FINAL EIS

# EAST LINK PROJECT

## FINAL ENVIRONMENTAL IMPACT STATEMENT

## Appendix H3
## Ecosystems Technical Report



SEATTLE


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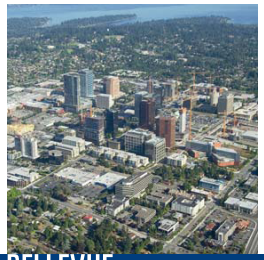
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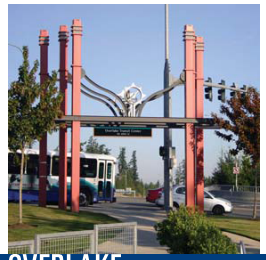
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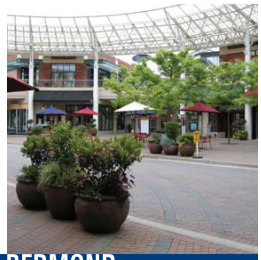
REDMOND

SOUNDTRANSIT

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REGIONAL TRANSIT AUTHORITY

Washington State Department of Transportation

U.S. Department of Transportation
Federal Transit Administration

July 2011

SOUND TRANSIT EAST LINK PROJECT

*Appendix H3*

# Ecosystems Technical Report

*Prepared for:*
Sound Transit

*Prepared by:*
CH2M HILL

July 2011

# Contents

## Appendices



## Tables

## Exhibits

# Acronyms and Abbreviations

| | |
|---|---|
| BMPs | best management practices |
| BNSF | Burlington Northern Santa Fe |
| CAO | critical areas ordinance |
| CWA | Clean Water Act |
| DDT | dichloro-diphenyl-trichloroethane |
| DNR | Washington Department of Natural Resources |
| Ecology | Washington State Department of Ecology |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| FAC | facultative plants |
| FACU | facultative upland plants |
| FACW | facultative wetland plants |
| GIS | geographic information system |
| GMA | Growth Management Act |
| HGM | hydrogeomorphic classification |
| I-405 | Interstate 405 |
| I-90 | Interstate 90 |
| LWD | large woody debris |
| MBTA | Migratory Bird Treaty Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NCCS | National Soil Survey Center |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NWI | National Wetlands Inventory |

| | |
|---|---|
| OBL | obligate wetland plants |
| OHWM | ordinary high water mark |
| PEM | palustrine emergent marsh |
| PFO | palustrine forested |
| PGIS | pollutant-generating impervious surface |
| PHS | Priority Habitat and Species |
| ppt | parts per thousand |
| PSS | palustrine scrub shrub |
| RCW | Revised Code of Washington |
| SCS | United State Soil Conservation Service |
| SEPA | State Environmental Policy Act |
| SMA | Shoreline Management Act |
| SMP | Shoreline Master Program |
| SR | State Route |
| TFW | Timber Fish And Wildlife |
| UPL | obligate upland plants |
| USACE | United State Army Corps of Engineers |
| USBEM | Urban Stream Baseline Assessment Evaluation Method |
| USDA | United States Department of Agriculture |
| USFWS | United States Fish and Wildlife Service |
| WAC | Washington Administrative Code |
| WDFW | Washington Department of Fish and Wildlife |
| WNHP | Washington Natural Heritage Program |
| WR | wetland resource |
| WRIA | Water Resource Inventory Area |
| WSDOT | Washington State Department of Transportation |

*Chapter 1*

# Introduction

An ecosystem is the interaction between plants, animals, microorganisms, and the physical environment in which they live. Ecosystems are made up of living organisms, including humans, and the environment they inhabit. Understanding this relationship is basic to the environmental review process and the assessment of impacts on ecosystems. This technical report addresses the ecosystem components—aquatic resources, vegetation and wildlife, and wetlands—in the vicinity of the East Link Project alternatives. The report describes the affected environment as well as the expected temporary construction impacts and permanent operational impacts on these ecosystem resources for each of the project alternatives. It also discusses measures intended to avoid and minimize impacts and compensatory mitigation for unavoidable impacts. This report is organized into five main parts, beginning with a summary of data-gathering activities, identification of related laws and regulations, definition of the study area, and assumptions (Section 1.0); followed by Section 2.0, Study Objectives and Methods; Section 3.0, Affected Environment; Section 4.0, Environmental Consequences; and Section 5.0, Potential Mitigation Measures. Section 6.0 provides reference information.

## 1.1 Data Gathered

Sound Transit conducted a literature and data review to identify and characterize potentially affected resources in and near the project vicinity. Existing documentation and information was compiled and reviewed first so that the field reconnaissance effort could focus on filling information gaps. Existing natural resource information was gathered from many local, state, and federal agencies. This information included published and unpublished reports, maps, websites, aerial photographs, and interviews with agency staff familiar with resources within the project vicinity. The data sources are listed in the following subsections.

### 1.1.1 Agency and Public Contacts

Sound Transit contacted the following local jurisdictions, agencies, organizations, and individuals for up-to-date information on ecosystems resources:

- City of Bellevue Development Services, Transportation, Utilities, and Parks departments
- City of Redmond Planning and Community Development and Public Works departments
- East Lake Washington Chapter of the Audubon Society
- Friends of Marymoor Park
- Friends of Mercer Slough
- King County Department of Natural Resources, Parks Department, and Water Resource Inventory Area (WRIA) planning group
- Muckleshoot Indian Tribe
- Snoqualmie Tribe
- Suquamish Tribe
- Tulalip Tribe
- Yakama Tribe
- Duwamish Tribe
- National Marine Fisheries Service (NMFS)
- U.S. Army Corps of Engineers (USACE)

- U.S. Fish and Wildlife Service (USFWS)
- Washington Department of Fish and Wildlife (WDFW)
- Washington Department of Natural Resources (DNR) Natural Heritage Program
- Washington State Department of Ecology (Ecology)

### 1.1.2 Maps and Existing Documentation

Maps and other existing reports were an important resource used to identify ecosystem features within the project vicinity. The following map resources were used:

- Aerial photography of the project corridor
- Bear Creek Basin Plan (King County, 1992)
- Bear Creek Parkway Extension Final Supplemental Environmental Impact Statement (EIS) (City of Redmond, 2004)
- Bel-Red Corridor Project Draft EIS (City of Bellevue, 2007b)
- Bel-Red Corridor Project Final EIS (City of Bellevue, 2007)
- Best Available Science Review for King County, City of Redmond, and City of Bellevue
- Catalog of Washington Streams and Salmon Utilization maps
- Cities of Bellevue, Mercer Island, and Redmond for sensitive and protected species and habitat information
- Comprehensive plans for the Cities of Bellevue, Mercer Island, Redmond, and Seattle (2007)
- Draft Puget Sound Salmon Recovery Plan (Shared Strategy Development Committee, 2005)
- Hydric Soils of King County (Natural Resources Conservation Service [NRCS])
- I-405 Corridor Program: NEPA/SEPA Draft EIS and Draft Preliminary Section 4(f) Evaluation (June 2002)
- I-405 Bellevue Nickel Improvement Project: Wetlands Discipline Report (WSDOT, 2006)
- I-90 Two-Way Transit and HOV Operations EIS (Sound Transit and WSDOT, 2004)
- Information from reports, maps, and personal communications from local WDFW habitat biologists
- King County Conservation District (KCD) Soil Descriptions and Soil Report (KCD, 2000)
- King County sensitive areas map folio and wetland inventory (King County, 1990)
- Mapping information from sources such as wetland delineation reports and stream studies by other consulting firms, as available
- Publications of the Washington Natural Heritage Program (WNHP), available at http://www.dnr.wa.gov/nhp/refdesk/pubs/index.html
- Reports, maps, and personal communications from City of Bellevue and WRIA sources
- Salmon and Steelhead Habitat Limiting Factors Report for the Lake Washington Watershed (WRIA 8) (Kerwin, 2001)
- Sammamish River Corridor Conditions and Enhancement Opportunities Report (King County, 1993)
- Sound Transit Central Link Light Rail EIS (Sound Transit, 1999)
- Sound Transit Technical Back-up on Ecosystems: Central Link Light Rail Final EIS (Sound Transit, 1999)
- Stream inventory maps for the City of Bellevue
- U.S. Geological Survey (USGS) topographic maps (1:24,000)

- U.S. Soil Conservation Service (SCS) soil survey maps of King County (U.S. Department of Agriculture [USDA] SCS, 2008)
- USFWS National Wetlands Inventory (NWI) maps (1:24,000)
- WDFW fish distribution database (http://wdfw.wa.gov/fish-sh.htm)
- WDFW Priority Habitats and Species (PHS) maps (1:24,000)
- Wetland and stream inventory maps for the Cities of Bellevue, Mercer Island, Redmond, and Seattle, as available
- Shoreline Inventory Report – Technical Appendix Volume I, Wetlands (City of Bellevue, 2008)
- Shoreline Inventory Report – Technical Appendix Volume II, Habitat (City of Bellevue, 2008)
- Wildlife Habitat Profile (King County, 1987)
- Kelsey Creek and Tributaries 2006 Salmon Spawner Surveys (City of Bellevue, 2007a)
- Kelsey Creek and Tributaries 2008 Salmon Spawner Surveys (City of Bellevue, 2009)

## 1.2 Related Laws and Regulations

The following federal, state, and local laws, regulations, and agency jurisdiction and management guidance describe the applicable requirements for wetlands; threatened and endangered species, wildlife, and aquatic species and habitat for these species; and high-value habitats and species:

- Critical Area Ordinances (CAOs) for the Cities of Bellevue, Mercer Island, Redmond, and Seattle and King County
- Endangered Species Act (ESA)
- Executive Orders 89-10, 90-40, and 11990
- Growth Management Act (GMA) (Revised Code of Washington [RCW] 36.70A)
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act
- Local agency Shoreline Master Programs (SMPs)
- Magnuson-Stevens Fishery Conservation and Management Act (MSA)
- National Environmental Policy Act (NEPA)
- Sections 404, 402, and 401 of the Clean Water Act (CWA)
- Washington State Water Pollution Control Act
- Shoreline Management Act (SMA)
- State Environmental Policy Act (SEPA)
- Washington State Hydraulic code (Washington Administrative Code [WAC] Chapter 222-110)
- WDFW PHS Management Recommendations

## 1.3 Study Areas

Each resource required a specific study area, described below.

