units A and B** – Twelve of the eighteen functional attributes listed in Table 2-3 will be positively affected; three of three water quality attributes, two of four hydrologic attributes, and seven of eleven habitat attributes will be positively affected.
- **Unit C** – Ten of the eighteen functional attributes listed in Table 2-4 will be positively affected in addition to a substantial increase in wetland area; two of four water quality attributes, one of three hydrologic attributes, and seven of eleven habitat attributes will be positively affected.
- **Unit D** – Three of the eighteen functional attributes listed in Table 2-5 will be positively affected; two of four water quality attributes and one of eleven habitat attributes will be positively affected.
- **Unit E** – Seventeen of the eighteen functional attributes listed in Table 2-6 will be positively affected, in addition to a substantial increase in wetland area and fish rearing and refuge habitat; three of three water quality attributes, three of four hydrologic attributes, and eleven of eleven habitat attributes will be positively affected.

2.8 CONSTRUCTION MONITORING

WSDOT will monitor site construction to ensure work is completed according to site plan sheets and permit conditions. Site elevations will be surveyed routinely during excavation in Units A, B, C, and E during construction to confirm elevations. As-Built drawings will be generated post-construction. Photo-documentation of site construction will be kept on file. Woody habitat structures and plant material will be inspected, properly stored, and installed.

Bank performance standards, included in Chapter 3, will measure site success. Performance standards will address as-built condition, grading accuracy, planting success and cover, and installation/retention of woody habitat structures. Monitoring reports will specifically address each aspect of site construction.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 2-3. Existing and Proposed Function Attributes for Springbrook Bank, Units A and B (Riverine)

WATER QUALITY IMPROVEMENT FUNCTION ATTRIBUTES			
Function Attribute	Existing Condition	Mitigation Work	Proposed Condition
Vegetation classes	Moderate – Two to three vegetation classes present (Unit A: forested, scrub-shrub, and emergent; Unit B: forested, emergent).	Mow, apply herbicide, create microtopography, and plant trees and shrubs in large areas dominated by reed canarygrass, including riparian areas.	Moderate to High – Replace large reed canarygrass emergent wetlands with forested and scrub-shrub vegetation classes. Establishing tree and shrub classes in the riparian areas contribute to improving water quality in Springbrook Creek.
Understory vegetation	Low – Limited understory development	Plant native trees and shrubs.	Moderate – Area and complexity of understory vegetation will increase.
Width ratio of wetland to stream	Low – Wetland is 30 to 70 times the stream width, but wetlands are hydrologically disconnected from Springbrook Creek.	Breach 20-foot berm sections next to Springbrook Creek (three breaches in Unit A; four breaches in Unit B).	High – Reconnecting the wetland floodplain to Springbrook Creek substantially increases the effective width ratio of wetland to stream.
HYDROLOGIC FUNCTIONS ATTRIBUTES			
Storage capacity	Moderate – Wetland has potential to store large volumes of stormwater. Low opportunity to store floodwater from creek because berms restrict connection.	Breach berm sections next to Springbrook Creek.	High – Breaching berm sections increases available storage capacity for floodwaters from Springbrook Creek.
Size ratio of wetland to basin	Low – Wetlands represents a small portion of total basin area.	Breach berm sections next to Springbrook Creek.	Low – The effective floodplain area will be increased, but that increase is relatively small compared to the basin drainage area.
Ratio of wetland to stream	High – Stream extends total length of wetland, but connectivity is low.	Breach berm sections next to Springbrook Creek.	High – No change in ratio, but connectivity will be substantially increased.
Cover by woody vegetation	Moderate – Woody vegetation covers approximately 33 percent of Unit A and 60 percent of Unit B.	Plant native trees and shrubs.	High – Overall cover by woody vegetation will increase in wetlands currently dominated by reed canarygrass, including riparian areas.
HABITAT FUNCTIONS ATTRIBUTES			
Buffer condition	Low – Buffers are relatively narrow and disturbed.	Within a 40-foot buffer screen around the perimeter of Units A and B, remove weeds and plant with native trees and shrubs. Plant native trees and shrubs in riparian enhancement area.	Moderate – Weed removal and native woody plantings will improve buffer condition.
Canopy closure over wetlands	Varies from Low to Moderate – Woody vegetation covers approximately 33 percent of Unit A and 60 percent of Unit B.	Mow, apply herbicide, create microtopography, and plant native trees and shrubs in large areas currently dominated by reed canarygrass.	High – Overall canopy closure by woody vegetation will increase in reed canarygrass removal areas.
Canopy closure over stream	Low – Very little woody vegetation present along stream	Mow, apply herbicide, and jute matting, plant trees and shrubs along riparian corridor currently dominated by reed canarygrass.	High – Canopy closure over stream will increase replacing reed canarygrass.
Number of vegetation strata	Moderate – Three strata present (tree, shrub, and herb).	Mow, apply herbicide, create microtopography, and plant native trees and shrubs in large areas currently dominated by reed canarygrass.	Moderate – Tree and shrub strata will replace the herb layer in large areas dominated by reed canarygrass.
Number of snags	Low – Few or no snags.	Install vertical snags in treatment areas.	High – Number of snags will substantially increase.
Number of LWD	Low – Little or no LWD.	Install large woody debris and brush piles in treatment areas.	High – Number of LWD and brush piles will substantially increase.
Vegetation interspersion	Moderate – Most of the areas have a moderate degree of interspersion.	Install native trees and shrubs and create micro-topography in large areas dominated by reed canarygrass.	Moderate – Increase vegetation interspersion with structurally complex boundaries by rehabilitating forested and scrub-shrub wetlands, and enhancing riparian uplands.
Number of hydrologic regimes	Moderate – Three hydrologic regimes (seasonally saturated, occasionally inundated, and seasonally inundated).	Install planting hummocks to create microtopography in reed canarygrass removal areas.	Moderate – No change to number of hydrologic regimes, but the wetland area with the various hydrologic regimes will be increased.
Number of water depth classes	Moderate – Two depth classes (0-8", 8-40").	Install planting hummocks to create microtopography in reed canarygrass removal areas.	Moderate – No change to number of depth classes, though complexity will increase by creating micro-topography.
Species richness	Low – Between four to eight species present, depending on area. No conifers are present.	Plant up to five additional species in reed canarygrass removal areas.	Moderate – Native species richness will increase as a result of plantings.
Mature woody vegetation	Moderate – Areas of mature woody vegetation are present.	Retain existing mature woody vegetation. Plant native trees and shrubs in large areas dominated by reed canarygrass.	High – Plantings will provide more mature woody vegetation as the site becomes established.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 2-4. Existing and Proposed Function Attributes for Springbrook Bank, Unit C (Depressional)

WATER QUALITY IMPROVEMENT FUNCTION ATTRIBUTES			
Function Attribute	Existing Condition	Mitigation Work	Proposed Condition
Vegetation classes	Moderate – Three vegetation classes present (deciduous forest, scrub-shrub, and emergent).	Create forest/scrub-shrub in wetland re-establishment area; Create forest/scrub-shrub wetlands in reed canarygrass removal areas; Create mixed forest by under-planting coniferous trees in deciduous forest.	Moderate – Same number of vegetation classes, but improved composition (deciduous forest, mixed forest, and scrub-shrub). Reed canarygrass-dominated emergent wetlands will be replaced by forest/scrub-shrub. Under-planting conifers will create mixed forest. Area of forest/scrub-shrub will be enlarged in wetland re-establishment area.
Understory vegetation	Low to Moderate – Limited understory development. Forested areas have shrub understory that is largely Himalayan blackberry.	Plant native conifers in the understory of existing deciduous forest.	Moderate – Diversity and complexity of understory vegetation will increase.
Storage capacity	Moderate – Wetland has capacity to store additional water.	Excavate fill to re-establish forest/scrub-shrub wetlands.	Moderate – Newly created wetlands will increase storage capacity.
Area seasonally inundated	Low – Only small portion of wetlands onsite have seasonal inundation	Excavate historic fill expanding wetland area onsite and providing additional areas with seasonal inundation.	Moderate – Additional wetlands onsite will provide substantial new area of seasonal inundation.
HYDROLOGIC FUNCTIONS ATTRIBUTES			
Storage capacity	Moderate – Wetland has capacity to store additional water.	Excavate fill to re-establish forest/scrub-shrub wetlands.	Moderate – Newly created wetlands will increase storage capacity.
Size ratio of wetland to basin	Moderate to High – Wetland represents approximately 15 percent of sub-basin drainage area.	Excavate fill to re-establish forest/scrub-shrub wetlands.	Moderate to High – The wetland area will be increased, but that increase is relatively small compared to the sub-basin drainage area.
Cover by woody vegetation	Varies from Low to High – Woody vegetation covers approximately 83 percent of the wetlands in Unit C.	Plant native trees and shrubs	High – Overall cover by woody vegetation will increase.
HABITAT FUNCTIONS ATTRIBUTES			
Buffer condition	Moderate – Buffers are greater than 100 meters for 50% of wetland.	Plant native trees and shrubs within a 40-foot buffer screen along Oakesdale Ave. SW and portion of BNSF property to the south.	Moderate – Plantings will improve buffer condition.
Canopy closure	Varies from Low to High – Woody vegetation covers approximately 83 percent of the wetlands in Unit C.	Plant native trees and shrubs.	High – Overall canopy closure by woody vegetation will increase.
Number of vegetation strata	Moderate – Three strata present (tree, shrub, and herb).	Plant native trees and shrubs. Under-plant native coniferous trees in deciduous forest.	Moderate – Tree and shrub strata will develop within the wetland re-establishment and reed canarygrass removal areas. Conifers under-planted in deciduous forest will contribute to near-term development of the sub-canopy stratum.
Number of snags	Varies from Low to Moderate – Few or no snags in Wetlands C-2/C-3; up to four classes of snags in Wetland C-1.	Install vertical snags in re-establishment and RCG removal areas.	High – Number of snags will substantially increase.
Number of LWD	Varies from Low to Moderate – Little or no LWD in Wetlands C-2/C-3, up to four classes of snags present in Wetland C-1.	Install large woody debris and brush piles in re-establishment and RCG removal areas.	High – Number of LWD and brush piles will substantially increase.
Vegetation interspersion	Low to Moderate – Most areas have low to moderate degree of interspersion	Excavate fill and plant forest/scrub-shrub in wetland re-establishment area; Establish forest/scrub-shrub wetlands in reed canarygrass removal areas; Create mixed forest by under-planting conifers in deciduous forest.	High – Increase vegetation interspersion with structurally complex boundaries by re-establishing, rehabilitating, and enhancing forested and scrub-shrub wetlands.
Number of hydrologic regimes	Moderate – Three hydrologic regimes (seasonally saturated, occasionally inundated, and seasonally inundated).	Re-establish new wetland area. Excavate micro-topography in the wetland re-establishment and install planting hummocks in reed canarygrass removal areas.	Moderate – No change to number of hydrologic regimes, but the wetland area with the various hydrologic regimes will be increased.
Number of water depth classes	Moderate – Two depth classes (0-8", 8-40").	Re-establish new wetland area. Excavate microtopography in the wetland re-establishment area.	Moderate – No change to number of water depth classes, but the wetland area with the depth classes will be increased.
Species richness	Moderate – From six to eight species present, depending on area. No conifers are present.	Plant up to ten additional native wetland tree and shrub species.	High – Native species richness will increase as a result of plantings.
Area seasonally inundated	Low – Only small portion of wetlands onsite have seasonal inundation	Excavate historic fill expanding wetland area onsite and providing additional areas with seasonal inundation.	Moderate – Additional wetlands onsite will provide substantial new area of seasonal inundation.
Mature woody vegetation	Moderate – Areas of mature woody vegetation are present.	Retain existing mature woody vegetation. Plant native trees and shrubs throughout.	High – Plantings will provide more mature woody vegetation as the site becomes established.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

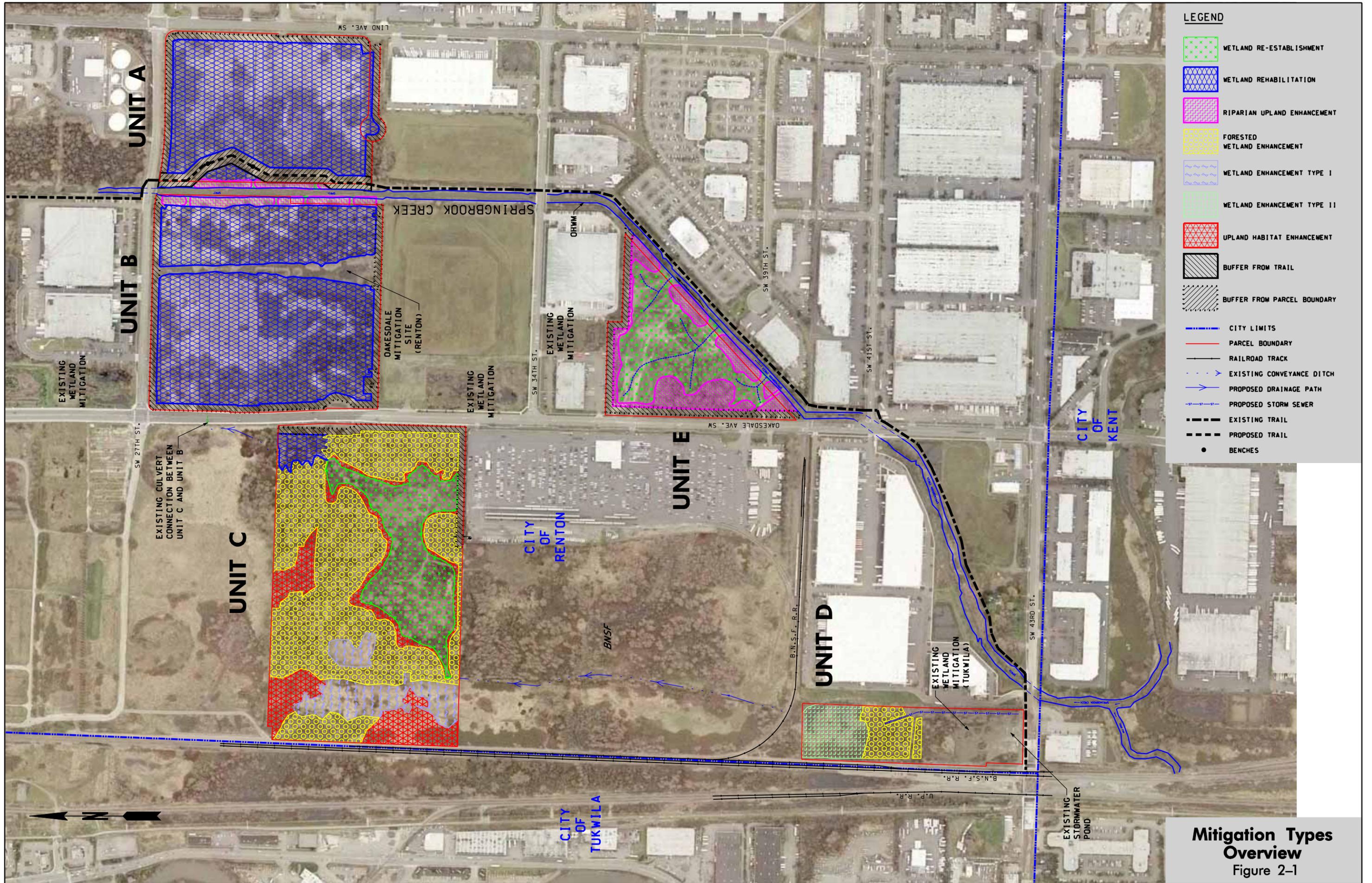
Table 2-5. Existing and Proposed Function Attributes for Springbrook Bank, Unit D (Depressional)

WATER QUALITY IMPROVEMENT FUNCTION ATTRIBUTES			
Function Attribute	Existing Condition	Mitigation Work	Proposed Condition
Vegetation classes	Moderate – Three vegetation classes present (deciduous forest, scrub-shrub, and emergent).	Create mixed forest by under-planting coniferous trees in deciduous forest.	Moderate to High – Increased number of vegetation classes and improved composition (deciduous forest, mixed forest, scrub-shrub, and emergent). Under-planting conifers will create mixed forest.
Understory vegetation	Low – Limited understory development	Plant native conifers in the understory of existing deciduous forest.	Moderate – Diversity and complexity of understory vegetation will increase.
Storage capacity	Moderate – Wetlands onsite store water.	No action planned to increase storage capacity.	Moderate – No change anticipated.
Area seasonally inundated	Moderate – Wetlands onsite have seasonal inundation	Add additional water from 43 rd St. grade separation project.	Moderate – Additional water may increase seasonal inundation
HYDROLOGIC FUNCTIONS ATTRIBUTES			
Storage capacity	Moderate – Wetland has capacity to store stormwater.	No action planned.	Moderate – No change.
Size ratio of wetland to basin	Moderate – Wetland represents approximately 5 percent of the sub-basin drainage area	No action planned.	Moderate – No change.
Cover by woody vegetation	Moderate – Woody vegetation covers approximately 60 percent of the wetland in Unit D.	Under-plant native coniferous trees in deciduous forest.	Moderate – No change to percentage of woody vegetation, but composition will improve.
HABITAT FUNCTIONS ATTRIBUTES			
Buffer condition	Low – Buffers are narrow and disturbed.	No action planned.	Low – No change.
Canopy closure	Moderate – Woody vegetation covers approximately 60 percent of the wetland in Unit D.	Under-plant native coniferous trees in deciduous forest.	Moderate – No change in canopy closure, but composition will improve.
Number of vegetation strata	Moderate – Three strata present (tree, shrub, and herb).	Under-plant native coniferous trees in deciduous forest.	Moderate – Conifers under-planted in deciduous forest will contribute to near-term development of the sub-canopy stratum.
Number of snags	Low – Few snags in Unit D.	No action planned.	Low – No change.
Number of LWD	Low – Little LWD in Unit D.	Install brush piles in the wetland enhancement area.	Moderate – Brush piles will increase the amount of downed wood.
Vegetation interspersion	Low – Unit D has low degree of interspersion.	No action planned.	Low – No change.
Number of hydrologic regimes	Moderate – Three hydrologic regimes (seasonally saturated, occasionally inundated, and seasonally inundated).	Supplement hydrology with surface water from 180 th Street grade separation project.	Moderate – Hydroperiod may be extended.
Number of water depth classes	Moderate – Two depth classes (0-8", 8-40").	Supplement hydrology with surface water from 180 th St. grade separation project.	Moderate – No increase to the number of depth classes, but the hydroperiod may be extended.
Species richness	High – Fifteen species present in Unit D. No conifers are present.	Plant three native coniferous tree species to increase native plant diversity.	High – Native species richness will improve as a result of plantings.
Area seasonally inundated	Moderate – Wetlands onsite have seasonal inundation	Add additional water from 180 th Street grade separation project.	Moderate – Additional water may increase seasonal inundation.
Mature woody vegetation	Moderate – Areas of mature woody vegetation are present.	Retain existing mature woody vegetation. Under-plant native coniferous trees in deciduous forest.	Moderate – Conifer plantings will provide mature woody vegetation over time.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 2-6. Existing and Proposed Function Attributes for Springbrook Bank, Unit E (Riverine)