### 1.3.1 Aquatic Resources

Aquatic habitats include ponds, lakes, rivers, and streams. The study area for aquatic resources is defined as 100 feet upstream and 300 feet downstream from where project limits cross a stream and the entire stretch of any stream, then runs parallel to a project alternative within 200 feet of the edge of the alternative. The 300-foot

downstream limit is based on WAC 73-201A-400 and reflects the length of mixing zones in streams and rivers as agreed to by NMFS and USWFS for ESA consultation.

### 1.3.2 Vegetation and Wildlife Resources

Sound Transit has established distinct study areas for vegetation and wildlife resources.

For vegetation, the study area is within 100 feet of either side of the project alternatives and the area within the vicinity of stations, maintenance facilities, park-and-ride lots, traction power substations, and roadway widening, including any trees of significance (as defined by the applicable jurisdiction) within these areas.

For wildlife, the study area was determined by the types of species known to exist near the project.

### 1.3.3 Wetland Resources

Wetlands are defined by soil characteristics, presence or absence of hydrology, and dominance of vegetation adapted to wet environments. Many wetlands in the study area are considered jurisdictional waters of the United States by the USACE and are protected by federal regulations and local CAOs. The wetland study area is defined as wetlands and wetland buffers within 200 feet of either side of the project alternatives and the area within the project limits, including the trackway, stations, maintenance facilities, park-and-ride lots, traction power substations, and roadway widening. Wetland buffers, which are necessary to evaluate project impacts, may extend beyond the wetland study area.

## 1.4 Assumptions

### 1.4.1 Impact Assessment

The process of analyzing and estimating project impacts requires a series of assumptions regarding the physical extent of impacts, the duration of impacts, site restoration following construction, and measures that would be implemented to avoid or minimize potential impacts. This includes temporary construction impacts (between the permanent project right-of-way and the construction limits), and permanent operational impacts within the project right-of-way. The following subsections identify these assumptions.

#### 1.4.1.1 Temporary Construction Impacts

##### Sedimentation Risk on Aquatic Resources

The spatial extent of water bodies and aquatic resources that may be adversely affected by construction activities varies depending on the type and magnitude of impact. The primary temporary construction impacts would be from sediment-related inputs to streams. Minor inputs would likely affect relatively short sections of stream before sediment settles out of suspension. Major inputs of sediment may be carried for longer distances. A short distance might be approximately 100 feet, while a major sedimentation event might affect a stream for 1,000 feet or more. Impacts from temporary turbidity are generally less than for sediment deposition. However, the distance the impact might cover is greater. The lighter the suspended particulates are, the longer it stays in suspension. Clay particulates settle out the slowest.

In this context, risk is the inherent potential for sediment–related impacts on aquatic resources, such as sedimentation or turbidity, and is site specific (hereafter referred to as sedimentation risk). Table 1-1 describes several example situations for assessing sedimentation risk. The greatest sedimentation risk would be where earthwork is conducted close to a stream or river, or on steep slopes with unstable soils, while the lowest risk would be from earthwork conducted at a greater distance from a stream on flat ground.

Erosion is caused when water from rain or snowmelt flows over ground surfaces that have bare or erodible soil that is not bound by plant roots. The more highly vegetated a surface is, the less likely that erosion will occur. The looser or inherently unstable a soil is, the more likely that erosion will occur for any given precipitation rate. The steeper the slope is, the more likely that erosion or even landslides might occur. The closer that erosion occurs to streams or other water bodies, the more likely that erosion-transported sediment will reach those water bodies.

TABLE 1-1
Example Situations for Assessing Sedimentation Risk to Aquatic Resources within the Study Area

| High Sedimentation Risk | Moderate Sedimentation Risk | Low Sedimentation Risk |
|---|---|---|
| Earthwork that is done:<br>• Within OHWM<br>• Very close to water body<br>• On steep slopes next to water body<br>• On bare or erodible soil types on moderate to steep slopes<br>• During wet season | Earthwork that is done:<br>• Moderately close to water body<br>• On level ground next to water body<br>• On bare or erodible soil types on shallow slopes | Earthwork that is done:<br>• Distant from water body<br>• Separated from water body by vegetated buffer<br>• Adjacent to piped water body<br>• With minimal earthwork or soil disturbance |

OHWM – ordinary high water mark

Measures to minimize sedimentation risk at a given site would be commensurate with risk, such as protecting exposed soils, constructing during the dry season, and implementing erosion controls. This may require multiple best management practices (BMPs) in some situations. Ultimately, BMP performance would determine the degree of impacts, if any.

### Limits of Construction and Right-of-Way

For wetlands, and vegetation and wildlife, the construction limit is the area that would be disturbed during construction. This area is typically the 35-foot-wide strip on each side of the 30-foot-wide permanent right-of-way, which totals 100 feet wide. However, for many areas, the project engineers defined the specific construction footprint, which varies from the 100-foot (typically more narrow). In these areas, the engineers provided the construction limits. For analysis purposes, Sound Transit assumed that all lands within the construction limit would be disturbed during construction and that all vegetation would be removed.

### Definition of Temporary Impacts

The duration of temporary construction impacts on wetlands would vary depending on the vegetation type and associated habitat functions that would be affected. As defined by Ecology et al. (2006a), temporary impacts are defined as follows:

- Short-term temporary impacts last for a limited time, and functions return to pre-impact performance fairly soon (about one year or within one growing season of the impact). For example, clearing emergent vegetation (e.g., cattails, rushes, sedges, or grasses) for temporary construction impacts associated with a road (for example, for a short-term staging area) changes how the wetland functions for a short time. Emergent vegetation might return within one growing season if the disturbance is not severe. Compensatory mitigation is often not required for short-term temporary impacts.
- Long-term temporary impacts affect wetland functions in such a way that they can be restored, or will eventually be restored over time, but not within a year or so. Long-term temporary impacts or alterations carry a risk of permanent loss, such as when soil is compacted by equipment, deep excavation is required, or pipeline trenches alter the water regime. Clearing a forested wetland for a temporary access road changes the plant community and degrades functions, such as songbird habitat provided by the tree canopy. It may take many years to grow back and re-establish the previous level of function. Long-term temporary impacts normally require compensatory mitigation but at a lower ratio than permanent impacts.

### Wetland Impacts under Elevated Guideway

Since the Draft EIS was released in 2008, impacts on wetlands have been updated to reflect additional design input and updated information on construction techniques based on experience from the Sound Transit Central Link project. Additionally, the Draft EIS conservatively assumed that the area under the elevated guideway would be a permanent operational impact on wetlands because of possible shading from the structure. However, as learned from the Sound Transit Central Link project, in most cases, the shading impacts on wetlands are minimal (and at times beneficial) because the guideway structure would be relatively narrow (30 feet wide) and high enough above the ground surface (generally 15 feet or greater) to allow wetland herbaceous plants and shrubs to grow underneath. Height estimates of the elevated guideway refer to the distance from the existing ground surface to the bottom of the guideway structure. Beneficial impacts sometimes occur in the first summer following planting and perhaps for some time afterwards, from shading preventing the young, shallow-rooted plantings from drying out and dying.

The construction limits for all alternatives was limited to a total width of 100 feet, which includes the 30-foot-wide permanent right-of-way and a 35-foot-wide construction impact on each side of the right-of-way.

#### Wetland Buffer Impacts

Impacts on wetland buffers within the 35-foot-wide construction corridors and staging areas would be temporary. These buffers would be restored and replanted with native vegetation, which may often be an improvement over existing non-native weeds such as Himalayan blackberry. For purposes of the Final EIS, impacts on buffer areas within the 30-foot-wide operational right-of-way under the elevated guideway are included as a permanent impact. Sound Transit would re-evaluate this assumption during the permitting phase of the project to identify specific situations where buffer vegetation under the elevated guideway structure could be restored (where the guideway would be high enough to allow rain during the growing season).

Vegetation within buffer areas receives water directly from precipitation. Therefore, the elevated guideway may create a rainshadow effect and in some cases may have a low clearance that could also limit sunlight. At several locations along Sound Transit's Central Link route, project wetland specialists observed places where vegetation within buffers under the elevated guideway was having difficulty re-establishing because of limited summer water and/or light.

Estimating this impact is complicated and depends on multiple variables, such as slope, aspect, soil conditions, and stormwater dispersion from the elevated guideway. All these variables make for a complicated buffer impact analysis that exceeds the site and design information available during the Final EIS.

A 2009 study on shading impacts on vegetation was conducted for the SR 520 I-5 to Medina: Bridge Replacement and HOV Project (Parametrix et al., 2009). The study synthesized the results of four previous studies, including in situ light and vegetation measurements at several locations on SR 520 and I-90. The study was specific to two wide interstate bridge structures across Lake Washington, which are considerably wider than the elevated guideways proposed for the light rail system. However, some general conclusions from the study can be applied to the East Link Project. For example, the study found that the low, wide SR 520 bridge decks create deep shade beneath the bridge. The study also concluded that higher, narrower bridge decks can let in substantial amounts of light and more light reaches the ground or water surface area underneath these structures; vegetation cover (including trees and dense shrubs) can be quite high in these areas. The elevated guideways will generally be higher and much narrower than the SR 520 bridges studied. Therefore, substantial vegetation growth is expected to be possible under the high elevated guideway sections.

### 1.4.1.2 Permanent Operational Impacts

The permanent impacts on aquatic resources may include beneficial impacts (improved habitat conditions or fish passage) and adverse impacts when stream channels are either enclosed within new culverts or shaded by overhead guideways (i.e., riparian function impacts). Sound Transit assumes that an overhead structure 30 feet wide extending over stream channels or riparian vegetation could result in potential shading. The width of riparian vegetation used to calculate the area of impact is defined by the Cities of Bellevue and Redmond CAOs and varies by stream type. Additional permanent impacts may include stormwater runoff to surface waters and accidental spills during operation of the maintenance facilities.

For vegetation and wildlife resources, the permanent project limit is the width of the trackway (30 feet) and stations (approximately 60 feet by 380 feet) after construction. Removal of high-quality habitat supporting wildlife functions within the project limit would be permanently affected by project facilities and considered to have direct permanent impacts. Impacts of operational noise on wildlife would likely be relatively minor compared to existing traffic noise. To prevent trees and branches from interfering with operation of the light rail, existing high-quality, forest-dominated vegetation and wildlife habitat under and within 20 feet of each side of the elevated guideways would be converted to shrub and short-tree habitat, which may become high-quality habitat for some species. Existing low-quality, weed-dominated and disturbed vegetation and wildlife habitat under and within 20 feet of each side of the elevated guideways would be converted to shrub and short-tree habitat, which would be a substantial environmental improvement.

Permanent wetland impacts resulting from removal of wetland area and function are those that would occur within the project limits of the project alternatives (i.e., at-grade alternatives, columns for elevated alternatives, stations, maintenance facilities, park-and-ride lots, traction power substations, permanent access roads, stormwater facilities, and road widening). Sound Transit assumes that these areas would be permanently affected

and all wetlands and/or buffers within these areas would be lost. Additional permanent impacts might also include stormwater runoff to surface waters during operation of the light rail facilities (see Section 4.9, Water Resources, in the Final EIS).

### 1.4.2 Site Restoration

For purposes of analysis and discussion of temporary impacts, Sound Transit assumed that areas supporting native upland or wetland vegetation and streambanks located outside of the project limits would be restored to their former condition after completion of construction. Site restoration features would be installed immediately following construction in each project segment. As noted above, the length of time that would be required for site restoration to effectively replace pre-project wetland functions would vary.

### 1.4.3 Avoiding and Minimizing Impacts on Sensitive Ecosystem Resources

Appendix A of this report provides a compilation of BMPs that could be used to avoid or minimize project construction and operational impacts on sensitive natural resources, including state and federal protected species and their habitats, wetlands, and aquatic resources. These BMPs are either required by state or federal agencies to obtain the permits that would be necessary for the project or may be required to comply with permit conditions. Sound Transit assumes that these BMPs would be implemented at appropriate locations and that they would perform as intended to avoid or minimize impacts.

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*Chapter 2*

# Study Objectives and Methods

This chapter describes the objectives and methods used to study the aquatic resources (Section 2.1), vegetation and wildlife resources (Section 2.2), and wetland resources (Section 2.3).

## 2.1 Aquatic Resources

This section describes the objectives of the aquatic resources investigations and the methods used to characterize aquatic resources within the study area and identify potential impacts on those habitats.

### 2.1.1 Aquatic Resources Study Objectives

The purpose of the aquatic resources investigation was to describe the aquatic resources in the East Link Project vicinity and the potential impacts on these resources. Objectives included the following:

- Identify important fisheries resources, such as anadromous and resident species reported to inhabit water bodies within the study area. Describe relevant aspects of salmonid seasonal use and life histories.
- Identify any federal- or state-listed endangered, threatened, or candidate aquatic species reported to inhabit water bodies within the study area.
- Conduct a reconnaissance-level physical habitat survey of water bodies within the study area that may potentially be affected by all project alternatives to describe fish and amphibian habitats and riparian conditions.
- Conduct a quantitative physical habitat survey of streams within the study area that may be affected by the preferred alternative routes.
- Describe potential impacts on aquatic resources that may result from the project alternatives, including temporary construction impacts and permanent operational impacts.
- Propose mitigation measures to avoid, minimize, and compensate for any adverse impacts.

### 2.1.2 Aquatic Resources Methods

#### 2.1.2.1 Review of Existing Information

Sound Transit performed a literature and data review to identify and characterize potentially affected resources in the study area. Sound Transit reviewed the sources listed in Section 1.1 to collect information regarding the presence of streams, rivers, and lakes and the resident and anadromous fish species and habitat within and near the study area. Existing documentation and information were compiled and reviewed first so that the field reconnaissance effort could focus on filling information gaps.

#### 2.1.2.2 Agency Coordination

Federal, state, and local agencies were contacted for information regarding existing conditions in the study area. For example, WDFW was contacted for information on PHS. The Washington Conservation Commission provided a copy of the Lake Washington watershed habitat limiting factors report (Kerwin, 2001). Kit Paulson with the City of Bellevue provided information on species occurrence, habitat, watershed conditions, spawner surveys, and fish passage assessments at culverts for streams in the Kelsey Creek watershed.

#### 2.1.2.3 Reconnaissance of Water Bodies

Sound Transit conducted reconnaissance-level aquatic habitat surveys during March 2007 at least 100 feet upstream and 300 feet downstream from each of the study area water-body crossings and along the entire reach of any stream running parallel to the project within 200 feet from the edge of the alternative and facilities. Aquatic habitat suitability (i.e., functional status) was evaluated based on the fish life histories, spawning and rearing habitat requirements, seasonal use, and field observations. The following stream habitat information was assessed during field reconnaissance:

- Overall habitat quality rating
- Habitat quality trend
- Water quality
- In-stream habitat
- Riparian habitat

#### 2.1.2.4 Anthropogenic factors

The habitat quality rating was subjective. The fisheries biologists who determined the ratings have extensive experience doing quantitative stream habitat surveys using King County methods (1991); the Urban Stream Baseline Assessment Evaluation Method (USBEM); Timber, Fish, and Wildlife (TFW) methodology (Scheuett-Hames et al., 1994); and other methods. They have experience applying data to rating systems such as USBEM, National Oceanic and Atmospheric Administration (NOAA) Fisheries Pathways and Indicators, and others. The USBEM method was developed for King, Snohomish, and Pierce counties for ESA compliance purposes (R2 Consultants et al., 2000). In addition, aquatic resources were described, when possible and applicable, in a subbasin or drainage area context. Culverts were described and visually assessed for fish passage.

#### 2.1.2.5 Detailed Analysis of Preferred Alternative

Sound Transit conducted quantitative aquatic habitat surveys in September 2009 at the stream crossings along the preferred alternative routes. Two methods were used:

- Crossings without anticipated impacts were assessed using the King County level one method with a Wolman pebble count added (King County, 1991).
- Crossings where impacts were anticipated were assessed using the watershed assessment method developed for the TFW program by Scheuett-Hames et al. (1994).

The King County method was used because it is the most widely used method in urban settings within King County and thus has the best comparative value. The TFW method was used at the request of the Muckleshoot Indian Tribe. Both methods give a quantitative assessment of stream habitat conditions.

#### 2.1.2.6 Water Body Classification and Stream Buffer Width Designations

Water body classification was determined based on the King County, DNR, City of Redmond, and City of Bellevue classification systems. The King County system is hierarchical and based on stream flow and salmonid usage. The King County system categories are as follows:

- Class 1: Streams that are designated as "Shorelines of the State"
- Class 2: Streams that are smaller than Class 1 and flow year-round during years of normal rainfall, or those used by salmonids
- Class 3: Streams that are intermittent or ephemeral during years of normal rainfall and are not used by salmonids
- Unclassified: A watercourse that has been identified but has not been classified

The DNR classification system categories are as follows:

- Type S: Shorelines of the State or Shorelines of Statewide Significance
- Type F: Fish
- Type Np: Nonfish – Perennial
- Type Ns: Nonfish – Seasonal
- Letter U: Unknown

The City of Bellevue classification system categories are as follows:

- Type S water: All waters, within their bankfull width, as inventoried as "shorelines of the state," including periodically inundated areas of their associated wetlands

- Type F waters: Segments of waters that are not Type S waters and that contain fish or fish habitat, including waters used by hatcheries
- Type N waters: All segments of waters that are not Type S or F waters and that are physically connected to Type S or F waters by an aboveground channel system, stream, or wetland
- Type O waters: All segments of waters that are not Type S, F, or N waters and that are not physically connected to Type S, F, or N waters by an aboveground channel system, stream, or wetland

The City of Redmond classification system categories are as follows:

- Class I: Streams identified as Shorelines of the State under the City of Redmond Shoreline Master Program
- Class II: Natural streams that are not Class I and are either perennial or intermittent and have salmonid fish use or the potential for salmonid fish use
- Class III: Natural streams that are not Class I or Class II and are either perennial or intermittent and have one of the following characteristics:
- Non-salmonid fish use or the potential for non-salmonid fish use
- Headwater streams with a surface water connection to salmon-bearing or potentially salmon-bearing streams (Class I or II)
- Class IV: Natural streams that are not Class I, Class II, or Class III and are either perennial or intermittent, do not have fish or the potential for fish, and are non-headwater streams
- Intentionally Created Streams: Manmade streams defined as such in these regulations, and which do not include streams created as mitigation; purposeful creation must be demonstrated to the City of Redmond through documentation, photographs, statements, and/or other evidence; intentionally created streams may include irrigation and drainage ditches, grass-lined swales, or other artificial watercourses unless they are used by salmonid fish or created for the purpose of stream mitigation.