WATER QUALITY IMPROVEMENT FUNCTION ATTRIBUTES			
Function Attribute	Existing Condition	Mitigation Work	Proposed Condition
Vegetation classes	Low – No wetlands are present in Unit E. The riparian uplands include three vegetation classes (deciduous forest, scrub-shrub, and emergent).	Excavate fill and plant native trees and shrubs in wetland re-establishment area; Plant native trees and shrubs in riparian enhancement area; Create mixed forest by under-planting coniferous trees in upland deciduous forest.	Moderate – The re-established wetlands will include two vegetation classes (deciduous forest and scrub-shrub). Under-planting conifers will create mixed upland forest.
Understory vegetation	Low – Limited understory development.	Plant native trees and shrubs, including conifers in the understory of existing upland deciduous forest.	Moderate – Diversity and complexity of understory vegetation will increase.
Width ratio of wetland to stream	Low – No wetlands are present in Unit E.	Excavate fill and plant native trees and shrubs in wetland re-establishment area.	High – The re-established floodplain wetland area will be approximately 45 meters wide and connected to Springbrook Creek.
HYDROLOGIC FUNCTIONS ATTRIBUTES			
Storage capacity	Low – No wetlands are present in Unit E.	Excavate fill to re-establish new wetland and connect to Springbrook Creek.	High – Re-established wetlands will increase storage capacity onsite.
Size ratio of wetland to basin	Low – No wetlands are present in Unit E.	Excavate fill to re-establish new wetland and connect to Springbrook Creek.	Low – Eight acres of wetlands will be re-established. This represents a small portion of total basin area.
Ratio of wetland to stream	Low – No wetlands are present in Unit E.	Excavate fill to re-establish new wetland and connect to Springbrook Creek.	High – Re-established wetland will extend the length of stream within Unit E.
Cover by woody vegetation	Low – Uplands in Unit E have approximately 40 percent cover of woody vegetation.	Plant native trees and shrubs.	High – Overall cover by woody vegetation will increase.
HABITAT FUNCTIONS ATTRIBUTES			
Buffer condition	Moderate – The riparian buffer is more than 50 meters wide and is disturbed by off-road vehicles.	Plant 40-foot buffer screen along Oakesdale Ave. SW and northern edge with native trees and shrubs. Plant native trees and shrubs in riparian enhancement area.	Moderate – Plantings will improve buffer condition.
Canopy closure over wetlands	Low – Uplands in Unit E have approximately 40 percent cover of woody vegetation.	Plant native trees and shrubs.	Moderate – Overall canopy closure by woody vegetation will increase.
Canopy closure over stream	Moderate – The majority of the stream has mature woody vegetation.	Plant additional native trees and shrubs in riparian areas.	High – Gaps in canopy closure over the stream be planted with trees and shrubs increasing canopy closure.
Number of vegetation strata	Low – No wetlands are present in Unit E.	Plant native trees and shrubs.	High – Tree and shrub strata will develop within the wetland re-establishment area. Conifers under-planted in upland deciduous forest will contribute to near-term development of the sub-canopy stratum.
Number of snags	Low – No snags in Unit E.	Install vertical snags in re-establishment areas.	High – Number of snags will substantially increase.
Number of LWD	Low – No LWD in Unit E.	Install large woody debris and brush piles in re-establishment and portions of the riparian area.	High – Number of LWD and brush piles will substantially increase.
Vegetation interspersation	Low – Unit E has a low degree of vegetation interspersation.	Excavate fill and plant native trees and shrubs in wetland re-establishment area; Plant native trees and shrubs in riparian enhancement area; Create mixed forest by under-planting coniferous trees in upland deciduous forest.	High – Increase vegetation interspersation with structurally complex boundaries by re-establishing forested and scrub-shrub wetlands, and enhancing riparian uplands.
Number of hydrologic regimes	Low – No wetland hydrology is present in Unit E.	Excavate fill to re-establish new wetland area. Excavate micro-topography in the wetland re-establishment area.	High – Wetlands will be re-established with four hydrologic regimes (intermittently flooded, temporarily flooded, seasonally flooded, and semi-permanently flooded).
Number of water depth classes	Low – No inundation areas are present in Unit E.	Excavate fill to re-establish new wetland area. Excavate micro-topography in the wetland re-establishment area.	High – Wetlands will be re-established with 2 water depth classes (0-8", 8-40").
Species richness	Low – No wetlands are present in Unit E.	Plant ten wetland native tree and shrub species, and eleven upland native tree and shrub species.	High – Native species richness will substantially increase as result of plantings.
Mature woody vegetation	Moderate – Mature woody vegetation present over small area.	Retain existing mature woody vegetation. Plant native trees and shrubs throughout.	High – Plantings will provide more mature woody vegetation as the site becomes established.



Mitigation Types Overview
Figure 2-1

UNIT B

SW 27TH ST.

UNIT A

SW 27TH ST.

UNIT A & B LEGEND

-  WETLAND RE-ESTABLISHMENT
-  WETLAND REHABILITATION
-  RIPARIAN UPLAND ENHANCEMENT
-  BUFFER FROM TRAIL
-  BUFFER FROM PARCEL BOUNDARY
-  PARCEL BOUNDARY
-  PROPOSED TRAIL
-  EXISTING TRAIL
-  BENCHES

OAKSDALE AVE. SW

OAKSDALE MITIGATION SITE (RENTON)

SPRINGBROOK CREEK

LIND AVE. SW

0 80 160
SCALE IN FEET



Units A and B Mitigation Types Figure 2-2



UNIT C LEGEND

- WETLAND RE-ESTABLISHMENT
- WETLAND REHABILITATION
- FORESTED WETLAND ENHANCEMENT
- WETLAND ENHANCEMENT TYPE I
- UPLAND HABITAT ENHANCEMENT
- BUFFER FROM PARCEL BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACK
- EXISTING CONVEYANCE DITCH
- CITY LIMITS

EXISTING WETLAND MITIGATION

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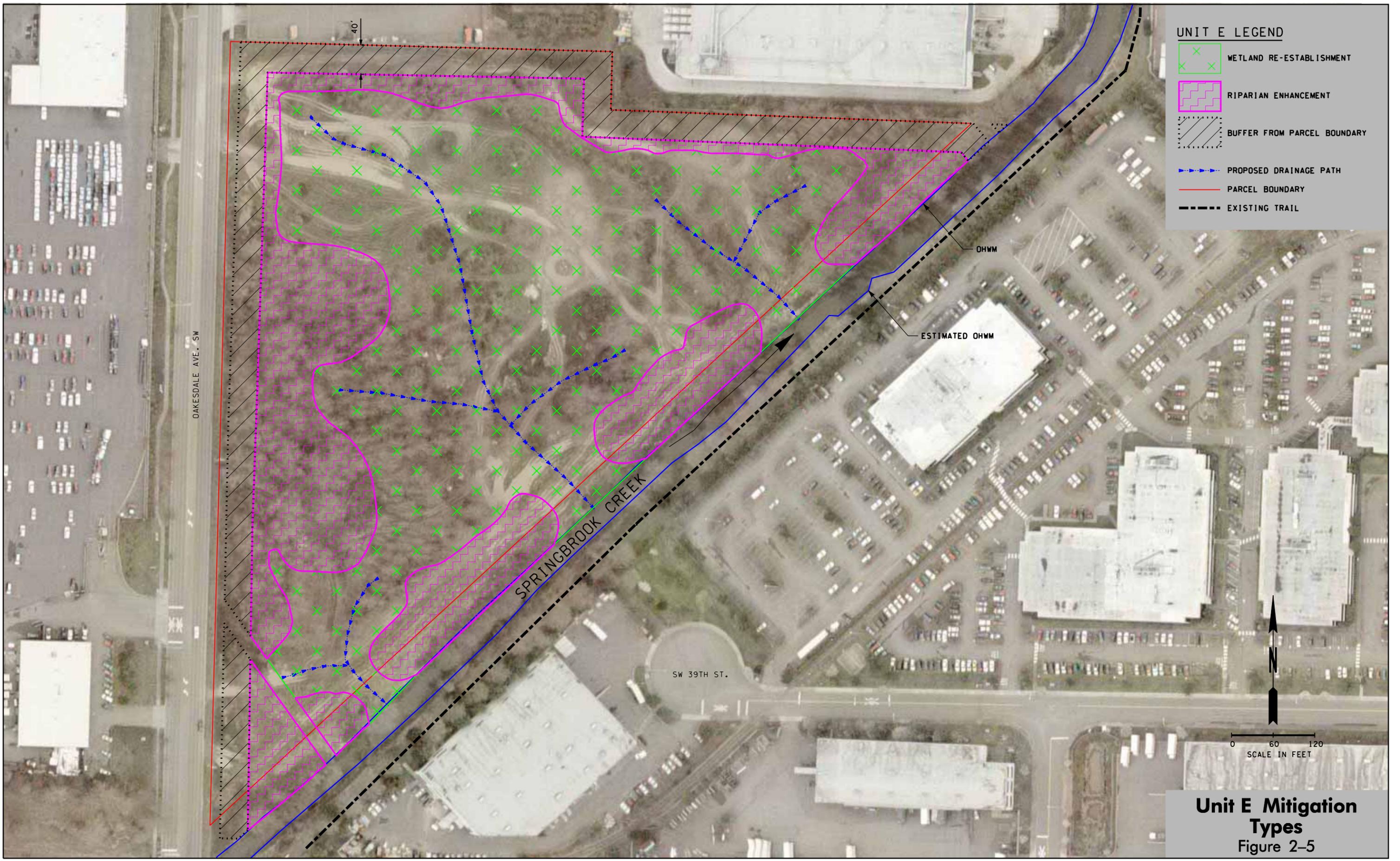
Unit C Mitigation Types
Figure 2-3

UNIT D LEGEND

-  FORESTED WETLAND ENHANCEMENT
-  WETLAND ENHANCEMENT TYPE II
-  PARCEL BOUNDARY
-  EXISTING STORM SEWER
-  PROPOSED STORM SEWER
-  RAILROAD TRACK
-  EXISTING CONVEYANCE DITCH
-  CITY LIMITS
-  EXISTING TRAIL



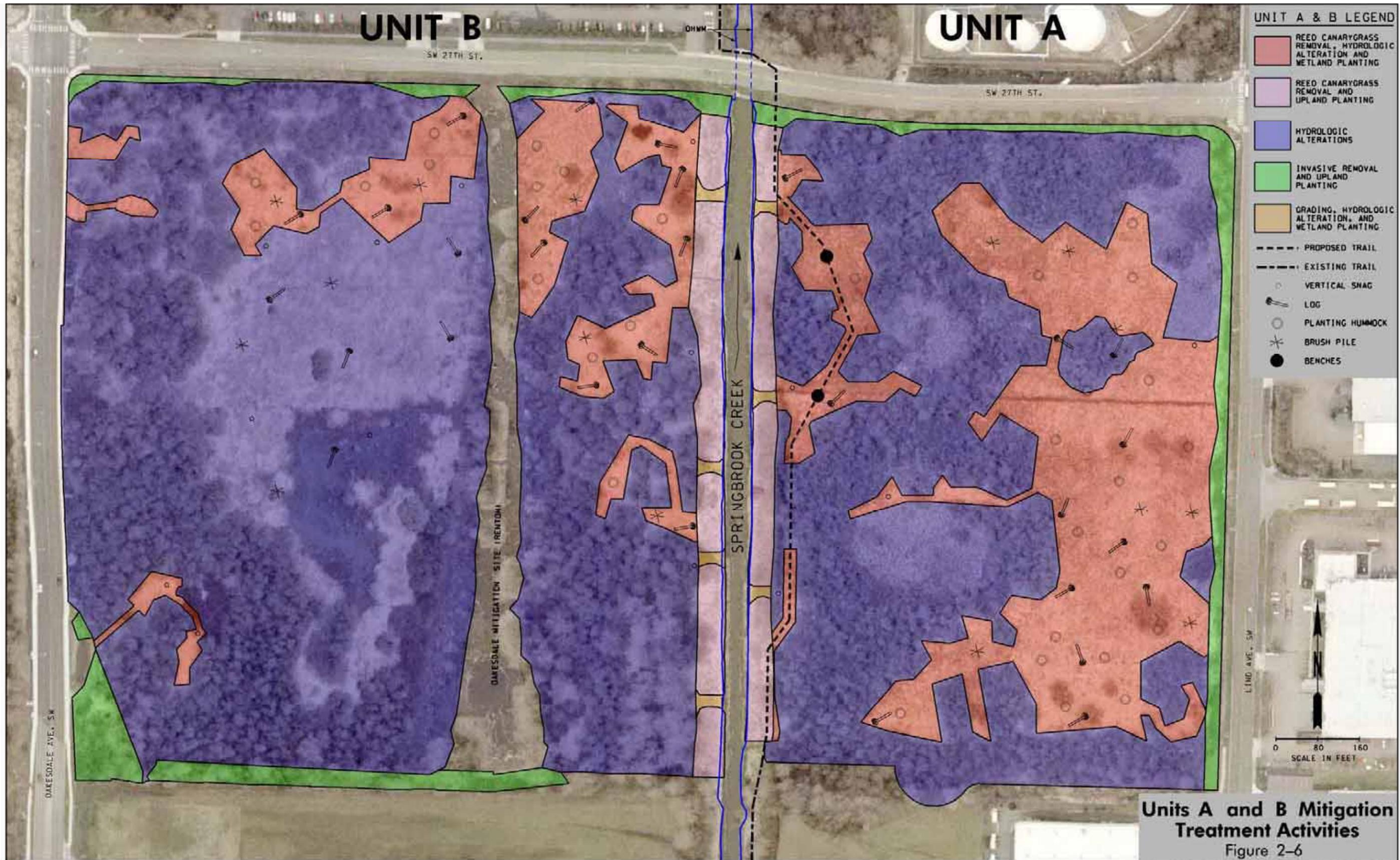
Unit D Mitigation Types
Figure 2-4



UNIT E LEGEND

- WETLAND RE-ESTABLISHMENT
- RIPARIAN ENHANCEMENT
- BUFFER FROM PARCEL BOUNDARY
- PROPOSED DRAINAGE PATH
- PARCEL BOUNDARY
- EXISTING TRAIL

Unit E Mitigation Types
Figure 2-5

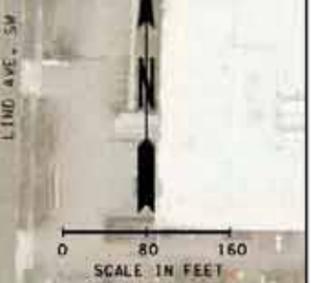


UNIT B

UNIT A

UNIT A & B LEGEND

- REED CANARYGRASS REMOVAL, HYDROLOGIC ALTERATION AND WETLAND PLANTING
- REED CANARYGRASS REMOVAL AND UPLAND PLANTING
- HYDROLOGIC ALTERATIONS
- INVASIVE REMOVAL AND UPLAND PLANTING
- GRADING, HYDROLOGIC ALTERATION, AND WETLAND PLANTING
- PROPOSED TRAIL
- EXISTING TRAIL
- VERTICAL SNAG
- LOG
- PLANTING HUMMOCK
- BRUSH PILE
- BENCHES



Units A and B Mitigation Treatment Activities
Figure 2-6



UNIT C LEGEND

- REED CANARYGRASS REMOVAL AND UPLAND PLANTING
- INVASIVE REMOVAL AND UPLAND PLANTING
- GRADING, HYDROLOGIC ALTERATION, AND WETLAND PLANTING
- INVASIVE REMOVAL AND WETLAND PLANTING
- HYDROLOGIC ALTERATION AND CONIFER UNDERPLANTING
- INVASIVE REMOVAL AND CONIFER UNDERPLANTING
- REED CANARYGRASS REMOVAL AND WETLAND PLANTING
- RAILROAD TRACK
- EXISTING CONVEYANCE DITCH
- CITY LIMITS
- VERTICAL SNAG
- LOG
- BRUSH PILE
- DITCH PLUG