Cities and counties (in areas that are not incorporated) have jurisdiction over stream buffers, which are regulated through the city's CAOs. Table 2-1 lists the stream buffer widths for the various stream classifications. The City of Redmond has different restrictions in the "inner" and "outer" portions of regulated buffers.

TABLE 2-1
Classification and Buffer Requirements for Streams Located in the Study Area

| Stream Classification System | Stream Type/Class | Stream Buffer Requirements (feet) |
|---|---|---|
| City of Bellevue | Type S | 100 |
| | Type F | 100 |
| | Type N | 50 |
| | Type O | 25 |
| City of Redmond | Class I | 150 (inner), 50 (outer) |
| | Class II | 100 (inner), 50 (outer) |
| | Class III | 100 |
| | Class IV perennial | 36 |
| | Class IV intermittent | 25 |

City of Bellevue Critical Areas Ordinance (2006) (Land Use Code 20.25H.025).
City of Redmond Critical Areas Ordinance (2005)

#### 2.1.2.7 Impact Assessment

Sound Transit evaluated potential impacts of the East Link Project on aquatic resources by overlaying the map of the project design on the habitat characterization map created for the project; including the location and size of storm drain pipes and stormwater treatment/detention ponds. Sound Transit reviewed proposed construction staging areas and construction methods to determine where erosion, dust, and vegetation disturbance/removal would directly or indirectly affect tributaries in the study area. Sound Transit also evaluated reports and assessments of similar projects.

# 2.2 Vegetation and Wildlife Resources

This section describes the objectives of the vegetation and wildlife investigations and the methods used to characterize the vegetation and wildlife habitats within the East Link Project vicinity and to identify potential impacts on those habitats. It includes a discussion of threatened and endangered species, species of concern, and high-value habitats within the vegetation and wildlife study areas.

## 2.2.1 Vegetation and Wildlife Resources Study Objectives

The purpose of the vegetation and wildlife investigations was to describe the ecological resources in the study area and identify and describe potential impacts of the light rail system on them. Objectives included the following:

- Identify important terrestrial habitats and wildlife resources, such as migratory and resident species reported to occupy habitats within and adjacent to the project
- Identify any federal- or state-listed endangered, threatened, or candidate species that may occur within the study area
- Identify suitable habitat for any federal-or state-listed endangered, threatened, or candidate species that may occur within the study area
- Conduct a reconnaissance-level survey of terrestrial habitats to describe plant communities and wildlife habitats within the study area that might be affected by the project
- Describe potential impacts from the project's build alternatives on plant communities and wildlife habitats, including temporary construction impacts and permanent operational impacts
- Propose mitigation measures to avoid, minimize, or compensate for any adverse impacts

## 2.2.2 Vegetation and Wildlife Resources Methods

### 2.2.2.1 Review of Existing Information

Sound Transit obtained and reviewed existing data on study area plant communities, wildlife, and wildlife habitat from several sources, including local, state, and federal agencies. Sound Transit also obtained and reviewed existing maps and aerial photographs of the study area.

General wildlife guides, including Peterson guides to mammals, birds, and butterflies, were used to obtain basic distribution maps and general habitat requirements. More detailed distribution and status information was gathered from gap analysis data from the University of Washington (Smith, et al., 1997), *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001), *Atlas of Oregon Wildlife* (Csuti et al., 1997), and *Ecology and Conservation of the Marbled Murrelet* (Ralph et al., 1995). Wildlife and plant databases were also accessed using internet resources; the NatureServe database (NatureServe, 2007) was one of the primary sources of information for plants and wildlife. Other sites used include the University of Montana's Butterflies and Moths of North America website (2007), the WDNR (2005), and the plant database for the United States Department of Agriculture (2007).

### 2.2.2.2 Identification of Threatened and Endangered Species and Species of Concern

Sound Transit analyzed the likely presence or absence of listed wildlife and plant species based on their known distributions and the presence of suitable habitat within the project vicinity, referred to as high-value habitat in this analysis. This process was also conducted to narrow the list of federally and state-listed species present in each of the project segments.

USFWS was contacted regarding federally listed plants and animals that may occur in the project vicinity. Data regarding the distribution of ESA-protected species were obtained from the USFWS online database (2007c).

Publications and general occurrence and distribution data for rare wildlife and plants were obtained from the WNHP website (2007). WNHP maintains site-specific data regarding rare, endangered, threatened, and sensitive wildlife, plants, and important ecological communities. WNHP publications that were reviewed included the currently updated version of the 1997 *Endangered, Threatened and Sensitive Vascular Plants of Washington* (WNHP, 1997), *Plant Associations in Washington's Puget Trough Ecoregion* (WNHP, 2007a), *Known High-Quality Rare Ecological*

*Communities by (Washington) County* (WNHP, 2007b), and *Washington Herp Atlas* (an online atlas of information on rare amphibians and reptiles) (DNR et al., 2005).

Priority species in Washington include all state endangered, threatened, sensitive, and candidate species, as well as federal endangered, threatened, candidate, and species of concern. State monitor species are not considered priority species but are monitored for status and distribution. They are managed by the WDFW, as needed, to prevent them from becoming endangered, threatened, or sensitive. WDFW maintains several geographic information system (GIS) databases that contain information on priority species in Washington. Sound Transit obtained data regarding rare species and habitats from the WDFW PHS database. In addition to publicly available information, WDFW provided site-specific data regarding the occurrence of rare plant communities, plants, wildlife, and wildlife habitat in the project vicinity in response to a project-specific request for these data. WDFW publications that were reviewed included *Priority Species and Habitats* and several volumes of *Management Recommendations for Washington's Priority Species* (WSFW, 1991).

Further literature reviews were required to determine whether habitat suitable for any state priority or listed species occurred within the project vicinity. This research was necessary because of the nature of PHS wildlife distribution data, which typically are very complete for larger, higher-profile species that are easily monitored and for which there are active monitoring efforts, but are often less comprehensive for lower-profile species.

Sound Transit used additional literature review combined with general habitat determinations for each affected potential habitat area to evaluate habitat suitability and potential presence for all PHS wildlife species occurring and likely occurring within the study area. Species that are not likely to occur in the study area were removed from consideration. Species occurrence in the study area was further assessed based on the habitat requirements of that species, habitats present in the study area, the location of known populations, and whether any historical or recent sightings of that species have occurred in King County. Any species that fit those criteria were added as either known to occur in the study area, likely present (i.e., having known historical or recent sightings and suitable habitat present), possibly occurring (i.e., habitat requirements fulfilled at the site and populations known to occur in the study area), or rare in the study area.

High-value habitats are identified as areas with unique or significant value to many species. These areas are not protected by state regulations. However, WDFW has developed management guidelines for land use activities that may affect high-value habitats. Field investigations were conducted in March and April 2007 to verify any priority species or habitats identified by WDFW and to assess potential impacts on these resources from the East Link Project.

Field investigators also surveyed low- and moderate-value habitats to assess their use to wildlife species, and cumulative impacts within the study area for low- and moderate-value habitats. These habitats might potentially be used by a variety of wildlife species, including priority species, though their expected occurrence is lower than for high-value habitats. Research indicates that low- and moderate-value habitats in an urban setting may still be important for some wildlife as they are often used to meet a specific need or life cycle (Marzluff et al., 2001).

#### 2.2.2.3 Coordination with Agencies and Interest Groups

Local, state, and federal agencies were contacted for information regarding existing site conditions for areas located within the study area. The King County DNR, the King County Parks Department, the City of Bellevue Parks Department, WDFW, and USFWS were contacted for information regarding the presence of sensitive or protected habitats, wildlife, and plant species. Sound Transit met with representatives of the Muckleshoot and Snoqualmie Tribes to discuss their concerns regarding the project.

Robert Schafer from the City of Bellevue Parks and Community Services Department provided a list of special-status and listed species for Mercer Slough (Schafer, 2007). Sharon Claussen of the King County Parks Department provided design maps of the mitigation wetland located in Marymoor Park (Claussen, 2007). Bill Ritchie of WDFW was contacted for additional information regarding the protective buffers for bald eagle (*Haliaeetus leucocephalus*) nests located in the study area (Ritchie, 2007). Cathy Beam from the City of Redmond offered information on the status listing and management of red-tailed hawks and great blue herons within their jurisdictional boundaries (Beam, 2007).

Sound Transit also discussed the East Link Project with interest groups such as Friends of Mercer Slough and Friends of Marymoor Park to obtain additional information about the particular area and potential impacts.