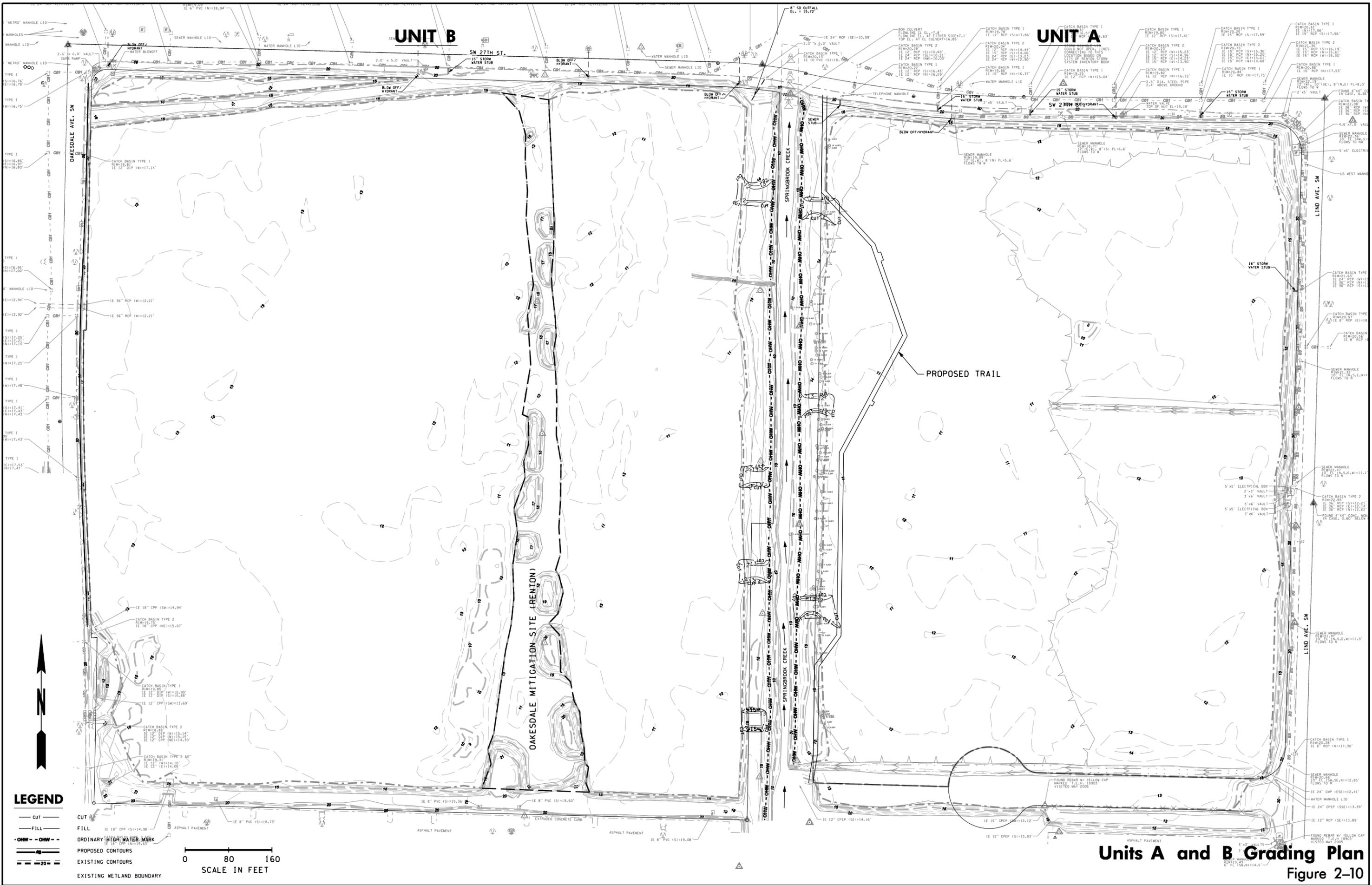


Unit C Mitigation Treatment Activities
Figure 2-7





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LEGEND

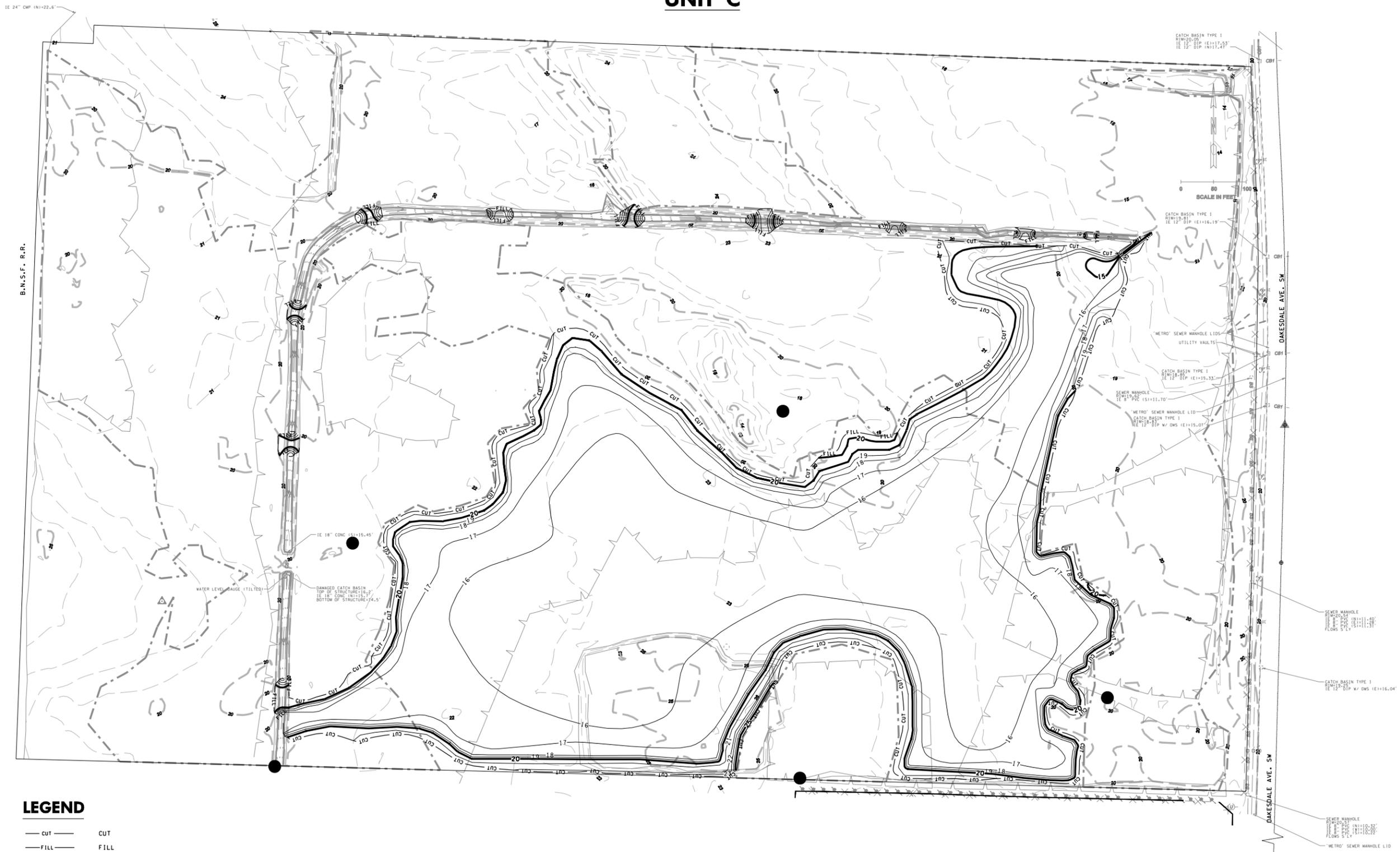
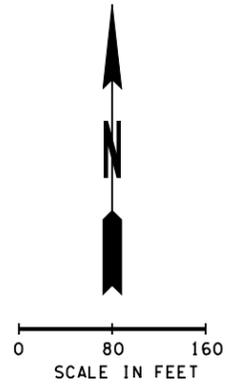
- CUT
- FILL
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOURS
- EXISTING CONTOURS
- EXISTING WETLAND BOUNDARY

SCALE IN FEET
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Units A and B Grading Plan
 Figure 2-10

Springbrook Creek Wetland and Habitat Mitigation Bank

UNIT C



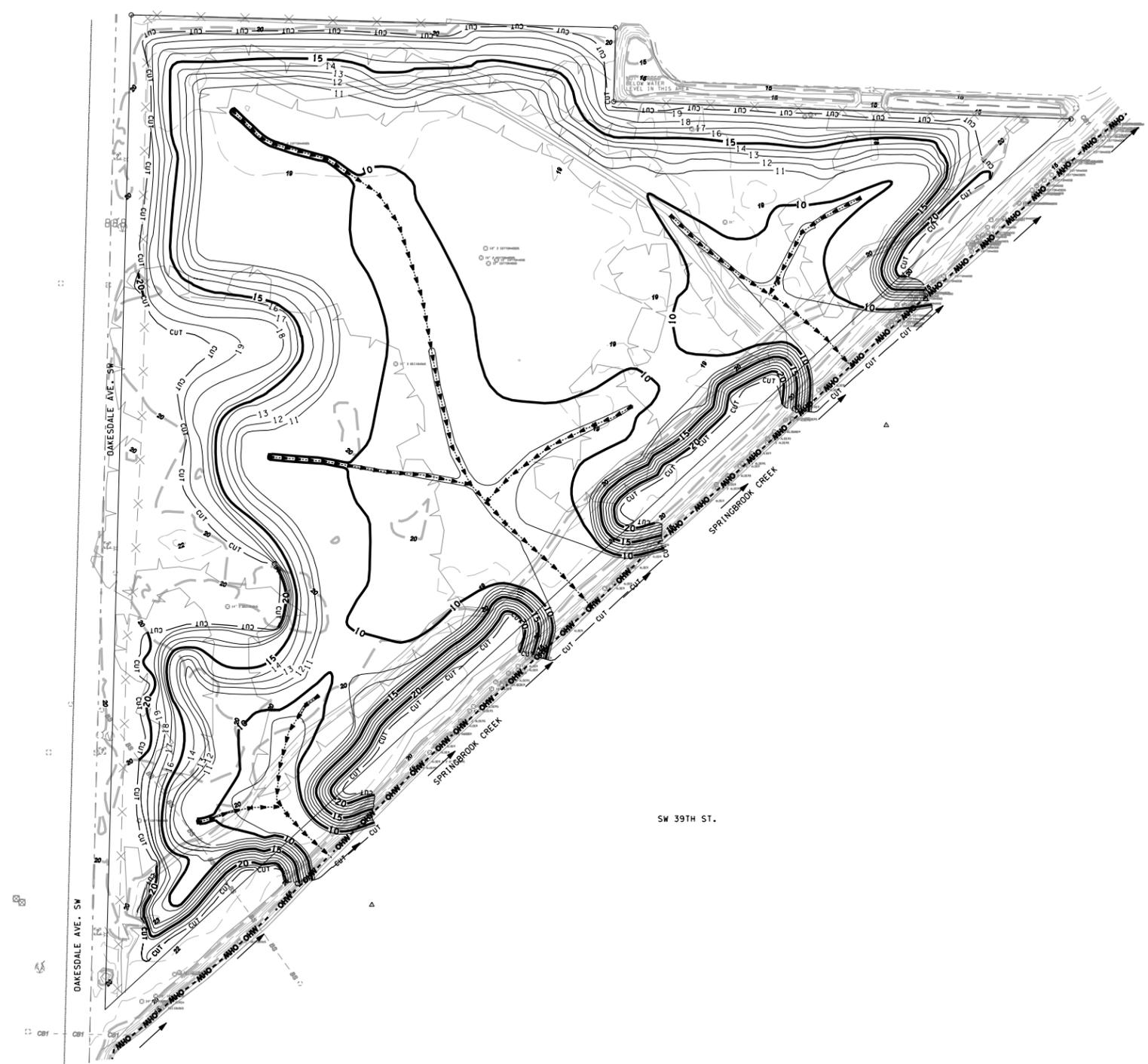
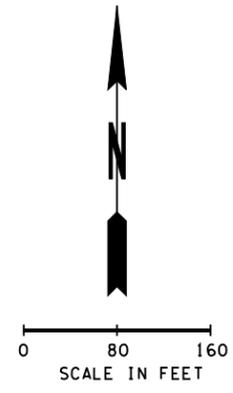
LEGEND

	CUT
	FILL
	PROPOSED CONTOURS
	EXISTING CONTOURS
	EXISTING WETLAND BOUNDARY
	MONITORING WELL

Units C Grading Plan
Figure 2-11

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UNIT E



LEGEND

- CUT — CUT
- FILL — FILL
- ▬▬▬▬▬▬ PROPOSED DRAINAGE PATH
- ▬▬▬▬▬▬ PROPOSED CONTOURS
- ▬▬▬▬▬▬ EXISTING CONTOURS

EXISTING R.R. SPUR

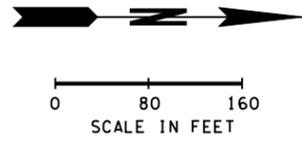
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Unit E Grading Plan
 Figure 2-13

Master Plant Materials List
 (same as Table 2.1)

Wetland Tree/Shrub #1 (wetter)	Riparian Upland Plantings
Oregon ash (<i>Fraxinus latifolia</i>)	Big-leaf maple (<i>Acer macrophyllum</i>)
Black twinberry (<i>Lonicera involucrata</i>)	Red alder (<i>Alnus rubra</i>)
Pacific ninebark (<i>Physocarpus capitatus</i>)	Sitka spruce (<i>Picea sitchensis</i>)
Black cottonwood (<i>Populus balsamifera</i>)	Douglas-fir (<i>Pseudotsuga menziesii</i>)
Nootka rose (<i>Rosa nutkana</i>)	Scouler's willow (<i>Salix scouleriana</i>)
Sitka willow (<i>Salix sitchensis</i>)	Snowberry (<i>Symphoricarpos albus</i>)
Wetland Tree/Shrub #2 (wettest)	Upland Plantings
Red-osier dogwood (<i>Cornus sericea</i>)	Big-leaf maple (<i>Acer macrophyllum</i>)
Oregon ash (<i>Fraxinus latifolia</i>)	Serviceberry (<i>Amelanchier alnifolia</i>)
Peafruit wild rose (<i>Rosa pisocarpa</i>)	Beaked hazel (<i>Corylus cornuta</i>)
Pacific willow (<i>Salix lucida</i>)	Oceanspray (<i>Holodiscus discolor</i>)
Sitka willow (<i>Salix sitchensis</i>)	Douglas-fir (<i>Pseudotsuga menziesii</i>)
	Snowberry (<i>Symphoricarpos albus</i>)
Wetland Tree/Shrub #3 (wet)	Hummock Plantings
Red-osier dogwood (<i>Cornus sericea</i>)	Oregon ash (<i>Fraxinus latifolia</i>)
Sitka spruce (<i>Picea sitchensis</i>)	Pacific ninebark (<i>Physocarpus capitatus</i>)
Black cottonwood (<i>Populus balsamifera</i>)	Sitka spruce (<i>Picea sitchensis</i>)
Nootka rose (<i>Rosa nutkana</i>)	Black cottonwood (<i>Populus balsamifera</i>)
Scouler's willow (<i>Salix scouleriana</i>)	Western red cedar (<i>Thuja plicata</i>)
Western red cedar (<i>Thuja plicata</i>)	
Wetland Forest Under-Plantings	
Sitka spruce (<i>Picea sitchensis</i>)	
Western red cedar (<i>Thuja plicata</i>)	
Western hemlock (<i>Tsuga heterophylla</i>)	

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Unit D Planting Plan
 Figure 2-16

3.0 PROJECT GOAL, OBJECTIVES, AND PERFORMANCE STANDARDS

3.1 GOAL

The goal of the Springbrook Bank is to increase wetland area and encourage improved hydrologic, water quality, and habitat functions while facilitating environmental education opportunities.

3.2 ECOLOGICAL OBJECTIVES

1. Increase wetland area at Springbrook Bank by removing fill material in Units A, B, C, and E to re-establish wetland functions on 17.79 acres.
2. Improve hydrologic functions by increasing wetland area and flood storage capacity in Units A, B, C, and E; extending wetland hydroperiod in Units A, B, C, and D; increasing the connectivity of wetlands in Units A, B, and E to Springbrook Creek; and increasing cover of woody vegetation in portions of all units.
3. Improve water quality functions by increasing wetland acreage; adding additional vegetation classes; increasing the connectivity of wetlands in Units A, B, and E to Springbrook Creek; and increasing the ratio of wetland to stream width in Unit E.
4. Improve habitat functions by increasing; the number of vegetation strata; the number of water depth classes; the number of vertical snags, brush piles, and large woody debris (LWD); canopy closure over the wetlands and in riparian areas; the number of hydrologic regimes; the number of native plant species; the number of plant assemblages; vegetation class interspersion; improve buffer condition; increase the diversity of plant communities in areas currently dominated by reed canarygrass and Himalayan blackberry; and connect new wetland areas in Unit E to Springbrook Creek.
5. Improve floodplain and riparian function by re-establishing hydrologic connectivity to Springbrook Creek and increasing woody cover directly adjacent to the creek in Units A, B, and E.

3.3 PERFORMANCE STANDARDS

The performance standards described below provide benchmarks for measuring achievement of the goal and objectives of the Springbrook Bank. Mitigation activities are intended to meet these performance standards within a specified time frame. The performance standards are based on function attributes described in *Method for Assessing Wetland Functions* (Hruby et al. 1999). These function-based performance standards correlate design, monitoring, and demonstrated improvements in site conditions. Methods to monitor each performance standard are described in general terms. A detailed monitoring plan is included in Appendix A. The performance standards, monitoring methods, related objectives, functions, and function attributes are summarized in Tables 3-1 through 3-4. Recreational, educational, and scientific activities that do not conflict with the use limitations or other provisions of the conservation easement, do not interfere with the delineation purposes and goals of the bank, and do not adversely affect the ecological viability and functionality of the bank may take place on the bank site.

Grading/Hydrologic Performance Standards

The grading/hydrologic performance standards help to document and verify that wetland area and ground elevations are established according to the criteria specified during the design. These performance standards directly relate to Ecological Objectives 1, 2, 3, and 4. The related functions are water quality, hydrologic, and habitat. Delineating the Wetland Re-Establishment areas at Springbrook Bank will demonstrate that wetland area has increased. After construction, ground elevations will be surveyed and documented on As-Built drawings, demonstrating that site grading has achieved the design elevations necessary to establish wetland conditions and provide intended functions.