Michael Hobbs from Friends of Marymoor Park provided a detailed history on the two bald eagle nests and the status of the purple martin *(Progne subis)* and osprey *(Pandion haliaetus)* nests at Marymoor Park (Hobbs, 2007a and b). In addition, Don Norman from Norman Wildlife Consulting and Herons Forever provided information regarding the status of the historical heronry on SE Leary Way in Redmond (Norman, 2007a and b).

#### 2.2.2.4 Vegetation Classification, Mapping, and Field Investigations

The system used to classify vegetation types within the study area was based on the accepted vegetation classification system used for Sound Transit's Central Link Project (Sound Transit, 1999), which was developed from the King County Wildlife Habitat Profile (1987). However, there are several differences between the basic characteristics of the vegetation types used for the East Link Project and those described by Sound Transit for the Central Link Project. For the East Link Project, the mapped vegetation types included the following and described in Table 2-2 (for more description, see Section 3.2 of this report):

- Riparian forest
- Urban mostly vegetated – coniferous forest
- Urban mostly vegetated – deciduous forest
- Urban mostly vegetated – mixed forest
- Urban moderately vegetated
- Urban sparsely vegetated
- Blackberry

TABLE 2-2
Vegetation Types and Associated Wildlife Habitat Value for East Link Project

| Vegetation/Habitat Type[a] | Description | Habitat Value |
|---|---|---|
| Riparian forest | Vegetated banks along river and stream edges. Often dominated by willow and red alder. Large big-leaf maple, black cottonwood, and red alder trees might occur. Non-native shrubs (Himalayan blackberry and Scot's broom), grasses, thistles, and other weeds are common. | High |
| Urban mostly vegetated – coniferous forest | Forest patches generally dominated by Douglas-fir with lesser amounts of black cottonwood, big-leaf maple, red alder in the overstory. Occasionally shore pine and red cedar. Canopy cover variable but generally greater than 40 percent. Douglas-fir trees mostly taller than 50 feet. Shrub layer often dominated by Himalayan blackberry but also includes salmonberry, snowberry, salal, Indian plum, rhododendron, and others. Herb layer, when present, includes grasses, sword fern, fringe cup, and nettles. | High |
| Urban mostly vegetated – deciduous forest | Forest patches with black cottonwood, big-leaf maple, red alder (40 to 70 feet tall), and few conifers in the overstory. Canopy cover 40 to 80 percent. Understory tree cover may include big-leaf maple, black cottonwood, red alder, and Pacific madrone. Shrubs similar to those of coniferous forest type. | High |
| Urban mostly vegetated – mixed forest (coniferous/deciduous) | A few small areas with a roughly even mix of deciduous trees and conifers in the overstory. | High |
| Urban moderately vegetated | Dominated by open mowed lawns. Large native and ornamental trees (generally 40 to 70 feet tall) also present. Some patches of ornamental and native shrubs may occur. Tree and shrub canopy cover values generally less than 30 percent. | Moderate |
| Urban sparsely vegetated | Commercial and industrial properties, road rights-of-way, and neighborhoods with a few or small patches of ornamental and native trees and considerable human activities. | Low |
| Blackberry | Areas dominated by blackberry were classified separately from riparian forest because of the much lower habitat value of blackberry-dominated areas. | Low |
| Open water | Highly variable community including saline and fresh waters, deep or shallow waters, rivers, creeks, and large water bodies. | High (except for Lake Bellevue) |

[a] East Link vegetation types adapted from designations developed for the Central Link study area by Sound Transit (1999) from the King County (1987) Wildlife Habitat Profile.
[b] East Link wildlife values were modified from those assigned to the Central Link Project based on field observations.

Other habitat types, such as open waters and wetlands, are also mapped and addressed in other sections of this report. The first four vegetation types (riparian and urban mostly vegetated) are viewed as offering high-value habitat for a variety of wildlife species. For purposes of wildlife habitat, the last three vegetation types (moderately, sparsely, and blackberry vegetation) offer only moderate- or low-value habitat.

There are minor differences between the vegetation types used for East Link and those used for Central Link. For Central Link, Sound Transit described the urban, mostly vegetated type as "dominated by open mowed lawns; large native and ornamental trees (generally 40–70 feet tall); some patches of ornamental and native shrubs may occur" and assigned a high habitat value rating to these areas (Sound Transit, 1999). During the East Link study, however, Sound Transit did not find areas with mowed lawns and enough of an overstory of trees and shrubs to allow the areas to be classified as "mostly vegetated." Identified areas with characteristics approaching this condition were classified instead as urban, moderately vegetated for several reasons. First, Sound Transit mapped smaller polygons for East Link than were mapped for the Central Link analysis. This allowed areas with mowed lawns to be distinguished from areas with a more natural understory or ground cover. Second, and more important, the canopy cover of trees and shrubs described in Sound Transit's 1999 Central Link Project EIS was considerably lower than the canopy cover of more natural areas. These were classified for East Link as urban mostly vegetated—coniferous forest, urban mostly vegetated—deciduous forest, and riparian forest. Most of the areas classified as urban, moderately vegetated for East Link have higher habitat values than those classified by Sound Transit in 1999 because of the location of these areas and their connectivity or association with larger habitat patches.

Wildlife habitat values were not attributed to each occurrence of a vegetation type along the project corridor but instead were assigned to the vegetation type as a whole. Habitat value within a vegetation type at a specific location can vary and depends on several factors, such as size of the area; presence of (or proximity to) other valuable habitat; level and type of human disturbance; diversity of plant species; presence of multiple vegetation layers (i.e., tree, shrub, forb, and emergent layers); presence of threatened, endangered, or sensitive species; and extent of invasive weeds.

Areas within 100 feet of either side of the project alternatives that appeared to provide some level of potential value for wildlife were initially mapped using 1 inch = 200 feet scale color aerial orthophotographs (i.e., aerial photographs adjusted for topography, lens distortion, and camera tilt). Vegetation type polygons were classified and mapped regardless of size or upland/wetland designation. Vegetation type polygons were digitized onto aerial photographs (scaled at 1 inch = 200 feet) for subsequent use in field reconnaissance of the study area.

All vegetation polygons were visited during the field reconnaissance to verify the initial classification. The initial vegetation classification and polygon boundary was modified if needed based on the field review.

#### 2.2.2.5 General Wildlife Habitat Value

Aerial photographs were used to locate all forested areas, which Sound Transit then assessed for plant diversity, plant density, and signs of wildlife use. Each of the urban mostly vegetated types (coniferous forest, deciduous forest, and mixed forest) and riparian forest polygons were assessed in the field by two biologists. A qualitative wildlife habitat functional value assessment form was adapted from the Washington State Department of Transportation (WSDOT) *Wetland Functions Characterization Tool for Linear Projects* (WSDOT, 2000) for use in evaluating general wildlife habitat value in the study area. The template for the data form is provided in Appendix B, and completed forms are available upon request. The qualitative functional value form assessed factors such as the following:

- Relative vegetation density, age, and growth form, and species and structural diversity
- Dominant plant species composition
- Location relative to sources of human disturbance
- General levels of development in the vicinity of the site
- Connectivity to other areas of valuable wildlife habitat
- Presence of movement barriers
- Presence of water and, if present, water type
- Specific factors affecting the potential habitat value for amphibians, mammals, and birds

These qualitative wildlife habitat assessment forms were not completed for wetlands because a separate wetland functional assessment form was used for those areas (see Section 2.3, Wetland Resources). The results of the wetland delineation and wetland functional assessment were used to identify important wildlife habitats of wetlands. These data were used to supplement information received from WNHP and WDFW, which covered both upland and wetland species.

#### 2.2.2.6 Impact Analysis

**Vegetation and Habitat**

Expected impacts from project construction and operations on vegetation and wildlife habitat were determined by evaluating the acreage of major vegetation types that would be directly or indirectly impacted by the alternatives.

**Wildlife**

Sound Transit assessed impacts on wildlife using several approaches, including quantitative and qualitative methods, and measured direct habitat loss based on the extent of impacts to various plant communities. The qualitative assessment was accomplished based on factors, such as the regional significance of the habitat, its value (such as a site's role as a wildlife movement corridor), the degree of fragmentation and loss of the habitat following project implementation, overall habitat quality, and the potential for enhancing or restoring unique plant communities or wildlife habitat or connectivity.

Temporary construction and permanent operational impacts on wildlife, including disturbances from increases in human access, noise, light, and habitat fragmentation, were also evaluated. Information presented by the USFWS regarding the impacts of noise on wildlife was used to assist in this aspect of the analysis (USFWS, 2007a). The potential for the introduction and/or removal of noxious and/or invasive species invasions because of the project were also evaluated. Impacts on rare species were assessed by considering both direct habitat loss and indirect impacts from habitat loss and human disturbance.

A program called VIEWSHED GIS was used to determine potential impacts on bald eagles. The program predicts whether project construction activities occurring with the one-half-mile nest buffer could be seen from each of the eagle nest sites. Recorded features include the presence of large hills or open areas and the position of the nest or roost in the landscape. The program also considers topographic features to conduct the analysis. When the required data are gathered, viewsheds are created using the VIEWSHED GIS software. These viewsheds show the lands within one-half mile that are visible from each bald eagle nest or roost. Potential impacts are assessed based on distances between bald eagle nests or roosts and construction areas and whether there is an unobstructed line-of-sight between the nest or roost and construction areas.

## 2.3 Wetland Resources

### 2.3.1 Wetland Resources Study Objectives

Earlier project reconnaissance findings show that wetlands are located within the construction limits for several project alternatives. As a result, specific objectives of this analysis include the following:

- Catalog the existing conditions of the wetlands and wetland buffers located within 200 feet of either side of the proposed project alternatives.
- Determine each project alternative's temporary construction and permanent operational impacts on wetlands.
- Describe measures to avoid, minimize, or compensate for impacts.

### 2.3.2 Wetland Resources Methods

Wetlands were identified through existing mapping inventories and published documents, field evaluations, and communications from various agencies. Federal, state, and local regulations were referred to assist in classifying and rating wetlands and to confirm project compliance with existing laws.

#### 2.3.2.1 Review of Existing Information

Existing wetland data were gathered from a variety of sources—including federal, state, and local agencies—reviewed in the office, and then evaluated in the field. Existing digital GIS information was obtained from the

Cities of Bellevue and Redmond, and the USFWS National Wetlands Inventory (NWI). The NWI database was the primary wetland mapping tool used.

#### 2.3.2.2 Agency Coordination

During this review, several state and local agencies were contacted. The Cities of Bellevue and Redmond were contacted regarding their wetland map inventories. WSDOT was contacted for permission to access the Mercer Slough wetlands along the Interstate 90 (I-90) overpass and for information regarding the wetland existing on the old WSDOT property adjacent to 118th Avenue SE in Bellevue. The King County Parks Department was contacted for information regarding the Marymoor Park mitigation wetland. Construction plans for the mitigation wetland were obtained and permission granted for accessing the site for evaluation.

#### 2.3.2.3 Wetland Determination

General field reconnaissance work was completed in February and March 2007 for the East Link Project using aerial photographs from 2005. The aerial photographs were at a scale of 1:24,000 (1 inch = 200 feet) and were used to evaluate existing mapped wetlands and to help pinpoint potential sensitive areas that were not included in any of the wetland maps or inventories. To determine whether wetlands were present, potential existing wetland data were plotted onto the aerial photograph map books created for the project, and the East Link Project alternatives were then added to the map books with 100-foot boundaries from the centerline. The boundary widths were placed on either side of the centerline to expand the study area in case the centerlines were shifted or adjusted along their route. In addition, Sound Transit examined an additional 200 feet on either side of the project alternatives to locate any additional wetland resources that might have been omitted from the existing wetland inventories and maps and that might have included buffers that intersect the study area.

The *2004 Washington State Wetland Rating System for Western Washington Manual* (Ecology publication #04-06-025) (Hruby, 2004) was used to determine the presence, class, and category of wetlands in the study area. For the Draft EIS, reconnaissance-level wetland assessments were completed for all alternative routes. Formal wetland delineation was conducted in 2009 for the *Preferred Alternative* routes identified as part of the Final EIS. Using the Ecology manual, each of the potential wetland sites was evaluated for the presence or absence of hydric soils, the dominance of hydrophytic vegetation, and the presence or absence of wetland hydrology. A discussion of these three wetland criteria is included in the methodology sections below. Once the sites were visited, if they were classified as wetlands, they were added into the project database and identified on project maps.

##### Soils

To help locate potentially missed wetland sites, Sound Transit used data obtained from the USDA Natural Resources Conservation Service (2008) and from King County (King County GIS Data, 2007)) to create 1:2,400 mapbooks that show the different soil boundaries and soil types within the study area. Before entering a site, the mapped soil types were verified to be either hydric or nonhydric soils. This information was especially useful for areas in the City of Bellevue and Bel-Red corridor area because access to several properties was not allowed. Wetland soil determinations were based on existing soil classification for the following known wetland complexes: Bear Creek (WR-12), West Tributary to Kelsey Creek Ponded (WR-7), West Tributary to Kelsey Creek Riparian (WR-8NW, WR-8N, and WR-8SE), 118th Avenue SE (WR-5), and Mercer Slough/I-90 (WR-4) wetlands.

In areas where property access was allowed, Sound Transit dug 16-inch-deep soil pits to view the soil profile. Soil matrix color was noted using a Munsell Soil Color Chart (Greytag Macbeth, 2000). Matrix texture was also noted. Within the upper 12 inches of the soil profile, soils were only considered wetland soils if the soil chroma had a value of 2 or lower with redoximorphic features on the Munsell Soil Color Chart, or with a value of 1 or lower without such features. If redoximorphic features were present in the soil, the color, size, abundance, and texture were noted. Soil pits were dug in 8 of the 13 wetlands located within the study area. Soil pits were not dug in the other wetlands because access restrictions were not resolved at the time of the Draft and/or Final EIS. Wetland data at the WSDOT property located east of 118th Avenue SE were obtained from the *I-405 Bellevue Nickel Improvement Project Wetlands Discipline Report* (WSDOT, 2006).

##### Vegetation

Plant communities were evaluated in February and March 2007 to determine the presence and dominance of hydrophytic vegetation. Deciduous and herbaceous species were still dormant during this time of year, so dormant shrubs and trees were identified by bark, branch growth patterns, and fallen leaves around the base of the plant. Herbaceous vegetation was identified by last year's growth, which was still evident on most species.

Hydrophytic vegetation exists when more than 50 percent of the dominant plants in each strata (i.e., tree layer, shrub layer, and/or herb layer) are either obligate, facultative wetland, or facultative indicator plants (Table 2-3). Wetland indicator status was determined using the 1996 *National List of Vascular Plant Species That Occur in Wetlands* (Reed, 1988).

TABLE 2-3
Wetland Plant Indicator Status

| Indicator Status | Indicator Symbol | Wetland Definition |
|---|---|---|
| Obligate Wetland Plants | OBL | Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions, but which might also occur rarely (estimated <1%) in nonwetlands |
| Facultative Wetland Plants | FACW | Plants that occur usually (estimated probability >67 to 99%) in wetlands, but which also occur (estimated probability 1 to 33%) in nonwetlands |
| Facultative Plants | FAC | Plants with a similar likelihood (estimated probability33 to 67%) of occurring in wetlands and nonwetlands |
| Facultative Upland Plants | FACU | Plants that occur sometimes (estimated probability 1 to <33%) in wetlands, but which occur more often (estimated probability >67 to 99%) in nonwetlands |
| Obligate Upland Plants | UPL | Plants that occur rarely (estimated probability <1%) in wetlands, but occur almost always (estimated probability >99%) in nonwetlands under natural conditions |

Source: Reed, 1988

### Hydrology

The hydrology of each site was also evaluated during February and March 2007. Signs of water were followed toward their sources. Indicators of wetland hydrology, including water-stained vegetation and debris dams, were noted. Aerial maps were used to determine the water sources and where to extend the search.

### 2.3.2.4 Wetland Functions and Classification

Wetlands were classified following federal and state guidelines. The Cowardin system (Cowardin et al., 1979) was used to define and describe the vegetation characteristics of wetlands in the study area (Table 2-4). In addition, the Hydrogeomorphic Classification (HGM) (Brinson, 1993) for each wetland was ascertained using guidance found in the *Washington State Wetland Rating System for Western Washington Revised* (Hruby, 2004). The HGM classification system breaks wetlands down into categories based on their hydrodynamics, hydrologic source, and geographic setting (such as depressional, riverine, or slope).

TABLE 2-4
Cowardin Classifications of Wetlands Located within the East Link Study Area

| Cowardin Classification | Definition |
|---|---|
| Palustrine Emergent (PEM) | Vegetation standing in a few inches to 3 feet of water. PEM are dominated by erect, rooted herbaceous freshwater hydrophytic vegetation. |
| Palustrine Scrub-Shrub (PSS) | Areas dominated by woody vegetation <6 meters (20 feet) tall. Woody shrub component consisting of shrubs and small trees. |
| Palustrine Forested (PFO) | Areas dominated by woody vegetation >6 meters (20 feet) tall. |

Ecology's *Rating System for Western Washington* (Hruby, 2004) as adopted by local CAOs was used to determine the category of each wetland based on functional capabilities. Higher quality functions result in higher ratings, with Category 1 being the highest functioning wetlands and Category 4 the lowest. Wetland-buffer width varies with a given wetland category, which also varies with the specific jurisdiction (Table 2-5). Wetland buffers are not given their own category but are associated with the category of wetland they abut.

TABLE 2-5
Wetland Categories and Buffer Requirements for Wetlands Located in the East Link Study Area

| Classification System | Wetland Category | Buffer Requirements[a,b] |
|---|---|---|
| City of Bellevue[b] | Category 1:<br>Category 2:<br>Category 3:<br>Category 4: | 75 – 225 feet<br>75 – 225 feet<br>60 – 110 feet<br>40 feet with no setback |
| City of Redmond [c] | Category 1:<br>Category 2:<br>Category 3:<br>Category 4: | 75 – 300 feet<br>75 – 300 feet<br>60 – 150 feet<br>40 – 50 feet |

[a] Variations in buffer width are due to functional scores and other criteria for each jurisdiction. Similarly, variations in mitigation ratios are based upon the type of mitigation offered (e.g., creation, restoration, re-establishment) and the Cowardin class affected.
[b] All Category 1, 2, and 3 Wetlands in Bellevue have a 20-foot setback that prohibits placement of any structure within 20 feet of the wetland boundary.
[c] The impact of adjacent land use anywhere in the City of Redmond is at least moderate, so the narrowest possible buffers shown in the City of Redmond CAO would not apply.

Wetland buffers were added to mapped wetlands and shown on aerial maps to display the total wetland footprint (including both wetland and buffer) occurring within the construction limits of each project alternative. In some cases, existing buildings, parking lots, and roads within wetland buffer areas reduced buffer widths.