Delineating wetland area will demonstrate an increase in the related attributes: wetland area, wetland width relative to Springbrook Creek, and wetland size relative to the basin. Increasing wetland area relative to Springbrook Creek and its basin provides a larger area for floodwaters to be stored and treated by vegetation and soils. Documenting hydrology in the early growing season within the Wetland Re-Establishment areas will document that the hydrologic conditions required to establish wetlands in these areas is being provided.

Documenting accurate ground elevations in As-Built drawings for Units C and E demonstrates an increase in the related attributes of flood storage capacity and the number of hydrologic regimes. Lowering ground elevations increases storage capacity and creating microtopography slows floodwaters, which reduces erosion and encourages sediment deposition. Creating multiple hydrologic regimes establishes habitat niches that can be used by wildlife. Monitoring hydrology in the Wetland Re-Establishment areas will demonstrate that these areas have adequate hydrology for wetland development. Monitoring hydrology in Units A and B will demonstrate the improved connectivity between Springbrook Creek and the adjacent wetlands and the change in HGM class from depressionnal to riverine of the wetlands behind the existing berms.

Vegetation Performance Standards

The woody vegetation performance standards directly relate to Ecological Objectives 2, 3, 4 and 5. The related functions are water quality, hydrologic, habitat, and riparian/floodplain. Measuring woody vegetation will demonstrate the increase in the related attributes: vegetation classes; cover by woody vegetation; canopy closure; and number of vegetation strata. Woody vegetation provides surface roughness to slow floodwaters, which reduces erosion and encourages sediment deposition. Establishing canopy closure and increasing the number of vegetation strata will provide habitat structure and increase uptake of nutrients introduced to the site by Springbrook Creek. Establishing woody vegetation in the riparian areas in Units A, B, and E will replace a reed canarygrass monoculture and increase shading of the active stream channel. Converting reed canarygrass areas in Units A and B to native woody plant communities will increase species and structural diversity in areas currently dominated by non-native invasive plant species. Ensuring that a diverse plant community develops in re-established wetlands and areas currently dominated by invasive species will demonstrate the increased habitat value at the sites. Reducing the cover of Himalayan blackberry and actively managing high priority invasive species will allow native plant communities to become established providing habitat for other native species.

Woody Habitat Structures Performance Standards

The woody habitat structures performance standards verify that habitat structures have been installed at Springbrook Bank. These performance standards are associated with Ecological Objective 4. Vertical snags, brush piles, and LWD provide habitat by creating niches for wildlife. Measuring habitat structures will demonstrate an increase in the related attributes: vertical snags, brush piles, and LWD.

3.4 REMEDIAL ACTION

The remedial action requirements listed below will apply in the event of failure to achieve the performance standards listed in Tables 3-1 through 3-4, or failure to comply with any other requirement of this Instrument

WSDOT, in consultation with the City, will propose remedial activities to correct any issues encountered during the establishment phase of the Bank (see Section 3.5 for maintenance activities that do not need BOC approval). If the monitoring reports or inspection by representatives of the BOC agencies indicate persistent failure to achieve and maintain the prescribed performance standards, WSDOT will propose adaptive management actions to correct the shortcomings. The BOC agencies may also unilaterally direct adaptive management actions, following consultation with WSDOT and the City, if the BOC agencies identify a need for corrective action and no adaptive management plan acceptable to the BOC has been submitted within a reasonable period of time. Any adaptive management plan will specify the nature of further examination of areas for potential causes of failure and/or corrective activities to be conducted, the schedule of completion for those activities, and a monitoring plan for assessing the effectiveness of the corrective action. The objective of the adaptive management plan will be to attain the originally prescribed performance standards, unless the BOC expressly establishes replacement performance standards, following consultation with the City and WSDOT, in light of circumstances and conditions observed at the site. The Sponsors will also implement all appropriate mitigation that the BOC determines is necessary to compensate for those authorized impacts to the aquatic environment that have not been successfully redressed by the Bank pursuant to the requirements of this Agreement. If WSDOT proposes to institute replacement performance standards, WSDOT may not initiate activities designed to achieve those replacement standards until those performance standards are approved by the Corps and Ecology following consultation with the other BOC members. During the period that a specific performance standard of the Bank is out of compliance, the BOC may direct that credits generated by that Bank performance standard may not be sold, used, or otherwise transferred.

If remedial actions taken by WSDOT under the provisions of the preceding paragraph do not bring that performance standard of the Bank into compliance with the requirements of this Agreement, including any approved changes to the Agreement, WSDOT may provide written notice of their intent to discontinue efforts to achieve one or more performance standards of the Bank. Upon providing such notice, no additional credits may be established for that performance standard, but at the discretion of the BOC, the Sponsors may be released from future maintenance and monitoring obligations for that performance standard provided that releasing the Sponsors from those obligations does not adversely affect the remainder of the Bank, or affect credits already sold, used, or transferred to date. If the BOC approves such a release from the Sponsors' obligations, and subsequent Bank conditions cause previously satisfied

performance standards to not be met, any previously awarded credits not yet sold, used, or transferred for that performance standard that is no longer met shall be removed from the Bank ledger, and any credits already sold, used, or transferred for that performance standard will be replaced with unsold, unused, and untransferred credits. If there are insufficient unsold, unused, and untransferred credits to replace those removed credits, the Sponsors shall implement other appropriate compensatory mitigation approved by the Corps and Ecology, following consultation with the other BOC members.

If the Sponsors fail to comply with the provisions of this Agreement as specified in Article IV.J., under the circumstances described in Article IV.J. the BOC may terminate this Agreement.

3.5 MAINTENANCE DURING THE ESTABLISHMENT PHASE

General maintenance will be performed throughout the year to address conditions that may limit the success of the Bank and attainment of performance standards and objectives. WSDOT is responsible for all site maintenance activities throughout the establishment phase of the Bank. Maintenance activities will include, but are not limited to, vegetative maintenance (including replanting, repair of any areas subject to erosion, weed control around plantings, mowing, control of invasive species, control and discouragement of voles, beaver and deer foraging on plants) and general maintenance (including fence repair, road and trail maintenance as necessary, clean-out of culverts, monitoring of the water control structures, and clean-up of trash). The routine activities listed above may be conducted without approvals by the BOC provided that they are consistent with the MBI. Management and maintenance activities requiring a departure from the MBI shall require prior approval by the BOC as stated in Article VI.B.2.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 3-1. Summary of Performance Standards, Monitoring Methods, Related Objectives, Functions and Values, and Function Attributes (Riverine) For Units A and B

Units A and B Performance Standards	Monitoring Tasks/Methods	Related Objectives	Functions and Values*	Function Attributes from Hruby et al. (1999) **
Grading/Hydrology				
A/B-1. As-Built drawings will document that site grading and planting has been completed as shown on the Unit A and B plans.	After construction is completed, As-Built drawings will be submitted to document the completion and accuracy of grading work. Monitoring will confirm conditions depicted in the As-Built drawings.	1, 2, 3, 4, 5	Wetland Area Hydrologic Water Quality Habitat	Wetland Area. Width of wetland to stream.
A/B-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. *** The extent of over-bank flooding from Springbrook Creek during late winter and/or early spring storm-events (January through March) will also be documented in Units A and B.	Hydrology will be verified by visual inspection of multiple hand-dug pits conducted during multiple site visits in the early growing season. Site visits during the wet season to correlate crest gages with the upstream USGS gage station, automated monitoring equipment, or other appropriate method will be used to document the extent of over-bank flooding in Units A and B.			
A/B-2B. In Years 3, 5, and 10, no more than 10% of the sites will be un-vegetated and permanently inundated based on observations made during the summer monitoring visit.	During the summer formal monitoring visit visual observations or another appropriate method will be used to determine the amount of the site that exists as permanently inundated un-vegetated open water. Use current aerial photos, if available.			
A/B-2C. In Years 5 and 10, at least 0.12 acre of wetland will be present in the Wetland Re-Establishment areas (bottom of the berm breaches) of Units A and B. Also, a separate wetland delineation will be done to verify that mitigation actions have not reduced the extent of existing wetlands in Units A and B.	Wetland conditions will be demonstrated by wetland delineation, performed according to the 1987 Corps of Engineers Wetland Delineation Manual and the 1997 Washington State Wetland Identification Manual, by a qualified WSDOT biologist in Years 5 and 10.			
Vegetation				
A/B-3A. In Year 1, the Wetland Tree/Shrub planting areas will each have at least 2,000 stems of living native woody vegetation per acre.	In Years 1 and 3, determine density of living stems per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.	2, 3, 4	Hydrologic Water Quality Habitat	Number of vegetation classes. Cover by woody vegetation. Canopy closure over wetland. Canopy closure over stream. Number of vegetation strata. Number of native plant species. Number of plant assemblages. Buffer condition. Mature woody vegetation.
A/B-3B. In Year 1, the Upland and Riparian Upland planting areas will each have at least 1,200 stems of living native woody vegetation per acre.				
A/B-4. In Year 3, the Wetland Tree/Shrub planting areas will each have at least 2,000 stems of living native woody vegetation per acre.				
A/B-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 50% aerial cover.	In Years 5, 7, and 10, determine woody cover by species in the Wetland Tree/Shrub, Riparian Upland, and Upland planting areas using randomly placed sample units and line intercept method as described in Elzinga et al. (1998) or other statistically appropriate method.			
A/B-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				
A/B-5C. In Year 5, native woody vegetation within the Upland and Riparian Upland planting areas will provide at least 30% aerial cover.				
A/B-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each within the Upland and Riparian Upland planting areas.				
A/B-6. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 60% aerial cover.				
A/B-7A. In Year 10, native woody vegetation within Wetland Tree/Shrub planting areas will provide at least 75% aerial cover.				
A/B-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each within the Wetland Tree/Shrub planting areas.				
A/B-7C. In Year 10, native woody vegetation within the Upland and Riparian Upland planting areas will provide at least 50% aerial cover.				
A/B-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each within the Upland and Riparian Upland planting areas.				
A/B-8. In Years 5 and 10, planting hummocks located within the Wetland Tree/Shrub planting areas will have at least one living native tree.	In Years 5 and 10, each planting hummock will be visited to verify that one living native tree is present per hummock.			
A/B-9. In Years 5 and 10, Himalayan blackberry will not cover more than 20% of the buffers and riparian areas at the site. In Years 1 through 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Units A and B.	In Years 5 and 10, determine cover of Himalayan blackberry on the buffers and riparian areas at the site using randomly placed sample units and line or point intercept method as described in Elzinga et al. (1998) or other statistically appropriate method. Annual visual inspections of the site will locate target species and they will be removed annually.			
Woody Habitat Structures				
A/B-10. In Year 1, at least 35 woody habitat structures (vertical snags, brush piles, and/ or LWD) will be present in Units A and B.	The number of habitat structures (vertical snags, brush piles, and LWD) will be counted and documented in monitoring reports in Year 1.	4	Habitat	LWD. Snags.

* See Table 2-3 for information on how the performance standards relate to functional lift in the categories listed.

**Some attributes listed are not contained in WAFAM, but address variables not considered in the models (i.e., wetland area, education).

***A qualifying year must have rainfall that meets or exceeds the thirty year average as measured at SEA/TAC International Airport.

Springbrook Creek Wetland and Habitat Mitigation Bank Instrument

Table 3-2. Summary of Performance Standards, Monitoring Methods, Related Objectives, Functions and Values, and Function Attributes (Depressional) For Unit C

Unit C Performance Standards	Monitoring Tasks/Methods	Related Objectives	Functions and Values *	Function Attributes from Hruby et al. (1999) **
Grading/Hydrology				
C-1. As-Built drawings will document that site grading and planting has been completed as shown on the Unit C plans.	After construction is completed, As-Built drawings will be submitted to document the completion of grading and planting work. Monitoring will confirm conditions depicted in the As-Built drawings.	1, 2, 3, 4	Water Quality Hydrologic Habitat	Wetland area. Area seasonally inundated. Number of water regimes. Number of water depths.
C-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. ***	Visual inspection of multiple hand-dug pits conducted during multiple site visits in the early growing season or other appropriate methodology.			
C-2B. In Years 5 and 10, at least 9.27 acres of wetland will be present within the Wetland Re-Establishment area in Unit C.	Wetland conditions will be demonstrated by wetland delineation, performed according to the 1987 Corps of Engineers Wetland Delineation Manual and the 1997 Washington State Wetland Identification Manual, by a qualified WSDOT biologist in Years 5 and 10.			
Vegetation				
C-3A. In Year 1, the Wetland Tree/Shrub planting areas will have at least 2,000 stems of living native woody vegetation per acre.	In Year 1, determine density of living stems per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.	2, 3, 4	Hydrologic Water Quality Habitat	Number of vegetation classes. Cover by woody vegetation. Canopy closure over wetland. Number of vegetation strata. Number of native plant species. Number of plant assemblages. Vegetation class interspersions. Mature woody vegetation. Buffer condition.
C-3B. In Year 1, The Upland planting areas will have at least 1,200 stems of living native woody vegetation per acre.				
C-3C. In Years 1, 5 and 10, the Forested Wetland Enhancement areas will contain at least 70 living native conifers per acre.				
C-4A. In Year 3, the Wetland Tree/Shrub planting areas will have at least 2,000 stems of living native woody vegetation per acre.	In Year 3, determine density of living stems per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
C-4B. In Year 3, the Wetland Enhancement Type I areas will have at least 100 conifers per acre.	In Year 3, determine density of living conifers per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
C-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 50% aerial cover.	In Years 5 and 7, determine woody cover by species in the Tree/Shrub planting areas, and in Year 5 in the Upland planting areas using randomly placed sample units and line intercept method as described in Elzinga et al. (1998) or other statistically appropriate method.			
C-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				
C-5C. In Year 5, native woody vegetation within the Upland planting areas will provide at least 30% aerial cover.				
C-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each within the Upland planting areas.				
C-6A. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 60% aerial cover.				
C-6B. In Year 7, the Wetland Enhancement Type I areas will have at least 75 conifers per acre.	In Year 3, determine density of living conifers per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
C-7A. In Year 10, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 75% aerial cover.	In Year 10, determine woody cover by species in the Wetland Tree/Shrub and Upland planting areas using randomly placed sample units and line intercept method as described in Elzinga et al. (1998) or other statistically appropriate method.			
C-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each within the Wetland Tree/Shrub planting areas.				
C-7C. In Year 10, native woody vegetation within the Upland planting areas will provide at least 50% aerial cover.				
C-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each in the Upland planting areas.				
C-8. In Years 5 and 10, Himalayan blackberry will not cover more than 20% of the Forested Wetland Enhancement, Upland planting areas, and buffers at the site, and not more than 10% in the Wetland Re-Establishment Area. In Years 1 through 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit C.	In Years 5 and 10, determine cover of Himalayan blackberry on the specified portions of the site using randomly placed sample units and line or point intercept method as described in Elzinga et al. (1998) or other statistically appropriate method. Annual visual inspections of the site will locate target species and they will be removed annually.			
Woody Habitat Structures				
C-9. In Year 1, at least 50 woody habitat structures (vertical snags, brush piles, and/or LWD) will be present within Unit C.	Woody habitat structures will be counted and documented in monitoring reports.	4	Habitat	LWD. Snags.

* See Table 2-4 for information on how the performance standards relate to functional lift in the categories listed.

**Some attributes listed are not contained in WAFAM, but address variables not considered in the models (i.e., wetland area, education).

*** A qualifying year must have rainfall that meets or exceeds the thirty year average as measured at SEATAC International Airport.

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Table 3-3. Summary of Performance Standards, Monitoring Methods, Related Objectives, Functions and Values, and Function Attributes (Depressional) For Unit D

Unit D Performance Standards	Monitoring Tasks/Methods	Related Objectives	Functions and Values*	Function Attributes from Hruby et al. (1999) **
Grading/Hydrology				
D-1A. As-Built drawings will document that the constructed conveyance pipe at the north end of Unit D has been installed and is functioning as intended and planting has been implemented per the plan.	After construction is completed, As-Built drawings will be submitted to document the completion of minor grading, planting, and pipe installation work. Monitoring will confirm conditions depicted in the As-Built drawings.	2, 3	Hydrologic Water Quality	Area seasonally inundated. Number of water regimes.
D-1B. In Years 3 and 7, there will be inundation present in the northern portion of Unit D on the 15 th of June.	In Years 3, 5, 7, and 10, photos will be taken on June 15th to document the presence of inundation in the Northern portion of Unit D. To qualify the water year in question must be within one standard deviation of the 30-year average rainfall (or greater) as measured at SEA/TAC International Airport.			
Vegetation				
D-2A. In Year 1, the Wetland Tree/Shrub planting area (area disturbed by grading and installation of the conveyance pipe) will have at least 2,000 living stems per acre.	In Year 1, determine the density of living native woody species within the disturbed area using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method	3, 4	Water Quality Habitat	Number of vegetation strata. Number of native plant species. Number of plant assemblages. Understory vegetation.
D-2B. In Years 1, 5, and 10, the Forested Wetland Enhancement areas will contain at least 70 living native conifers per acre.	In Years 1, 5, and 10, determine the density of living conifers within the Forested Wetland Enhancement areas using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
D-3. In Years 5 and 10, the aerial cover of Himalayan blackberry will not exceed 20% of the site. In Years 1 through 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit D.	In Years 5 and 10, determine the aerial cover of Himalayan blackberry on the site using randomly placed sample units and line or point intercept method as described in Elzinga et al. (1998) or other statistically appropriate method. Annual visual inspections of the site will locate target species and they will be removed annually.			
Woody Habitat Structures				
D-4. In Year 1, at least 2 woody habitat structures (brush piles) will be present within Unit D.	Woody habitat structures will be counted and documented in monitoring reports.	4	Habitat	Brush piles.

* See Table 2-5 for information on how the performance standards relate to functional lift in the categories listed.

**Some attributes listed are not contained in WAFAM, but address variables not considered in the models (i.e., wetland area, education).

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Table 3-4. Summary of Performance Standards, Monitoring Methods, Related Objectives, Functions and Values, and Function Attributes (Riverine) For Unit E

Unit E Performance Standards	Monitoring Methods	Related Objectives	Functions and Values*	Function Attributes from Hruby et al. (1999) **
Grading/Hydrology				
E-1. As-Built drawings will document site grading and planting has been completed as shown on the Unit E plans.	After construction is completed, As-Built drawings will be submitted to document the completion of grading and planting work. Monitoring will confirm conditions depicted in the As-Built drawings.	1, 2, 3, 4, 5	Hydrologic Water Quality Habitat	Flood storage capacity. Number of hydrologic regimes. Wetland area. Wetland width relative to creek. Wetland size relative to basin. Area seasonally inundated.
E-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. ***	Hydrology will be verified in Year 3 by visual inspection of multiple hand-dug pits conducted during multiple site visits in the early growing season.			
E-2B. In Years 3, 5, and 10, no more than 10% of the sites will be un-vegetated and permanently inundated based on observations made during the summer monitoring visit.	During the summer formal monitoring visit visual observations or another appropriate method will be used to determine the amount of the site that exists as permanently inundated un-vegetated open water. Use current aerial photos, if available.			
E-2C. In Years 5 and 10, at least 8.37 acres of wetland will be present within the Wetland Re-Establishment area of Unit E.	Wetland conditions will be demonstrated by wetland delineation, performed according to the 1987 Corps of Engineers Wetland Delineation Manual and the 1997 Washington State Wetland Identification Manual, by a qualified WSDOT biologist in Years 5 and 10.			
Vegetation				
E-3A. In Year 1, the Wetland Tree/Shrub planting areas will have at least 2,000 stems of living native woody vegetation per acre.	In Year 1, determine density of living stems per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.	2, 3, 4	Hydrologic Water Quality Habitat	Number of vegetation classes. Cover by woody vegetation. Canopy closure over wetland. Canopy closure over stream. Number of vegetation strata. Number of native plant species. Number of plant assemblages. Vegetation class interspersions. Mature woody vegetation. Buffer condition.
E-3B. In Year 1, the Upland and Riparian Upland planting areas will have at least 1,200 stems of living vegetation per acre.				
E-3C. In Years 1, 5, and 10, the Forest Underplanting area will have at least 70 living conifers per acre.	In Years 1, 5, and 10 determine the density of living conifers within the Forest Under-planting areas using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
E-4. In Year 3, the Wetland Tree/Shrub planting areas will have at least 2,000 stems of living native woody vegetation per acre.	In Year 3, determine density of living stems per acre using randomly placed unequal-area belt transects as described by Stehman and Salzer (2000) or other statistically appropriate method.			
E-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 50% aerial cover.	In Years 5, 7 and 10, determine woody cover by species in the Wetland Tree/Shrub planting areas, and in Years 5 and 10 in the Upland and Riparian Upland planting areas using randomly placed sample units and line intercept method as described in Elzinga et al. (1998) or other statistically appropriate method.			
E-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				
E-5C. In Year 5, native woody vegetation within the Upland and Riparian Upland planting areas will provide at least 30% aerial cover.				
E-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each within the Upland and Riparian Upland planting areas.				
E-6. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 60% aerial cover.				
E-7A. In Year 10, native woody vegetation within the Wetland Tree/Shrub planting areas will provide at least 75% aerial cover.	In Years 5 and 10, determine the aerial cover of Himalayan blackberry on the site using randomly placed sample units and line or point intercept method as described in Elzinga et al. (1998) or other statistically appropriate method Annual visual inspections of the site will locate target species and they will be removed annually.			
E-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each within the Wetland Tree/Shrub planting areas.				
E-7C. In Year 10, native woody vegetation in the Upland and Riparian Upland planting areas will provide at least 50% aerial cover.				
E-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each within the Upland and Riparian Upland planting areas.				
E-8. In Years 5 and 10, the aerial cover of Himalayan blackberry will not exceed 20% of the buffers, uplands, and riparian areas on the site, and not more than 10% of the Wetland Re-Establishment Area. In Years 1 through 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit E.				
Woody Habitat Structures				
E-9. In Year 1, at least 40 woody habitat structures (vertical snags, brush piles, and/or LWD) will be present in Unit E.	Woody habitat structures will be counted and documented in monitoring reports.	4	Habitat	LWD. Snags.

* See Table 2-6 for information on how the performance standards relate to functional lift in the categories listed.

**Some attributes listed are not contained in WAFAM, but address variables not considered in the models (i.e., wetland area, education).

*** A qualifying year must have rainfall that meets or exceeds the thirty year average as measured at SEA/TAC International Airport.

4.0 BANK OPERATION

4.1 CREDIT DETERMINATION

Credits are the “currency” of a mitigation bank. The value of credits that a mitigation bank generates equals its net ecological benefit. The 129.37-acre Springbrook Bank includes 116.82 acres that qualify for bank credit. The remaining 12.55 non-credit acres have been designated for protection setback and the Trail Zone to minimize disturbances from adjacent roads, development, and the trail through Unit A. Units D and E each have an existing 20-foot utility easement inside the parcel boundary that will not generate mitigation credit (see Figures 2-4 and 2-3). The 45.12 credits expected to be generated at Springbrook Bank represents the number of acres of impacts to Category II wetlands (Hruby 2004) for which the bank could be used as compensation (Table 4-1). These mitigation credits will become available as performance standards and other measures are achieved (see Tables 3-1 through 3-4 and Table 4-3). The precise number of credits actually generated by the Springbrook Bank cannot be determined until the project is constructed and the success of restoration and enhancement activities is assessed by the BOC. The final number of credits will be determined by the BOC and will be based on achievement of the performance standards.

Table 4-1. Credit Potential

Mitigation Treatment	Acreage	Ratios*	Mitigation Credits**					Total
			Unit A	Unit B	Unit C	Unit D	Unit E	
Wetland Re-Establishment	17.79	1:1	0.05	0.12	9.27	--	8.35	17.79
Wetland Rehabilitation	52.14	3:1	6.64	10.39	0.35	--	--	17.38
Wetland Enhancement – Type I	4.69	4:1	--	--	1.17	--	--	1.17
Wetland Enhancement – Type II	2.63	5:1	--	--	--	0.53	--	0.53
Forested Wetland Enhancement	25.22	5:1	--	--	4.65	0.40	--	5.05
Riparian Upland Enhancement	6.56	4:1	0.16	0.37	--	--	1.11	1.64
Upland Habitat Enhancement	7.80	5:1	--	--	1.56	--	--	1.56
Buffer Enhancement	9.89	--	--	--	--	--	--	--
Trail Zone	2.66	--	--	--	--	--	--	--
Totals	129.37	--	6.85	10.88	17.00	0.93	9.46	45.12

* The ratio of acreage to credits is the number of credits established per acre of mitigation activity in first column.

** The number of mitigation credits that Springbrook Bank will generate for each mitigation treatment. Each credit can compensate for the loss of a typical acre of Category II wetland.

4.2 APPROVING PERFORMANCE STANDARDS FOR CREDIT RELEASE

Springbrook Bank is expected to generate 45.12 credits that will be eligible for release as the associated performance standards are met and approved by the BOC (Tables 3-1 through 3-4), with the exception that no credits may be released until a BOC-approved Memorandum of Agreement and Instrument are signed by the Sponsors, Ecology, and the Corps, and until a BOC-approved conservation easement is placed on the property title

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and properly recorded with King County. Once a credit is released, WSDOT or the City may sell, use, or transfer that credit at any time, subject to the provisions of this Agreement.

Credits will be released from the bank according to Table 4-3 provided that WSDOT and the City demonstrate success in meeting the subject performance standards and are compliant with the provisions of this Agreement. To obtain release of credits associated with a particular performance standard, WSDOT and the City will provide the BOC with documentation of success, usually in the form of a scheduled monitoring report. Each monitoring report will include a letter requesting the release of the credits associated with performance standards that have been met. The Corps and Ecology agree to coordinate with the other BOC members and reach a determination on release of credits within 60 days of receipt of a request that is accompanied by all required substantial information.

Upon approval from the Corps and Ecology, following consultation with the other BOC members the credits are available for release and should be added to the ledger sheet. If Springbrook Bank is not able to meet a particular performance standard by the year indicated in table 4-3, WSDOT and the City may submit documentation of successful achievement of those performance standards during a subsequent year, and the BOC will give full consideration to the release of appropriate credits for sale, use, or transfer without reduction or other penalty. The BOC may, at its discretion, release partial credit for partial accomplishment of a performance standard. Bank credits may be used, subject to the approval of the regulatory agencies with jurisdiction over projects that desire to satisfy mitigation obligations through use of the Springbrook Bank, to compensate for authorized permanent or temporary impacts, as well as to resolve enforcement or permit compliance actions such as replacing previously implemented project-specific mitigation that has partially or completely failed.

If the institution of an adaptive management or remedial action plan as described in Section 3.4 of this Instrument causes delay in the achievement of a performance standard, the timeline for achievement of each subsequent milestone for that performance standard will be deferred for a like interval, unless otherwise specifically approved by the Corps and Ecology following consultation of the other BOC members. The BOC, in consultation with the Sponsors, will determine what remedial actions are necessary to correct the situation pursuant to Article IV.H, and direct their performance prior to the release of any additional mitigation credits.

4.3 USE OF CREDITS

Springbrook Bank credits were developed to compensate at a 1:1 ratio for adverse impacts (including direct loss or indirect impacts) to a Category II wetland. The number of credits required to compensate for each acre of Category I, III, or IV wetland impact will differ because wetland categories have a different level of function on a per-acre basis (see Table 4-2). Wetland categories will be determined using the *Washington State Wetland Rating System for Western Washington* (Hruby 2004).

The following table depicts the number of Bank credits that will be required for most projects to compensate for each unit of permanent loss of wetland based on category of impacted wetland. In specific cases, such as when the functions of the impacted wetlands

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are rare or difficult to replace, the ratios may be raised by Ecology and the Corps in consultation with the BOC. Conversely, the ratios may be lowered in instances where functions of the impacted wetlands have previously been severely degraded or when project impacts are indirect and cause only partial loss of functions to a wetland. Project proponents requesting to use the bank to satisfy compensatory mitigation requirements should consult early in the permitting process with the resource agencies with jurisdiction to confirm whether the credit debit ratios in the table are acceptable for their project. Again, the ratios within the table are intended to be broadly applied for typical project impacts.

Table 4-2. Credits Required for Wetland Impacts

Category of Impacted Wetland	Credit Required per Impact Acre
I	Case-by-Case
II	1.0
III	0.85
IV	0.70

For example, if a proposed project would impact 3 acres of Category II wetland, 3 credits would be withdrawn from the bank to compensate for that impact. If a proposed project would impact 3 acres of Category III, 2.55 credits would be withdrawn. Credits may potentially be used as compensation for impacts to non-wetland waters of the U.S. with specific approval of the agencies with jurisdictional authority over the project. Credits required per impact acre would be determined on a per-project basis due to the variability of non-wetland areas.

An applicant seeking a permit for a project with adverse impacts to the aquatic environment within the service area must generally obtain the approval of each regulatory agency with jurisdiction over that project, in order to use the Bank as a source of compensatory mitigation. To receive approval to use the Bank, the applicant must demonstrate to the satisfaction of the pertinent regulatory agencies that the project complies with all applicable requirements pertaining to alternatives and mitigation sequencing and that purchasing credits from the Bank for compensatory mitigation would be in the best interest of the environment. Specifically, a permit applicant must generally be able to demonstrate to the satisfaction of the involved regulatory agencies that:

1. There is no practicable alternative to adversely impacting the water body, critical area, buffer, or other regulated area.
2. All appropriate and practicable measures to minimize adverse impacts to the aquatic ecosystem have been considered and included in the project.
3. All appropriate and practical on-site compensatory mitigation for unavoidable adverse impacts is included in the project.

Other types of credit uses may include, but are not necessarily limited to, transfers made that are not associated with any one particular project or impact (i.e., “good will” transfers), transfers to natural resource stewards resulting from expenditures from in-lieu-fees, or similar type funds; and credit sales made for the purpose of brokerage.

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WSDOT and the City reserve the right to develop mitigation credits as compensation for impacts to flood storage and wetland and/or riparian buffer at Springbrook Bank with no effect on the value or number of credits established by this Instrument, provided that the generation of such credits will not conflict with the provisions of this Instrument.

Prior to proposing to utilize the Springbrook Creek Bank credits for fish habitat impacts, the following criteria will be assessed to determine a project's eligibility:

1. Project impacts to stream bed and bank, or riparian areas must be adjacent to Springbrook Creek or its tributaries.
2. All on-site mitigation opportunities have been exhausted.

4.3.1 Credit Release Flexibility

Credits may not be released sooner than specified in Table 4-3, except in extraordinary situations with the written approval of the Corps and Ecology, in consultation with the other members of the BOC. If exceptional circumstances unforeseen during the development and implementation of Springbrook Bank arise such that the public interest would be better served by earlier than scheduled release of credits from the bank, the City and WSDOT may request the BOC approve a modification in the Credit Release Schedule (Table 4-3). In such a circumstance, the Sponsors must submit a written request that clearly explains the nature of the exceptional circumstances and demonstrates how the requested change in the credit release schedule would serve the public interest. If the BOC concurs that the early release of credits would serve the public interest and not violate existing mitigation banking rules and regulations, then they may approve the request. This approval will become a part of the Instrument, pursuant to Article VI.B.2. of the Agreement.

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Table 4-3. Credit Release Schedule for Springbrook Bank

Performance Standard	Number of Credits to be Released By Year							
	0*	1	3	5	7	10	Total	
Administrative Measures (10% of total)								
Sign MBI, MOA, and Conservation Easement	4.5						4.5	
Grading/Hydrology (31% of total)								
A/B-1. As-Built drawings will document that site grading and planting has been completed as shown on the Unit A and B plans.		1.5					1.5	
A/B-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. ** The extent of over-bank flooding from Springbrook Creek during late winter and/or early spring storm-events (January through March) will also be documented in Units A and B.			0.25				0.25	
A/B-2B. In Years 3, 5, and 10, no more than 10% of the sites will be un-vegetated and permanently inundated based on observations made during the summer monitoring visit.			0.25	0.25		0.1	0.6	
A/B-2C. In Years 5 and 10, at least 0.12 acre of wetland will be present in the Wetland Re-Establishment areas of Units A and B. A separate wetland delineation will be done to verify that mitigation actions have not reduced the extent of existing wetlands in Units A and B.				0.1		0.1	0.2	
C-1. As-Built drawings will document that site grading and planting has been completed as shown on the Unit C plans.		2.5					2.5	
C-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. **			1				1	
C-2B. In Years 5 and 10, at least 9.27 acres of wetland will be present within the Wetland Re-Establishment area in Unit C.				1.25		0.4	1.65	
D-1A. As-Built drawings will document that the constructed conveyance pipe at the north end of Unit D has been installed and is functioning as intended and planting has been implemented per the plan.		0.25					0.25	
D-1B. In Years 3 and 7, there will be inundation present in the northern portion of Unit D on the 15 th of June. **			0.25		0.2		0.45	
E-1. As-Built drawings will document site grading and planting has been completed as shown on the Unit E plans.		2.5					2.5	
E-2A. In Year 3, soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 10% of the growing season. **			1				1	
E-2B. In Years 3, 5, and 10, no more than 10% of the sites will be un-vegetated and permanently inundated based on observations made during the summer monitoring visit.			0.25	0.25		0.1	0.6	
E-2C. In Years 5 and 10, at least 8.37 acres of wetland will be present within the Wetland Re-Establishment area of Unit E.				1.25		0.2	1.45	
Vegetation (56% of total)								
A/B-3A. In Year 1, the Wetland Tree/Shrub planting areas will each have 2,000 stems of living native woody vegetation per acre.			1				1	
A/B-3B. In Year 1, the Upland and Riparian Upland planting areas will each have 1,200 stems of living native woody vegetation per acre.		0.5					0.5	
A/B-4. In Year 3, the Wetland Tree/Shrub planting areas will each have 2,000 stems of living native woody vegetation per acre.			1				1	
A/B-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 50% aerial cover.				0.90			.90	
A/B-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				0.25			0.25	
A/B-5C. In Year 5, native woody vegetation within the Upland and Riparian Upland planting areas will provide 30% aerial cover.				0.1			0.1	
A/B-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each in Upland and Riparian Upland planting areas.				0.1			0.1	
A/B-6. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 60% aerial cover.					2		2	
A/B-7A. In Year 10, native woody vegetation within Wetland Tree/Shrub planting areas will provide 75% aerial cover.						0.4	0.4	
A/B-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each in the Wetland Tree/Shrub planting areas.						0.16	0.16	
A/B-7C. In Year 10, native woody vegetation within the Upland and Riparian Upland planting areas will provide 50% aerial cover.						0.1	0.1	
A/B-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each in Upland and Riparian Upland planting areas.						0.1	0.1	
A/B-8. In Years 5 and 10, planting hummocks located within the Wetland Tree/Shrub planting areas will have at least one living native tree.				0.5		0.25	0.75	
A/B-9. In Years 5 and 10, Himalayan blackberry will not cover more than 20% of the buffers and riparian areas at the site. In Years 1 - 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Units A and B.				0.1		0.1	0.2	
C-3A. In Year 1, the Wetland Tree/Shrub planting areas will have 2,000 stems of living native woody vegetation per acre.			1				1	
C-3B. In Year 1, the Upland planting areas will have 1,200 stems of living native woody vegetation per acre.		0.25					0.25	
C-3C. In Years 1, 5, and 10, the Forested Wetland Enhancement areas will contain at least 70 living native conifers per acre.		0.55		0.5		0.25	1.3	
C-4A. In Year 3, the Wetland Tree/Shrub planting areas will have 2,000 stems of living native woody vegetation per acre.			1				1	
C-4B. In Year 3, the Wetland Enhancement Type I areas will have at least 100 conifers per acre.			0.75				0.75	
C-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 50% aerial cover.				1			1	
C-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				0.25			0.25	
C-5C. In Year 5, native woody vegetation within the Upland planting areas will provide 30% aerial cover.				0.25			0.25	
C-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each within the Upland planting areas.				0.1			0.1	
C-6A. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 60% aerial cover.					2		2	
C-6B. In Year 7, the Wetland Enhancement Type I areas will have at least 75 conifers per acre.					0.5		0.5	
C-7A. In Year 10, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 75% aerial cover.						0.4	0.4	
C-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each within the Wetland Tree/Shrub planting areas.						0.16	0.16	
C-7C. In Year 10, native woody vegetation within the Upland planting areas will provide 50% aerial cover.						0.1	0.1	
C-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each in the Upland planting areas.						0.1	0.1	
C-8. In Years 5 and 10, Himalayan blackberry will not cover more than 20% of the Forested Wetland Enhancement and other upland areas of the site, and not more than 10% in the Wetland Re-Establishment Area. In Years 1 - 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit C.				0.1		0.1	0.2	
D-2A. In Year 1, the Wetland Tree/Shrub planting area will have 2,000 stems of native living vegetation per acre.		0.1					0.1	
D-2B. In Years 1, 5, and 10 the Forested Wetland Enhancement areas will contain at least 70 living native conifers per acre.		0.2		0.2		0.2	0.6	
D-3. In Years 5 and 10, the aerial cover of Himalayan blackberry will not exceed 20% of the site. In Years 1 through 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit D.				0.1		0.1	0.2	
E-3A. In Year 1, the Wetland Tree/Shrub planting areas will have 2,000 stems of living native woody vegetation per acre.		1					1	
E-3B. In Year 1, the Upland and Riparian Upland planting areas will have 1,200 stems of living vegetation per acre.		0.25					0.25	
E-3C. In Years 1, 5, and 10, the Forest Wetland Enhancement area will have 70 living conifers per acre.		0.25		0.1		0.1	0.45	
E-4. In Year 3, the Wetland Tree/Shrub planting areas will have 2,000 stems of living native woody vegetation per acre.			1				1	
E-5A. In Year 5, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 50% aerial cover.				1			1	
E-5B. In Year 5, at least 3 native woody species will provide at least 5% aerial cover each within the Wetland Tree/Shrub planting areas.				0.25			0.25	
E-5C. In Year 5, native woody vegetation within the Upland and Riparian Upland planting areas will provide 30% aerial cover.				0.25			0.25	
E-5D. In Year 5, at least 3 native woody species will provide at least 3% aerial cover each in the Upland and Riparian Upland planting areas.				0.1			0.1	
E-6. In Year 7, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 60% aerial cover.					2		2	
E-7A. In Year 10, native woody vegetation within the Wetland Tree/Shrub planting areas will provide 75% aerial cover.						0.4	0.4	
E-7B. In Year 10, at least 2 native woody species will provide at least 10% aerial cover each within the Wetland Tree/Shrub planting areas.						0.15	0.15	
E-7C. In Year 10, native woody vegetation in the Upland and Riparian Upland planting areas will provide 50% aerial cover.						0.1	0.1	
E-7D. In Year 10, at least 2 native woody species will provide at least 7% aerial cover each in Upland and Riparian Upland planting areas.						0.1	0.1	
E-8. In Years 5 and 10, the aerial cover of Himalayan blackberry will not exceed 20% of the uplands on site, and not more than 10% of the Wetland Re-Establishment Area. In Years 1 - 10, remove all Japanese knotweed, English ivy, and purple loosestrife identified within Unit E.				0.1		0.1	0.2	
Woody Habitat Structures (4% of total)								
A/B-10. In Year 1, at least 35 woody habitat structures (vertical snags, brush piles, and/ or LWD) will be present in Units A and B.			0.5				0.5	
C-9. In Year 1, at least 50 woody habitat structures (vertical snags, brush piles, and/or LWD) will be present within Unit C.			0.5				0.5	
D-4. In Year 1, at least 2 woody habitat structures (brush piles) will be present within Unit D.			0.1				0.1	
E-19. In Year 1, at least 40 woody habitat structures (vertical snags, brush piles, and/or LWD) will be present in Unit E.			0.5				0.5	
Percent of Total Credits	10%	15%	15%	15%	20%	15%	10%	
Totals	4.50	6.75	6.70	6.75	9.35	6.70	4.37	45.12