#### 2.3.2.5 Wetland Functional Assessment

The functions and values that exist in each wetland and their level of performance were evaluated during site visits. The presence and quality of functions provided by each wetland resource were assessed using the *Washington State Wetland Rating System for Western Washington Revised* (Hruby, 2006). The rating system defines three main wetland functional categories (i.e., hydrologic, water quality, and habitat). The wetland rating scores for each function group can be converted into general groups (low, moderate, or high) according to the *Focus Sheet: Using the Wetland Rating System in Compensatory Mitigation* (Ecology, 2008).

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*Chapter 3*

# Affected Environment

The East Link Project would be constructed in a generally urban area with variable levels of existing human activity. Portions of the project would be constructed in highly urbanized cities such as Seattle, Bellevue, and Redmond or along heavily traveled highways, including I-90, I-405, and State Route (SR) 520. This chapter describes the affected environments for aquatic resources (Section 3.1), vegetation and wildlife resources (Section 3.2), and wetland resources (Section 3.3).

## 3.1 Aquatic Resources

The East Link Project would be constructed in an urban area that has already experienced a moderate to high degree of alteration to aquatic habitats. The degree of alteration varies from water body to water body, with the greatest alteration occurring where urban development is the greatest, such as some of the tributaries to Kelsey Creek and Sturtevant Creek in Bellevue. Some of the smaller streams and headwater reaches have been placed in long pipe systems. The least-altered stream in the study area is Bear Creek in Redmond. However, recent development in that watershed has been extensive.

### 3.1.1 Drainage System Configuration

The Lake Washington Watershed (i.e., WRIA 8) is composed of two major subbasins: the Sammamish River and the Cedar River. Table 3-1 lists the water bodies that would be potentially affected by the East Link Project. The Kelsey Creek system, the primary watershed with associated potential impacts from the project, is located in Segments B, C, and D. Exhibit 3-1 shows the water bodies in and around the study area.

### 3.1.2 Fish and Other Aquatic Species and Habitat

This section describes the aquatic species and habitat in the study area by segment. Exhibits 3-2 through 3-5 show streams and fish passage features along and nearby Segments B through E, respectively, within each related segment subsection in this chapter. (This results in some exhibits appearing out of sequence in this section.)

#### 3.1.2.1 Segment A

Lake Washington is the second largest lake in Washington, with a surface area of 22,138 acres. The lake lies at an elevation of 22 feet. The lake is about 20 miles long, averages about 1.5 miles wide, and is oriented in a north-south direction. The maximum depth is 214 feet. The major sources of water that enter the lake are the Cedar River (55 percent of the average inflow) and the Sammamish River (27 percent of the average inflow). The remainder of inflow comes from May Creek, Kelsey Creek, Juanita Creek, Thornton Creek, Lyon Creek, and other, smaller creeks. The lake drains to Puget Sound through the Lake Washington Ship Canal, an artificial waterway constructed in 1916. The ship canal was built to allow ship traffic to access freshwater moorage in Lake Union and Lake Washington via the Hiram Chittenden (Ballard) Locks, which were built at the same time as the ship canal.

Many species of resident fish, both native and introduced, inhabit Lake Washington (Table 3-2). Several species of introduced fish are very abundant, such as yellow perch (*Perca flavescens*) and smallmouth bass (*Micropterus dolomeiui*). Many of these species were introduced when the live fish exhibit at the 1909 Alaska-Yukon-Pacific Exposition was released into Lake Washington. These include tench (*Tinca tinca*) and common carp *(Cyprinus carpio)*, both native to Europe.

TABLE 3-1
Description of Water Bodies Potentially Affected by the East Link Project

| Water Body | Alternatives Crossing or Adjacent to Water Body[a] | WRIA Number | King County Class | WDNR Class | Local CAO Stream Class or Type and Buffer Width (ft) | Stream Length (miles) | Drainage Area (square miles) | Comments |
|---|---|---|---|---|---|---|---|---|
| **Cedar River Subbasin** | | | | | | | | |
| Lake Washington | *Preferred A1* | 8 | 1 | S | NA: | NA | 692 | A regionally important lake and designated as a Shoreline of Statewide Significance. |
| Mercer Slough | *Preferred B2M*, B1, B2A, B2E, B3, B3 Design Option, B7 | 8-0059 | 1 | S | Class Type S: Buffer: 100 | 1.2 | 2.1 | Chinook gather at the mouth of Mercer Slough under the I-90 crossing. All salmonids destined for Kelsey Creek pass through Mercer Slough. Designated as a Shoreline of Statewide Significance. |
| Mercer Slough West | *Preferred B2M*, B1, B3, B3 Design Option, B2A, B2E | 8-0059 | 1 | S | Type F: Buffer: 100 | 1.2 | 2.1 | Western channel between 112th Avenue SE and Bellefield Office Park. Designated as a Shoreline of Statewide Significance. |
| Sturtevant Creek | B3 Design Option, *Preferred C11A, C9T,* C1T, C2T, C3T, C4A, C7E, C8E, C9A, C14E | 8-0262 | 2 | F | Type: F Buffer: 100 | 1.0 | 1.2 | Urbanized area results in rapidly fluctuating flow regimes. |
| Kelsey Creek | B7 | 8-0259 | 2 | F | Type: F Buffer: 100 | 8.6 | 11.4 | The largest stream in Bellevue. This is an urban stream of regional significance due to high presence of Chinook. |
| West Tributary to Kelsey Creek | *Preferred D2A*, D2E, D3, D5 | 8-0264 | 2 | F | Type: N Buffer: 50 | 2.8 | 1.6 | Pacific giant salamander documented. Urbanized area results in rapidly fluctuating flow regimes. Impassable culvert at Bel-Red Road, below the project study area. |
| Goff Creek | *Preferred D2A*, D2E, D3, D5, MF3 | None | 2 | F | Type: F Buffer: 100 | 1.5 | 1.1 | Impassable culvert at Bel-Red Road, below the project study area. Urbanized area results in rapidly fluctuating flow regimes. |
| Unnamed Tributary to Kelsey Creek | *Preferred D2A*, D2E, D3 | None | 3 | Ns | Type: O Buffer: 25 | Unk | Unk | Very small, intermittent. Urbanized area results in rapidly fluctuating flow regimes. Impassable culvert at Bel-Red Road, below the project study area. |
| Valley Creek | *Preferred D2A*, D2E, D3, D5 | 8-0266 | 2 | F | Type: F Buffer: 100 | 2.5 | 2.2 | Urbanized area results in rapidly fluctuating flow regimes. |

TABLE 3-1 CONTINUED
Description of Water Bodies Potentially Affected by the East Link Project

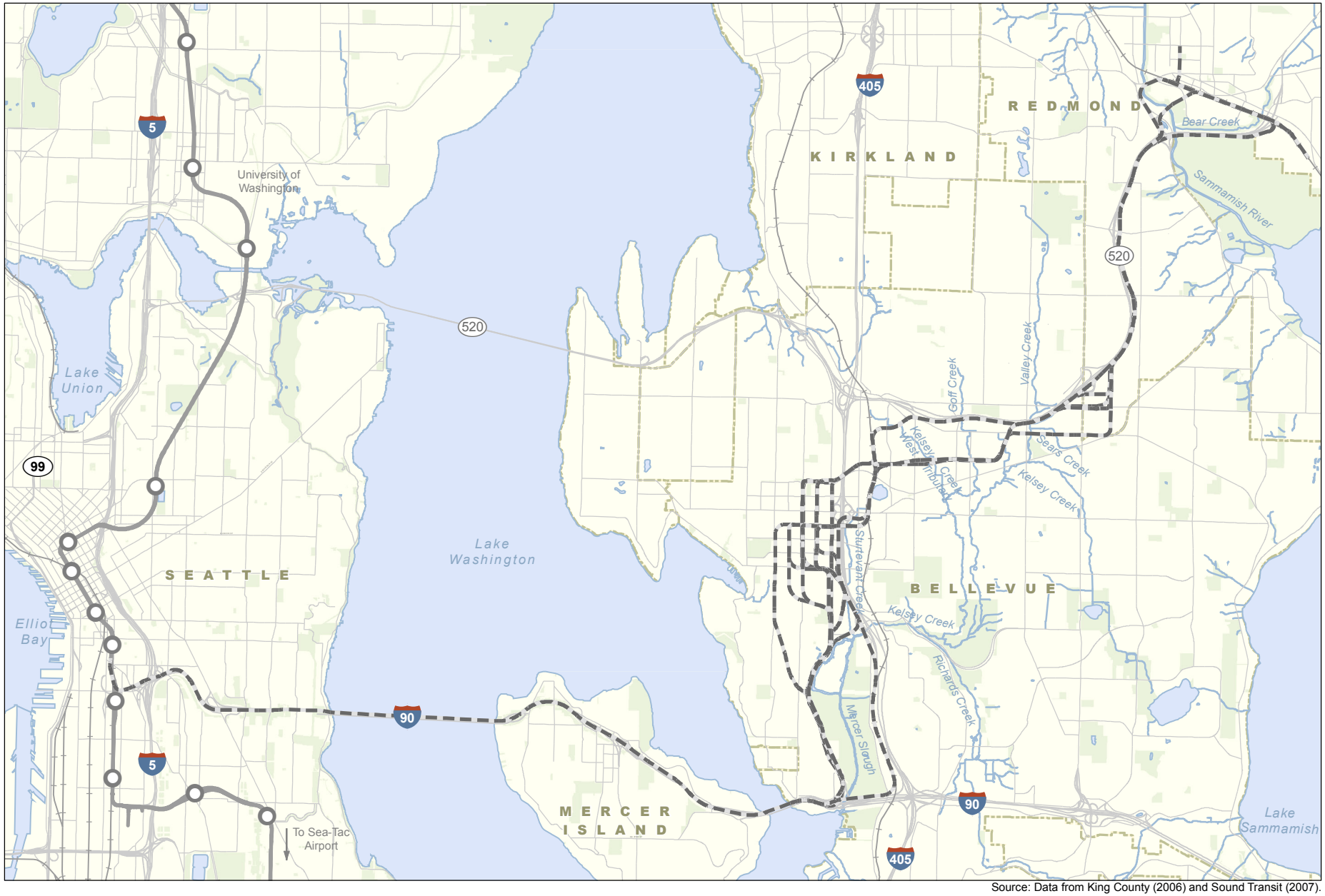
| Water Body | Alternatives Crossing or Adjacent to Water Body[a] | WRIA Number | King County Class | WDNR Class | Local CAO Stream Class or Type and Buffer Width (ft) | Stream Length (miles) | Drainage Area (square miles) | Comments |
|---|---|---|---|---|---|---|---|---|
| Sears Creek | D3 | 8-0267 | 2 | F | Type: F<br>Buffer: 100 | 0.6 | 0.9 | Most of drainage is piped. Urbanized area results in rapidly fluctuating flow regimes. |
| **Sammamish River Subbasin** | | | | | | | | |
| Sammamish River | *Preferred E2*, E1, E4 | 8-0057 | 1 | S | Class: I<br>Buffer: 150 | 13.8 | 240 | All salmonids destined for Bear and Issaquah creeks pass through the Sammamish River. |
| Bear Creek | *Preferred E2*, E1, E4 | 8-0105 | 1 | S | Class: I<br>Buffer: 150 | | 50 | Identified as one of the top six natural resource drainages in King County. Designated as a Shoreline of Statewide Significance. |