* Year 0 indicates as-built site conditions based on site work completed in the second construction year.

** A qualifying year must have rainfall that meets or exceeds the thirty year average as measured at SEA/TAC International Airport..

4.4 ACCOUNTING PROCEDURES AND LEDGER MANAGEMENT

WSDOT shall establish and maintain for inspection and reporting purposes a ledger of all credit transactions. WSDOT will maintain a ledger of the credits that are released through the achievement of specified performance standards, as well as credits that are debited through sale, use, or transfer (Table 4-6). The City may maintain its own separate concurrent ledger to track its portion of the credits, but WSDOT will retain responsibility for the master ledger detailing all debits and credits associated with Springbrook Bank to satisfy BOC requirements and comply with the CBMOA. When credits are to be withdrawn from the bank, any agencies with jurisdiction over the debiting project's mitigation requirements and decisions will coordinate the debiting of credits through the appropriate permit process.

The following information will be recorded in the ledger for each transaction:

1. Date of transaction.
2. Number of credits transacted.
3. For credits released for sale/use/transfer, reference the performance standard(s) to which the released credits correspond.
4. For credit sales/use/transfers, include the name, address, and telephone number of user/purchaser; permit or project number(s) and name of the regulatory agency(ies) requiring permits; location of the project for which the credits are being purchased; and a brief description of the adverse project impacts requiring compensatory mitigation (e.g., nature, size and quality of aquatic resources affected).
5. For credits withdrawn from the ledger for reasons other than credit sale/use/transfer, include the specific reason for withdrawal.
6. Number of credits available in the Bank at the time of transaction.

WSDOT will provide the BOC a copy of the bank ledger, by March 31 of each year, showing a cumulative tabulation of all transactions at the Bank to date. This ledger will be submitted in conjunction with the annual monitoring report until all credits have been released and sold, used, or otherwise transferred; or until the BOC has accepted Springbrook Bank's written certification that it has terminated all banking activity.

4.5 SITE COMPLIANCE MONITORING

During the establishment phase of the Bank, WSDOT, on behalf of itself and the City will monitor and report on the progress of the Bank toward achieving the goals, objectives, and performance standards established by the Instrument. WSDOT will prepare and submit monitoring reports to the BOC by March 31 following each monitoring year listed in Table 4-4. These reports will document the progress that has been made towards achieving the performance standards, adaptive management actions, and an overview of site progress.

A combination of formal and informal monitoring of the bank site will occur during the establishment phase or until all performance standards are met, whichever occurs later. Formal monitoring will consist of quantitative sampling techniques to address specific performance standards listed in Tables 3-1 through 3-4, while informal monitoring will

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consist of visual inspection of the mitigation area to identify any issues and necessary adaptive management actions. Formal monitoring will occur once per specified year between June and September (see Table 4-4), informal monitoring may occur periodically throughout the year (see Table 4-5). Additional formal monitoring visits may be conducted in years not listed to address performance standards not achieved in designated and/or prior years. The monitoring plan provides specific details about methods and reporting requirements (see Appendix A).

Table 4-4. Formal Monitoring

Monitoring Year	Frequency
Year 1	Annual Site Visit
Year 3	Annual Site Visit
Year 5	Annual Site Visit
Year 7	Annual Site Visit
Year 10	Annual Site Visit

Table 4-5. Informal Monitoring

Monitoring Year	Frequency
Year 1	Quarterly Site Visits
Year 2	Quarterly Site Visits
Year 3	Quarterly Site Visits
Year 4	Quarterly Site Visits
Year 5	Quarterly Site Visits
Year 6	Annual Site Visit
Year 7	Annual Site Visit
Year 8	Annual Site Visit
Year 9	Annual Site Visit
Year 10	Annual Site Visit

WSDOT’s Wetland Mitigation Monitoring staff will conduct the formal and informal monitoring of Springbrook Bank during the establishment phase of the Bank. The WSDOT Monitoring Program conducts compliance monitoring for many of WSDOT’s compensatory wetland mitigation projects. Compliance monitoring provides a means for tracking the development of WSDOT mitigation projects over time, and for determining compliance with permits issued by federal, state, local, or tribal jurisdictions. The Monitoring Program provides important internal feedback role in mitigation site management and maintenance. This feedback serves as an essential link in the internal adaptive management process, increasing the overall success of mitigation sites.

WSDOT’s Monitoring Program uses a variety of monitoring methods. Quantitative data collection techniques are based on standard ecological and biostatistic methods. The configuration, placement, and number of sample units (e.g., belt transects, plots, lines, point-lines, point frames) required to address site-specific performance objectives will be based on characteristics observed in the vegetative community and patterns of plant distribution. Sample size analysis will be used to ensure data from an adequate number of sample units has been obtained to meet the sampling objectives. Monitoring reports will include a description of methods and sampling designs used to monitor the various performance standards for the bank site (See Chapter 3).

The City and WSDOT will obtain the approval of Corps and Ecology, following consultation with the other BOC members prior to altering any element of the monitoring plan. The BOC may require additional monitoring, if necessary to demonstrate that certain performance standards have been met.

5.0 SITE PROTECTION AND MANAGEMENT

5.1 PROTECTION MECHANISMS

WSDOT and the City will take actions to ensure that Springbrook Bank wetland, riparian, and habitat functions and values will be protected in perpetuity. The actions include establishing a conservation easement and encumbering the deed with the signed MBI.

5.1.1 Conservation Easement

The City will grant and record an appropriate conservation easement to dedicate in perpetuity the property constituting each unit of the Bank that is to be created, restored, or enhanced for credit. The conservation easement must be approved by the BOC and recorded with King County. The conservation easement can not be removed or modified without written approval of the BOC. Conveyance of any interest in the property will be subject to this conservation easement. Use prohibitions reflected in the easement will preclude the site from being used for activities that would be incompatible with the establishment and operation of the Bank. All restrictions will be granted in perpetuity without encumbrances or other reservations, except those encumbrances or reservations approved by the BOC and not adversely affecting the ecological viability of the Bank. Any portion of the site not encumbered by the conservation easement will not be included in the credit-generating area of the Bank.

The conservation easement will reflect that the site owner warrants that it will comply with all applicable state and local requirements for controlling noxious weeds on the Bank site. Furthermore, this conservation easement will provide that all structures, facilities, and improvements within the Bank, including roads, trails and fences, that are merely incidental to the functionality of the mitigation site but are necessary to the Bank management and maintenance activities, will be maintained by the site owner for as long as it is necessary to serve the needs of long-term management and maintenance. All structures, facilities, and improvements that directly and substantially contribute to the functionality of the mitigation site will be included within the responsibilities delineated in the Long-Term Management Plan.

5.1.2 Financial Assurances

The funding for the Springbrook Bank design, construction, monitoring, and a portion of the site management during the establishment phase of the bank is secured through the 2003 Transportation Funding Package for the I -405 Corridor Program. The City is providing the land in perpetuity and funding the trail design, trail construction, a portion of the site management of the establishment phase and long-term management.

WSDOT, as the permit holder of the bank will be the responsible party for the financial assurances during the establishment phase of the bank. As a state agency, WSDOT has secured funds through the 2003 and 2005 Transportation Funding Packages. Future funds are secured through annual legislative allocations to the department.

The City shall initiate a Long-Term Management Endowment Fund pursuant to Article III.C.3. of the Agreement. If the responsibility for long-term management is assigned to a third party pursuant to Article IV.M, the contents of the Long-Term Management Fund shall be transferred pursuant to Articles III.C.3.a. and IV.K. If the City retains responsibility for long-term management of the Bank, following the commencement of the long-term management period, the contents of the Fund shall be deposited in a restricted liability account and devoted solely to long-term management of the Springbrook Bank until exhausted.

5.1.3 Site Access

See Article IV.B. of this Agreement for specific details.

5.2 LONG-TERM MANAGEMENT REQUIREMENTS

Site management after the establishment phase will be conducted by the City to ensure that functional benefits of the mitigation activities are not degraded. Springbrook Bank will be managed to maximize fulfillment of mitigation bank goals and objectives by ensuring the long-term protection of wetland and buffer areas. Long-term management of the site will focus on maintaining native plant communities and wildlife habitat diversity. The Long-Term Management Plan will adhere to the following requirements and the BOC agrees not to impose additional categories of Long-Term Management without the concurrence of the City following consultation with WSDOT.

- Deciduous scrub-shrub and forested areas will remain dominated by native woody species.
- Native woody vegetation will dominate the reed canarygrass treatment areas in Units A and B, and the wetland re-establishment areas in Units C and E.
- Weed control activities at the site will meet requirements of all applicable State and local requirements in force at the time.
- If hydrologic conditions change within the system providing hydrology to the re-establishment area in Unit C, adjustments to the controls may be made. If excess water threatens woody planting survival, then water from the grade-separation pump station may be diverted to Springbrook Creek via existing infrastructure, or if insufficient water is present, the height of the weir may be raised at the outflow of the re-establishment area to retain more water at the site.
- Site management activities include, but are not limited to, weed control, trash removal, vandalism repair, and structure and/or signage repair.
- All structures and facilities within Springbrook Bank, including fences, the elevated boardwalk, pump-station diversion pipe and structure, the Tukwila stormwater facility, and the stop-log weir, shall be properly maintained in perpetuity or for as long as each is needed to accomplish the goals of Springbrook Bank and achieve the requirements of the MBI.

The City is responsible for ensuring that a Long-Term Management Plan is developed and implemented to protect and maintain in perpetuity the aquatic functions and values of the Bank site. This plan must be approved by the BOC prior to the termination of the establishment phase of the Bank. Once the establishment phase of the Bank has terminated pursuant to Article IV.K. of this Agreement, the City will assume responsibility for implementing that Plan, as provided in Article IV.M., unless the City assigns this responsibility pursuant to the provisions of Article IV.M. and Section 5.2.E of this Instrument.

To gain BOC approval, the Long-Term Management Plan will consist of enumerated activities that will implement and maintain the requirements. In the event that problems occur during the long-term management phase, and/or the conditions of the long-term management as described in Section 5.2 of the MBI are not met, the BOC will be contacted and will be informed of the situation. The BOC may choose to require actions necessary to resolve any issues that result in non-compliance with the Long-Term Management Plan. A primary goal of the Bank is to create

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a self-sustaining natural aquatic system that achieves the intended level of aquatic ecosystem functionality with minimal human intervention, including long-term site maintenance. As such, natural changes to the vegetative community, other than changes caused by noxious weeds, that occur after all Bank performance standards have been met are not expected to require remediation.

The City will conduct site visits periodically during the long-term management phase to gauge the need for and scope of site management activities in order to implement the Plan.

The City will manage the site in perpetuity by fulfilling landowner obligations defined in the Conservation Easement to maintain the ecological functions on the site.

If the City elects to request the approval of the BOC to assign long-term management to a Long-Term Steward pursuant to Article IV.M., the long-term management assignment agreement will reflect that the assignee has assumed the obligation, owed to the BOC, of accomplishing the Long-Term Management Plan. The Corps and Ecology will also execute this assignment agreement. In exchange for the assignee's promise to achieve the Long-Term Management Plan, contemporaneously with the assignment of long-term management responsibilities the Corps and Ecology will direct disbursement of the Long-Term Management Endowment Fund as prescribed in Article III.C.3.c. of this Agreement. In the event the responsibility for executing the Long-Term Management Plan is not assigned to a third-party assignee, at the termination of the establishment phase of the Bank the BOC will authorize the City to apply the contents of the Endowment Fund prescribed in Article III.C.3.c. of this Agreement to the long-term management of the Bank.

5.3 FORCE MAJEURE

See Article IV.I. of this agreement for specific details.

6.0 GLOSSARY

Adaptive management: a systematic process for continually improving management policies and practices by learning from the outcomes of actions. Related to compensatory mitigation, it involves the applicant and the regulatory agencies discussing the problems occurring on a compensation site and coming to agreement on possible solutions or alternative approaches necessary to bring the site into compliance.

Aerial cover: is the percent of ground surface covered by vegetation of a particular species (or suite of species) when viewed from above (Elzinga et al. 1998). Values for aerial cover are typically obtained from point-line, point-frame, or line-intercept data. Aerial cover does not include overlapping cover of separate plants, thus it does not exceed 100%.

Class: a grouping based on shared characteristics in a classification scheme. In the Cowardin et al. (1979) classification of wetlands a class is the third level in the ‘taxonomy’ of wetlands whereas in the hydrogeomorphic classification (Brinson 1993b) it is the highest taxonomic unit.

Compensatory mitigation: the compensation stage of the mitigation sequence where impacts to the functions and values of wetlands are replaced through creation, restoration, or enhancement of other wetlands. Because regulatory requirements and policies tend to focus on the compensation stage, the term “mitigation” is often used to refer to compensation, which is just one part of the overall mitigation sequence.

Conservation easement: a restriction placed on a piece of property to protect the resources (natural or man-made) associated with the parcel. The easement is either voluntarily sold or donated by the landowner, and constitutes a legally binding agreement that prohibits certain types of activities from taking place on the land.

Corridor: areas that contain relatively undisturbed habitat and/or vegetation that maintain connections for wildlife throughout the landscape. Corridors usually represent linear habitats with the range of environmental functions necessary to permit the movement of animals between larger and more fully functioning habitats. Corridors can include but are not limited to, annual or seasonal migration corridors that connect wintering and breeding habitat, or intraseasonal corridors that connect foraging and nesting habitat or breeding and dispersal habitat.

Depressional wetland: a class of wetlands in the hydrogeomorphic classification. These are wetlands that occur in topographic depressions that exhibit closed contour interval(s) on three sides and elevations that are lower than the surrounding landscape.

Ecological restoration: “Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.” (From the Society for Ecological Restoration website 2005 <http://www.ser.org/>)

Emergent wetland: a wetland class under the Cowardin classification that is dominated by erect, rooted, herbaceous plants. Emergent wetlands include marshes and wet meadows.

Enhancement: the manipulation of the physical, chemical, or biological characteristics of a wetland site to heighten, intensify or improve specific function(s) or to change the

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growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention or wildlife habitat. Activities typically consist of planting vegetation, controlling non-native or invasive species, modifying site elevations or the proportion of open water to influence hydroperiods, or some combination of these. Enhancement provides a change in some wetland functions and can lead to a decline in other wetland functions, but does not result in a gain in wetland acres.

Establishment (creation): the manipulation of the physical, chemical, or biological characteristics present to develop a wetland on an upland or deepwater site, where a wetland did not previously exist. Activities typically involve excavation of upland soils to elevations that will produce a wetland hydroperiod, create hydric soils, and support the growth of hydrophytic plant species. Establishment provides a gain in wetland acres.

Establishment Phase: The establishment phase of the Bank commences when both the MOA and the MBI have been executed. The establishment phase terminates when the Corps and Ecology have determined, in consultation with the other members of the BOC and the Sponsors, that the following terms have been met:

- 1) All applicable performance standards prescribed in the Instrument have been achieved;
- 2) All available credits have been released or the Sponsors have permanently ceased banking activities;
- 3) The City has prepared a Long-Term Management Plan that reflects the Long-Term Management Guidelines identified in Section 5.2 of the Instrument that has been approved by the Corps and Ecology;
- 4) The City has either: (i) assumed responsibilities for accomplishing the Long-Term Management Plan, in which case the City will fulfill the role of Long-Term Steward, or (ii) has assigned those responsibilities to another Long-Term Steward pursuant to Article IV.M of this Agreement;
- 5) The Long-Term Management Endowment Fund has been fully funded;
- 6) The contents of the Long-Term Management Endowment Fund have been transferred to the Long-Term Steward; and
- 7) The Bank has complied with the terms of this Agreement.

Flood storage: the volume available for flood water from a river or stream to occupy outside the channel itself. This storage can reduce peak flows in the channel and desynchronize the movement of floodwaters downstream.

Functions: the physical, biological, chemical, and geologic interactions among different components of the environment. See *wetland functions*.

Habitat: the environment occupied by individuals of particular species, population or community.

Habitat functions: function provided by a wetland and driven by specific site attributes related to its ability to provide habitat suitable for animals and plants in general or specific groups or species.

Habitat structures: structures that increase the number and availability of habitat niches at a site, which may include snags, large woody debris, and brush piles.

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Hydric soils: a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrogeomorphic (HGM) classification: a system used to classify wetlands based on the position of the wetland in the landscape (geomorphic setting), the water source for the wetland, and the flow and fluctuation of the water once in the wetland.

Hydrogeomorphic wetland class: the highest level in the Hydrogeomorphic classification of wetlands. There are six basic hydrogeomorphic wetland classes including depressional, tidal fringe, slope, riverine, lake fringe, and flat. See *class*.

Hydrologic functions: functions provided by a wetland related to its ability to provide flood storage, reduce peak flows, and reduce downstream erosion. These functions are driven by specific site attributes.

Hydrologic regime: see *hydroperiod* below.

Hydroperiod: the pattern of water level fluctuations in a wetland. Includes the depth, frequency, duration, and timing of inundation or flooding. Patterns can be daily, monthly, seasonal, annual or longer term.

Hydrophytic vegetation: a plant species that is typically adapted to life in saturated soil conditions.

Inundated: water covering land not usually submerged, usually from flooding.

Invasive species: defined by the National Invasive Species Council (NISC) as “(1) a non-native (alien) to the ecosystem under consideration and (2) a species whose introduction is likely to cause economic or environmental harm, or harm to human health.”

Jurisdictional wetland: a wetland that is regulated by the provisions of the law under the jurisdiction of one or more federal, state, or local agencies. Not all areas of the landscape that have the biological characteristics of wetlands are regulated or jurisdictional wetlands.

Large woody debris (LWD): large pieces of downed wood such as logs, rootwads, and limbs that are in or near a body of water. LWD provides habitat structure for fish and other aquatic organisms.

Limiting factor: an environmental factor that limits the growth or activities of an organism or that restricts the size of a population or its geographical range.

Long-Term Management Phase: begins at the end of the *establishment phase* and extends for perpetuity.

Microtopography: minor variations in the elevation of the ground surface.

Mitigation (or mitigation sequencing): a series of actions that requires addressing each action, or step, in a particular order. This sequence of steps is used to reduce the severity of negative impacts from activities that potentially affect wetlands. Mitigation involves the following:

- 1) Avoiding the impact altogether by not taking a certain action or parts of an action;

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- 2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps, such as project redesign, relocation, or timing, to avoid or reduce impacts;
- 3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- 4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
- 5) Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and
- 6) Monitoring the required compensation and taking remedial action when necessary (WAC 197.11.768). See *compensatory mitigation*.

Mitigation banking: has been defined as “wetland restoration, creation, enhancement, and in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial.” 1995 Federal Guidance on Wetland Mitigation Banking (U.S. Army Corps of Engineers 1995)

Mitigation credit: for the purposes of this Mitigation Bank Instrument, one mitigation credit is valued as one unit of mitigation “currency” required to compensate for one acre of Category II wetland as defined by the Washington State Department of Ecology Rating System (Hruby 2004).

Monitoring: a systematic evaluation of the site by qualified personnel to determine the degree to which the site meets its performance standards and to determine modifications in management and maintenance of the site needed to achieve performance standards.

Formal: quantitative sampling techniques will be used to assess if the site is achieving specific performance standards, which may be tied to the release of mitigation credits.

Informal: qualitative visual inspection of the site to identify any issues and necessary adaptive management actions.

Operational Life: The operational life of the Bank commences when both the MOA and the MBI have been executed. The operational life terminates following the termination of the establishment phase of the Bank, and upon (1) sale, use, or transfer of all credits, or (2) upon acceptance by the BOC of a written declaration by the Sponsors that they have permanently ceased banking activities.

Performance standards: quantifiable standards capable of measuring the degree of success of a site compared to established goals and objectives.

Planting hummock: a raised area to provide topographic variation and facilitate tree establishment in existing wetlands.

Perpetuity: forever, eternity.

Protection Setback (Buffer): vegetated areas adjacent to wetlands, or other aquatic resources, that can reduce impacts from adjacent land uses through various physical, chemical, and/or biological processes.

Reach: a segment of river or stream and associated riparian area defined by geomorphic

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features with similar environment and aquatic habitat.

Re-establishment: the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former wetland. Activities could include removing fill material, plugging ditches or breaking drain tiles. Re-establishment provides a gain in wetland acres and functions. Compare to rehabilitation. See also *restoration* and *establishment*.

Rehabilitation: the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural or historic functions and processes of a degraded wetland. Activities could involve breaching a dike to reconnect wetlands to a floodplain, restoring tidal influence to a wetland, or breaking drain tiles and plugging drainage ditches. Rehabilitation provides a gain in wetland function but does not provide a gain in wetland acres. Compare to establishment (creation), re-establishment and enhancement. See also *restoration*.

Restoration: the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former or degraded wetland. For the purpose of tracking net gains in wetland acres, restoration is divided into re-establishment and rehabilitation.

Riparian: the strip of land adjacent to a body of water that is transitional between the aquatic system and the upland. Some riparian areas contain wetlands.

Riverine wetland: a class of wetlands in the hydrogeomorphic classification. Wetlands that occur in floodplains and riparian corridors in association with stream or river channels where there is frequent overbank flooding.

Service area: Absent special circumstances, the service area is the geographic area in which the mitigation credits generated at a mitigation bank site may be used to compensate for unavoidable wetland impacts.

Site management: activities undertaken at the site to address management needs, may include: vandalism, weed control, replanting, maintaining structures, etc...

Stormwater: the water coming from rain or snow that runs off surfaces such as rooftops, paved streets, highways, and parking lots. It can also come from hard grassy surfaces like lawns, play fields, and from graveled roads and parking lots.

Sub-basin: a smaller drainage basin that is part of a larger drainage basin or watershed. For example, the watershed of a large river may be composed of several sub-basins, one for each of the river's tributaries.

Surface water: water present above the substrate or soil surface.

Unavoidable impact: impacts to wetlands or other aquatic resources that have gone through the appropriate steps in the mitigation sequencing process. See mitigation.

Under-planting: Installation of plants under a canopy of existing woody vegetation.

Upland: any area that does not qualify as wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands.

Water quality functions: functions provided by a wetland and driven by specific site attributes related to its ability to improve water quality including: removing sediment,

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nutrients, and heavy metals and toxic organic compounds.

Water Resource Inventory Area (WRIA): geographic area usually corresponding to major watersheds. Washington State is divided into 62 WRIsAs for water management purposes.

Watershed: a geographic area of land bounded by topographic high points in which water drains to a common destination.

Wetland: has been defined as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” *Washington State Wetlands Delineation Manual* (Ecology 1997)

Wetland functions: the physical, biological, chemical, and geologic interactions among different components of the environment that occur within a wetland. Wetlands perform many valuable functions and these can be grouped into three categories (1) functions that improve water quality, (2) functions that change the water regime in a watershed such as flood storage, and (3) functions that provide habitat for plants and animals.

Wetland hydrology: the sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

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Appendix A

Monitoring Plan Springbrook Creek Wetland and Habitat Mitigation Bank

1.0 INTRODUCTION

This monitoring plan describes the framework and methods that Washington Department of Transportation (WSDOT) and the City of Renton (City) will use to monitor the Springbrook Creek Wetland and Habitat Mitigation Bank (Springbrook Bank). Monitoring results will be used to document how Springbrook Bank is performing in relation to the project objectives and performance standards documented in the Springbrook Creek Wetland and Habitat Mitigation Bank Instrument (MBI). Documented monitoring results will be used to establish when mitigation credits from Springbrook Bank are eligible for release.

2.0 WSDOT WETLAND MITIGATION MONITORING PROGRAM

WSDOT's Wetland Mitigation Monitoring Program (Monitoring Program) staff will conduct the site monitoring at the Springbrook Bank during the establishment phase (Year 0 to Year 10). The Monitoring Program conducts compliance monitoring for the majority of WSDOT's compensatory wetland mitigation projects statewide. Compliance monitoring provides a means for tracking the development of WSDOT mitigation projects over time, and for determining compliance with permits issued by federal, state, local, or tribal jurisdictions. The monitoring data also provide an important internal feedback role in mitigation site management and maintenance serving as an essential link in the internal adaptive management process, which increases the overall success of the mitigation sites.

The City will conduct periodic site visits at the Springbrook Bank during the long-term management phase to assess the need and scope of any additional site management activities.

2.1 Monitoring Protocols

WSDOT's Monitoring Program uses both formal and informal methods. Formal monitoring may include qualitative monitoring and/or quantitative monitoring addressing the performance standards in a given year. Informal monitoring will usually be conducted during years for which there are no performance standards, intending to provide a general idea of how the site is performing, and may only include qualitative monitoring. Informal monitoring may quantitatively address some performance standards, but may be less statistically rigorous than formal monitoring. Results (compliance with performance standards) of both formal and informal monitoring will be summarized in monitoring reports and submitted to BOC members. During some interim years that neither formal nor informal monitoring is scheduled, internal site inspections will take place with no external reporting. The results of internal site inspections will be used to guide site management activities at Springbrook Bank.

The Monitoring Program uses quantitative data collection techniques based on standard ecological and biostatistical methods. The configuration, placement, and number of sample units (e.g., belt transects, plots, lines, point-lines, point frames) required to address site-specific performance objectives will be based on characteristics observed in the vegetative community and patterns of plant distribution. Sample size analysis will be used to ensure data from an adequate number of sample units has been obtained to meet the sampling objectives. Monitoring reports will include a description of the methods and sampling designs used to monitor Springbrook Bank.

Further information on WSDOT monitoring methods is available at:

<http://www.wsdot.wa.gov/environment/biology/docs/MethodsWhitePaper052004.pdf>

2.2 Submission of Annual Reports

WSDOT will prepare and submit annual monitoring reports to BOC members, on behalf of itself and the City, during the establishment phase of the Bank. The reports will be submitted by March 31 after each monitoring year for which a report is required. These reports will document the progress that has been made towards achieving the performance standards specified in the MBI. Reports will also include descriptions of adaptive management actions that have been taken to facilitate achievement of performance standards that are not being met.

3.0 GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

3.1 Goal

Springbrook Bank will increase wetland area, improve hydrologic functions, water quality functions, habitat functions, fish refuge/rearing habitat, and promote environmental education

3.2 Objectives

Springbrook Bank will re-establish 17.81 acres of wetland; rehabilitate 52.92 acres of wetland, enhance 33.61 acres of wetland, enhance 6.88 acres of riparian area, and 7.80 acres of uplands; and result in significant improvements for fish and wildlife habitat, water quality, and other stream and wetland functions in the Black River Basin. The mitigation design includes removal of fill from areas of historic wetlands, re-connecting Springbrook Creek to its floodplain, and improving functions in existing wetlands.

3.3. Performance Standards

Performance standards outlined in the MBI (Section 3.3) are intended to measure the success of Springbrook Bank in meeting the overall project goals and objectives. Performance standards establish specific parameters that the site must meet in order to determine that the goals and objectives have been met.

4.0 MONITORING SCHEDULE

A combination of formal and informal monitoring of Springbrook Bank will occur during the establishment phase of the Bank (Tables A-1 and A-2). Site visits will occur periodically after the 10-year monitoring period to document changes in the site over time and to provide information to WSDOT and the City (who is the lead entity for long-term site management). Formal monitoring will occur once per specified year between June and September, while informal monitoring may occur periodically throughout the year. More frequent monitoring may be warranted because of specific site conditions or site-specific goals. For example, more frequent monitoring may be necessary to track the cover of invasive weeds or report results from management treatments. The Springbrook Bank will be monitored according to the schedules listed below.

**Table A-1.
Formal Monitoring Schedule**

Monitoring Year ¹	Frequency
Year 1	Annual Site Visit
Year 3	Annual Site Visit
Year 5	Annual Site Visit
Year 7	Annual Site Visit
Year 10	Annual Site Visit

¹ Additional formal monitoring may be needed to measure site attributes identified in performance standards (see MBI Section 3.3).

**Table A-2.
Informal Monitoring Schedule**

Monitoring Year	Frequency
Year 1	Quarterly Site Visits
Year 2	Quarterly Site Visits
Year 3	Quarterly Site Visits
Year 4	Quarterly Site Visits
Year 5	Quarterly Site Visits
Year 6	Annual Site Visit
Year 7	Annual Site Visit
Year 8	Annual Site Visit
Year 9	Annual Site Visit
Year 10	Annual Site Visit

5.0 MONITORING TASKS AND METHODS

The monitoring tasks are summarized in Table A-3. The specific methods to be used are discussed in more detail in the text that follows.

Table A-3. Monitoring Tasks by Year

Monitoring Year	Monitoring Tasks (with Corresponding Performance Standard)	Expected Site Visits
Year 0	<ul style="list-style-type: none"> • Submittal of As-Built drawings depicting the grading, planting, habitat structure placement, and water routing structures will be submitted to BOC signatories at the completion of construction/planting (A/B-1, C-1, D-1, and E-1). • Establish conservation easement and submit (may occur before Year 0). 	Several times during site construction. Once upon completion of site construction/plant installation.
Year 1	<ul style="list-style-type: none"> • Estimate density of living native woody stems in wetland planting areas (A/B-3A, C-3A, D-2A, and E-3A). • Estimate density of living native woody stems in upland and riparian upland planting areas (A/B-3B, C-3B and E-3B). • Estimate density of conifers in under-planted Forest Wetland Enhancement Areas (C-3C, D-2B, and E-3C). • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Identify and count habitat structures in all units to confirm installed per as-built drawings (A/B-10, C-19, D-4, and E-9). • Conduct multiple early growing season monitoring visits to assess if wetland hydrology is present in the wetland re-establishment areas for at least 10% of the growing season in Units A, B, C, and E. (A/B-2A, C-2A, and E-2A). • Conduct informal monitoring visits in quarters other than that of formal monitoring to assess site conditions and identify any issues or problems. • GPS planting hummocks to be able to locate in future. • Take representative photos of each site to document progress. • Submit formal monitoring report and credit ledger. 	Quarterly informal site visits. Monitoring activities will occur in appropriate seasons during quarterly site visits.

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Monitoring Year	Monitoring Tasks (with Corresponding Performance Standard)	Expected Site Visits
Year 2	<ul style="list-style-type: none"> • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Conduct multiple early growing season monitoring visits to assess if wetland hydrology is present in the wetland re-establishment areas for at least 10% of the growing season in Units A, B, C, and E. (A/B-2A, C-2A, and E-2A). • Monitor for any standards not achieved in Year 1 to assess for credit release. • Conduct quarterly informal site visits to assess site conditions and identify any issues or problems. • Submit monitoring report and credit ledger. 	Quarterly site visits
Year 3	<ul style="list-style-type: none"> • Conduct multiple early growing season monitoring visits to assess if wetland hydrology is present in the wetland re-establishment areas for at least 10% of the growing season in Units A, B, C, and E. (A/B-2A, C-2A, and E-2A). • Document the extent of over-bank flooding from Springbrook Creek during late winter and/or early spring storm-events in Units A and B (A/B-2A). • Determine the extent of permanent un-vegetated open water in Units A, B, and E during summer monitoring visit (A/B-2B and E-2B). • Determine if inundation is still evident in the northern portion of Unit D on June 15th (D-1B). • Estimate density of living native woody stems in wetland planting areas (A/B-4, C-4A, and E-4). • Estimate the density of living conifers per acre in the Wetland Enhancement Type I areas in Unit C (C-4B). • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Take representative photos of each site to document progress. • Conduct informal monitoring visits in quarters other than that of formal monitoring to assess site conditions and identify any issues or problems. • Submit formal monitoring report and credit ledger. 	Quarterly site visits. Monitoring activities will occur in appropriate seasons during quarterly site visits.
Year 4	<ul style="list-style-type: none"> • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Monitor for any standards not achieved in prior years to assess for credit release. • Conduct quarterly informal site visits to assess site conditions and identify any issues or problems. • Submit monitoring report and credit ledger. 	Quarterly site visits
Year 5	<ul style="list-style-type: none"> • Conduct wetland delineations in Wetland Re-Establishment areas in Units A, B, C, and E (A/B-2C, C-2B, and E-2B). • Conduct wetland delineation of existing wetlands in Units A and B to document that berm breaches have not adversely affected wetlands in these units (A/B-2C). • Determine the extent of permanent un-vegetated open water in Units A, B, and E during summer monitoring visit (A/B-2B and E-2B). • Estimate aerial cover of native woody vegetation in Wetland Tree/Shrub planting areas in Units A, B, C, and E (A/B-5A, C-5A, and E-5A). • Determine if three native woody species are each providing a minimum of 5% aerial cover in the wetland planting areas in Units A, B, C, and E (A/B-5B, C-5B, and E-5B). • Determine if planting hummocks have a minimum of 1 living tree per hummock in Units A and B (A/B-8). • Estimate aerial cover of native woody vegetation in the Upland and Riparian Upland Planting areas in Units A, B, C and E (A/B-5C, C-5C, and E-5C). • Determine if three native woody species are providing at least 3% cover each in the Upland and Riparian Upland planting areas in Units A, B, C, and E (A/B-5D, 	Quarterly site visits. Monitoring activities will occur in appropriate seasons during quarterly site visits.

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Monitoring Year	Monitoring Tasks (with Corresponding Performance Standard)	Expected Site Visits
	<p>C-5D, and E-5D).</p> <ul style="list-style-type: none"> • Estimate density of conifers in under-planted Forest Wetland Enhancement Areas (C-3C, D-2B, and E-3C). • Estimate aerial cover of Himalayan blackberry in uplands at Units A, B, C, and E, over entire site at Unit D, and in the re-establishment area in Units C and E. Verify that Himalayan blackberry does not cover more than 20% of the uplands at any site or more than 10% of the re-establishment areas (A/B-9, C-8, D-3, and E-8). • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Take representative photos of each site to document progress. • Submit formal monitoring report and credit ledger. 	
Year 6	<ul style="list-style-type: none"> • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Monitor for any standards not achieved in prior years to assess for credit release. • Submit report (if prior year standards monitored for credit release) and credit ledger. 	Annual site visit
Year 7	<ul style="list-style-type: none"> • Estimate aerial cover of native woody vegetation in Wetland Tree/Shrub planting areas in Units A, B, C, and E (A/B-6, C-6A, and E-6). • Estimate density of living native conifers in Wetland Enhancement Type I areas in Unit C (C-6B). • Determine if inundation is still evident in the northern portion of Unit D on June 15th (D-1B). • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Monitor for any standards not achieved in prior years to assess for credit release. • Take representative photos of each site to document progress. • Submit formal monitoring report and credit ledger. 	Annual site visit
Year 8	<ul style="list-style-type: none"> • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Monitor for any standards not achieved in prior years to assess for credit release. • Submit report (if prior year standards monitored for credit release) and credit ledger. 	Annual site visit
Year 9	<ul style="list-style-type: none"> • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Monitor for any standards not achieved in prior years to assess for credit release. • Submit report (if prior year standards monitored for credit release) and credit ledger. 	Annual site visit
Year 10	<ul style="list-style-type: none"> • Estimate the aerial cover of native woody vegetation in Wetland Tree/Shrub planting areas in Units A, B, C, and E (A/B-7A, C-7A, and E-7A). • Determine if two native woody species are each providing a minimum of 10% aerial cover in the Wetland Tree/Shrub planting areas in Units A, B, C, and E (A/B-7B, C-7B, and E-7B). • Estimate the aerial cover of native woody vegetation in the Upland and Riparian Upland planting areas in Units A, B, C, and E (A/B-7C, C-7C, and E-7C). • Determine if two native woody species are each providing a minimum of 7% in the Upland and Riparian Upland planting areas in Units A, B, C, and E. (A/B-7D, C-7D, and E-7D). • Identify any populations of Japanese knotweed, purple loosestrife, English ivy, and other Class A and B noxious weed and remove (A/B-9, C-8, D-3, and E-8). • Determine if planting hummocks have a minimum of 1 living tree per hummock in 	Annual site visit

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Monitoring Year	Monitoring Tasks (with Corresponding Performance Standard)	Expected Site Visits
	Units A and B (A/B-8). <ul style="list-style-type: none"> • Estimate aerial cover of Himalayan blackberry in uplands Units A, B, C, and E, over entire site at Unit D, and in the re-establishment area in Units C and E. Verify that Himalayan blackberry does not cover more than 20% of the uplands at any site or more than 10% of the re-establishment areas (A/B-9, C-8, D-3, and E-8). • Conduct wetland delineations in Wetland Re-Establishment areas in Units A, B, C, and E (A/B-2C, C-2B, and E-2B). • Conduct wetland delineation of existing wetlands in Units A and B to document that berm breaches have not adversely affected wetlands in these units (A/B-2C). • Determine the extent of permanent un-vegetated open water in Units A, B, and E during summer monitoring visit (A/B-2B and E-2B). • Take representative photos of each site to document progress. • Submit formal monitoring report and credit ledger. 	
After Year 10	<ul style="list-style-type: none"> • Monitor for any standards not achieved in prior years to assess for credit release. • Submit report (if prior standards monitored for credit release) and credit ledger. 	Periodic site visits

5.1 Conduct formal monitoring (Years 1, 3, 5, 7, and 10).

Formal monitoring addresses the site's fulfillment of project goals, objectives, and performance standards. It may include qualitative and/or quantitative monitoring that is summarized in a monitoring report and submitted to the BOC. Quantitative formal monitoring will attempt to provide an estimate with a confidence level of 80 percent and confidence interval of 20 percent to address standards requiring biostatistical sampling methods to address. Formal monitoring will be conducted during Years 1, 3, 5, 7, and 10, which have performance standards to address. Formal monitoring may also be conducted in additional years not listed to assess performance standards not met in designated years.

5.2 Conduct informal monitoring (Years 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10).

In contrast to formal monitoring, informal monitoring is intended to provide a general overview of site progress versus a direct assessment of performance standards. A qualitative visual inspection of the mitigation area will be conducted to identify concerns associated with meeting project goals and objectives. Informal monitoring may also quantitatively address some performance standards of coming years to assess progress toward meeting future goals, but may be less statistically rigorous than formal monitoring. Informal monitoring will be the only monitoring method during years 2, 4, 6, 8, and 9 for which there are no performance standards, although qualitative methods will also be employed during some informal site visits in years of formal monitoring. Informal monitoring will also identify any noxious weed or other invasive species issues that need to be addressed at the site.

5.3 Complete monitoring report and submit to the BOC (Years 1, 2, 3, 4, 5, 7, and 10).

Monitoring reports will provide a description of site conditions observed during the past year. Reports will include results from formal and/or informal monitoring visits, along with an assessment of site conditions as they relate to the performance standards outlined in the MBI. Results of monitoring will lead to recommendations for any management and/or contingency actions that may be necessary to ensure that the objectives and goals of the Springbrook Bank are met. The monitoring report will also describe adaptive management activities that may be necessary or have been implemented to meet current and future performance standards. Monitoring reports will be submitted to the BOC in Years 1, 2, 3, 4, 5, 7, and 10, additional reports may be submitted in years not specified if unmet performance standards from prior years have been monitored.

**5.4 Verify habitat structures still exist per as-built drawings (Year 1)
(Performance Standards A/B-11, C-10, D-5, and E-10)**

Locate all habitat structures shown in as-built drawings in Units A, B, C, D, and E in Year 1 to verify they were installed per plan and remain on-site.

**5.5 Determine density of native woody stems within Wetland Tree/Shrub planting areas in Units A, B, C, D, and E (Years 1 and 3)
(Performance Standards A/B-3A, A/B-4, C-3A, C-4A, D-2A, E-3A, and E-4).**

The density of living native woody stems per acre in the Wetland Tree/Shrub planting areas will be determined in Years 1 and 3 using randomly placed un-equal area belt transects as described by Stehman and Salzer (2000) or other methods determined appropriate for the site. This

estimate will include any natural recruitment of native species in addition to planted materials. Transects will be randomly placed along a perpendicular baseline, with the long axis of each transect running parallel to the strongest environmental gradient.

Sampling objectives for this type of monitoring include two components related to the precision of the estimate:

- The confidence level. How confident are you that your confidence interval will include the true value?
- The confidence interval width. How wide is the range you are willing to accept around your estimated value?

The sampling objective is to be 80 percent confident that the true number of woody stems per acre in wetland planting areas at Springbrook Bank is within 20 percent of the estimated density. The estimate generated via sampling will be compared to the relevant performance standards to determine if the standards have been met and if the associated credits are eligible for release.

**5.6 Estimate density of native woody stems within the Upland and Riparian Upland planting areas in Unit A, B, C, and E (Year 1)
(Performance Standards A/B-3B, C-3B, and E-3B).**

The density of living native woody stems per acre in the Upland and Riparian Upland planting areas will be determined in Year 1 using randomly placed un-equal area belt transects as described by Stehman and Salzer (2000) or other methods determined appropriate for the site. This estimate will include any natural recruitment of native species in addition to planted vegetation. Transects will be randomly placed along a perpendicular baseline, with the long axis of each transect running parallel to the strongest environmental gradient. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.7 Determine if soils are saturated to the surface, or standing water will be present 12 inches below the surface or less, for at least 10% of the growing season in the wetland re-establishment areas in Units A, B, C and E. (Year 3)
(Performance Standards A/B-2A, C-2A, and E-2A).**

The wetland re-establishment areas in Units A/B (in berm breaches), C, and E will be visited in the early growing season (beginning the first of March) of Years 0-3 to determine if wetland hydrology exists in these areas. Multiple hand-dug holes will be dug along the edges of these areas looking for water within 12 inches of the surface and observations documented. These visits will be repeated in subsequent weeks documenting the duration of wetland hydrology in the early growing season. Wetland hydrology must be documented for at least 25 days in the growing season to meet the 10% criterion stated in the performance standards. A qualifying year must have rainfall that meets or exceeds the thirty year average as measured at SEA/TAC International Airport (<http://www.wrcc.dri.edu/cgi-bin/cliMONtpre.pl?waseat>).

**5.8 Monitor the extent of over bank flooding in Units A and B during or after late-winter/early-spring storm events (Year 3)
(Performance Standard A/B-2B).**

Site visits during the late winter/early spring (January through March) will correlate crest gages with the upstream USGS gage station (USGS 12113346 SPRING BROOK CREEK AT

ORILLIA, WA [<http://waterdata.usgs.gov/wa/nwis/uv?12113346>]). Looking at the on-line USGS gage data and comparing the peak stage at the USGS gage to the data from on-site crest gauges and on-site monitoring may accomplish this task. By comparing the crest gage water surface elevations with site topography the extent of flooding generated by a specific peak water surface elevation can be estimated. If this method does not prove practical and to supplement gauge observations, on-site observations and photos of inundation (such as high water marks, drift lines, and other indicators of hydrology) can be used to indicate the extent of over-bank flooding and meet the intent of this standard.

**5.9 Estimate the density of living conifers per acre in the Wetland Enhancement Type I areas in Unit C (Years 3 and 7)
(Performance Standards C-4B and C-6B).**

The density of living native conifers per acre in the Wetland Enhancement Type I areas will be determined in Years 3 and 7 using randomly placed un-equal area belt transects as described by Stehman and Salzer (2000) or other methods determined appropriate for the site. This estimate will include any natural recruitment of native conifer species in addition to planted materials. Transects will be randomly placed along a perpendicular baseline, with the long axis of each transect running parallel to the strongest environmental gradient. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.10 Estimate aerial cover of woody vegetation in Wetland Tree/Shrub planting areas in Units A, B, C, and E (Years 5, 7, and 10)
(Performance Standards A/B-5A, A/B-6, A/B-7A, C-5A, C-6, C-7A, E-5A, E-6, and E-7A)**

The aerial cover of native woody vegetation in Wetland Tree/Shrub planting areas in each unit will be determined in Years 5, 7, and 10 using randomly placed sample units and line-intercept method as described in Elzinga et al. (1998) or other statistically appropriate method. Data will be collected by species. Transects will be placed perpendicular to the strongest environmental gradient. Sampling objectives are to be 80 percent confident that the estimate is within 20 percent of the true value. Estimates derived from sampling will be compared to the relevant performance standard to assess if the standards are being met and if the associated credits are eligible for release.

**5.11 Determine if three native woody species have 5% or greater cover in the Wetland Tree/Shrub planting areas in Units A, B, C, and E (Year 5)
(Performance Standards A/B-5B, C-5B, C-7B, and E-5B)**

Using the aerial cover by species data collected in Year 5 for the Wetland Tree/Shrub planting areas in Units A, B, C, and E, determine if three native woody species each provide five percent cover in each unit listed. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.12 Determine if 2 native woody species have 10% or greater cover in the Wetland Tree/Shrub planting areas in Units A, B, C, and E (Year 10)
(Performance Standards A/B-7C, C-7B, and E-7B)**

Using the aerial cover by species data collected in Year 10 for the Wetland Tree/Shrub planting areas in Units A, B, C, and E determine if two native woody species each provide 10% cover in each unit listed. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.13 Estimate aerial cover of native woody vegetation in the Upland and Riparian Upland planting areas in Units A, B, C and E (Years 5 and 10)
(Performance Standards A/B-5C, C-5C, and E-5C).**

The aerial cover of native woody vegetation in the Upland and Riparian Upland planting areas in Units A, B, C, and E will be determined in Years 5 and 10 using randomly placed sample units and line-intercept method as described in Elzinga et al. (1998) or other statistically appropriate methods. Data will be collected by species. Transects will be placed perpendicular to the strongest environmental gradient. Sampling objectives are to be 80 percent confident that the estimate is within 20 percent of the true value. Estimates derived from sampling will be compared to the relevant performance standard to assess if the standards are being met and if the associated credits are eligible for release.

**5.14 Determine if 3 native woody species have 3% or greater aerial cover in the Upland and Riparian Upland planting areas in Units A, B, C, and E (Year 5)
(Performance Standards A/B-5D, C-5D, and E-5D).**

Using the aerial cover by species data collected in Year 5 for the Upland and Riparian Upland planting areas in Units A, B, C, and E determine if three native woody species each provide three percent cover in each unit listed. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.15 Determine if 2 native woody species have 7% or greater aerial cover in the Upland and Riparian Upland planting areas in Units A, B, C, and E (Year 10)
(Performance Standards A/B-7D, C-7D, and E-7D).**

Using the aerial cover by species data collected in Year 10 for the Upland and Riparian Upland planting areas in Units A, B, C, and E determine if two native woody species each provide seven percent cover in each unit listed. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

**5.16 Determine density of living native conifer plantings in the Forested Wetland Enhancement areas in Units C, D, and E (Years 1, 5 and 10)
(Performance Standards C-3B, D-2B, and E-3C)**

In Years 1, 5, and 10, the density of living native conifers in the Forested Wetland Enhancement Areas shown on the treatment maps (Figures 2-1 through 2-5) will be determined using randomly placed un-equal area belt transects as described by Stehman and Salzer (2000) or other methods determined appropriate for the site. This estimate will include any natural recruitment of native conifer species in addition to planted materials. Transects will be randomly placed along a perpendicular baseline, with the long axis of each transect running parallel to the strongest

environmental gradient. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

5.17 Determine if at least one living native tree is present per planting hummock in Units A and B (Years 5 and 10) (Performance Standard A/B- 8)

Locate planting hummocks in Units A and B in Years 5 and 10. Count the number of living native trees per hummock and determine if each hummock has at least one living native tree present. Results will be compared to the relevant performance standards to assess if the standards are being met and if the associated credits are eligible for release.

5.18 Identify and remove any purple loosestrife, English ivy, and/or Japanese knotweed (Years 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10) (Performance Standards A/B-9, C-8, D-3, and E-8)

Walk through all units to identify existing populations of purple loosestrife, English ivy, Japanese knotweed, and/or any other noxious weeds listed for control by the King County Noxious Weed Board (<http://dnr.metrokc.gov/wlr/lands/weeds/laws.htm>). Mark all invasive species populations needing control with flagging and/or GPS data and notify appropriate WSDOT staff to schedule removal of the target species.

5.19 Determine the extent of un-vegetated open water in Units A, B and E during the summer monitoring visit (Years 3, 5, and 10) (Performance Standards A/B-2B and E-2B)

During the summer formal monitoring visits make a qualitative estimate of the extent of un-vegetated open water present in Units A, B, and E. The extent of un-vegetated open water in these units is not to exceed 10% of the any one unit.

5.20 Determine if inundation is still present in the Northern portion of Unit D on June 15th (Years 3 and 7) (Performance Standard D-1B)

Visit Unit D on June 15th of Years 3 and 7 and document the presence or lack of inundation in the northern portion of the unit using photographs and field notes.

5.21 Estimate the aerial cover of Himalayan blackberry in the uplands of Units A, B, C (include WL forest underplanting areas w/ uplands in Unit C), and E, over the entirety of Unit D, and in the re-establishment areas in Units C and E (Years 5 and 10) (Performance Standards A/B-9, C-8, D-3, and E-8)

In Years 5 and 10 estimate the aerial cover of Himalayan blackberry in the upland areas of Units A, B, and E. In Unit C include the Forested Wetland Enhancement area in with the uplands and develop an estimate for these areas combined. In addition, estimate the aerial cover of Himalayan blackberry in the Wetland Re-Establishment areas in Units C and E. In Unit D develop an estimate of blackberry cover over the entire site. See the relevant performance standards to confirm the cover criteria, but in general the maximum is 20% cover the uplands and Forested Wetland Enhancement area of Unit C and 10% in the Wetland Re-Establishment areas.

5.22 Take representative photo points of the sites (Years 1, 3, 5, 7, and 10)

Take photographs from permanent locations, if possible the locations will be documented on the as-built drawings. The photographs are intended to document the progress of each component of the Bank, as well as the Bank in general, toward achieving the objectives and performance standards of the Bank. Photo-monitoring should include general vantage points around the margin of the Bank, vantage points within the Bank, and at specific monitoring locations such as transects and/or sampling points.”

6.0 REFERENCES

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