Note: Alternatives not listed would not affect any water bodies.

[a] Alternative names:
*Preferred A1 = I-90*
*Preferred B2M = 112th SE Modified*
B1 = Bellevue Way
B2A = 112th SE At-Grade
B2E = 112th SE Elevated
B3 = 112th SE Bypass
B3 Design Option = 114th Extension Design Option
B7 = BNSF
C11A = *Preferred 108th NE At-Grade*
*C9T = Preferred 110th NE Tunnel*
C1T = Bellevue Way Tunnel
C2T = 106th NE Tunnel
C3T = 108th NE Tunnel
C4A = At-Grade Couplet
C7E = 112th NE Elevated
C8E = 110th NE Elevated
C9A = 110th NE At-Grade
C14E = 114th NE Elevated
*Preferred D2A = NE 16th At-Grade*
D2E = NE 16th Elevated
D3 = NE 20th
D5 = SR 520
*Preferred E2 = Marymoor*
E1 = Redmond Way
E4 = Leary Way
MF3 = Maintenance Facility 3

Five species of anadromous salmonids are resident to the Lake Washington Watershed (sockeye, Chinook, coho, steelhead, and sea-run cutthroat trout). Table 3-3 lists the species present and their stock status. Anadromous fish are those species that begin their life in freshwater, migrate to the ocean to rear, and then return to freshwater as adults to spawn. The most abundant of these is sockeye salmon (*Oncorhynchus nerka*). Sockeye is the only species to rear in the lake for a whole year as juveniles. Sockeye enter the lake as adults starting in June and remain until September, when temperatures drop in the tributary streams where they spawn. The primary spawning areas are in the Cedar River, Issaquah Creek, and Bear Creek, but substantial numbers also use nearly all of the larger tributary streams, including Kelsey Creek. Juveniles enter the lake as fry during late winter and early spring, and most rear in the lake for one year. Sockeye smolts leave the lake in spring to enter Puget Sound, and then migrate to the open ocean. A resident form of sockeye, called Kokanee, does not migrate out to sea but remains in fresh water throughout its life cycle.

Adult spawner Chinook salmon (*Oncorhynchus tshawytscha*) enter Lake Washington from early July through the end of October. Their residence time in the lake is thought to be relatively brief, although the early-arriving fish may linger if tributary temperatures are too high. When tributary temperatures drop in fall, Chinook migrate up into the tributary streams and rivers to spawn. There is a major hatchery program for Chinook at the Issaquah Creek hatchery and a smaller program at the University of Washington. All Chinook in the Lake Washington system are "ocean-type," meaning they rear in freshwater as juveniles for only 3 to 6 months. There are two juvenile life-history variants in the population. One variant enters the lake as fry and rears in the lake until late spring/early summer before entering Puget Sound. The second variant rears in streams until late spring/early summer before migrating into and through the lake and out to sea. This second, and most common, variant does not spend much time in the lake.

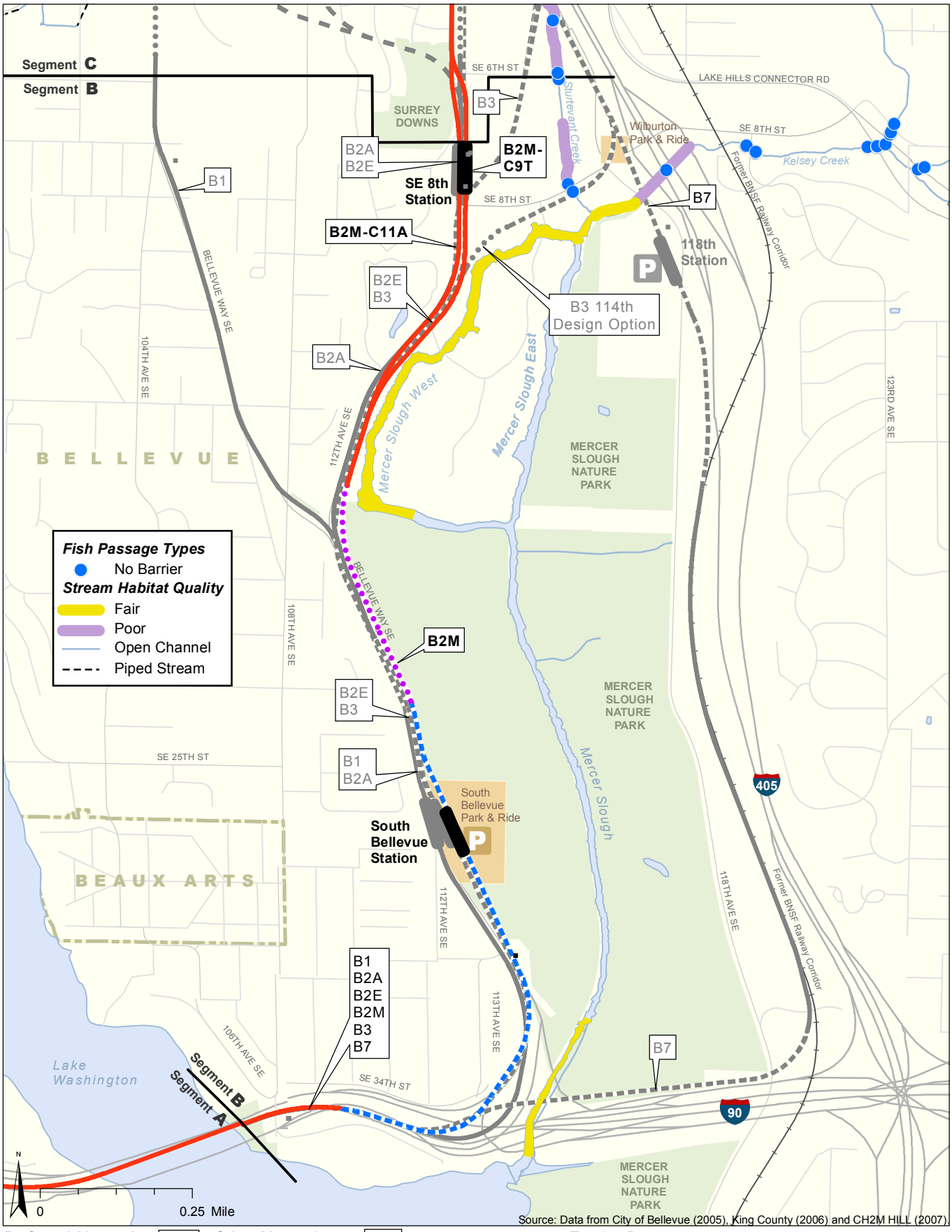



Source: Data from King County (2006) and Sound Transit (2007).

Stream
East Link Alternative
Central Link Alignment and Station
City Limits

N
0 1 Miles

Exhibit 3-1
**Waterbody Features**
**Segments A, B, C, D, and E**
*East Link Project*




Source: Data from City of Bellevue (2005), King County (2006) and CH2M HILL (2007).

**Preferred Alternative** B2M
- At-Grade Route
- Elevated Route
- Retained-Cut Route
- Retained-Fill Route
- Tunnel Route

**Other Alternatives** B2A
- At-Grade Route
- Elevated Route
- Retained-Cut or Retained-Fill Route
- Tunnel Route

- Traction Power Substation
- Proposed Station
- New and/or Expanded Park-and-Ride Lot

Exhibit 3-2 **Streams and Fish Passage Features Segment B**
*East Link Project*

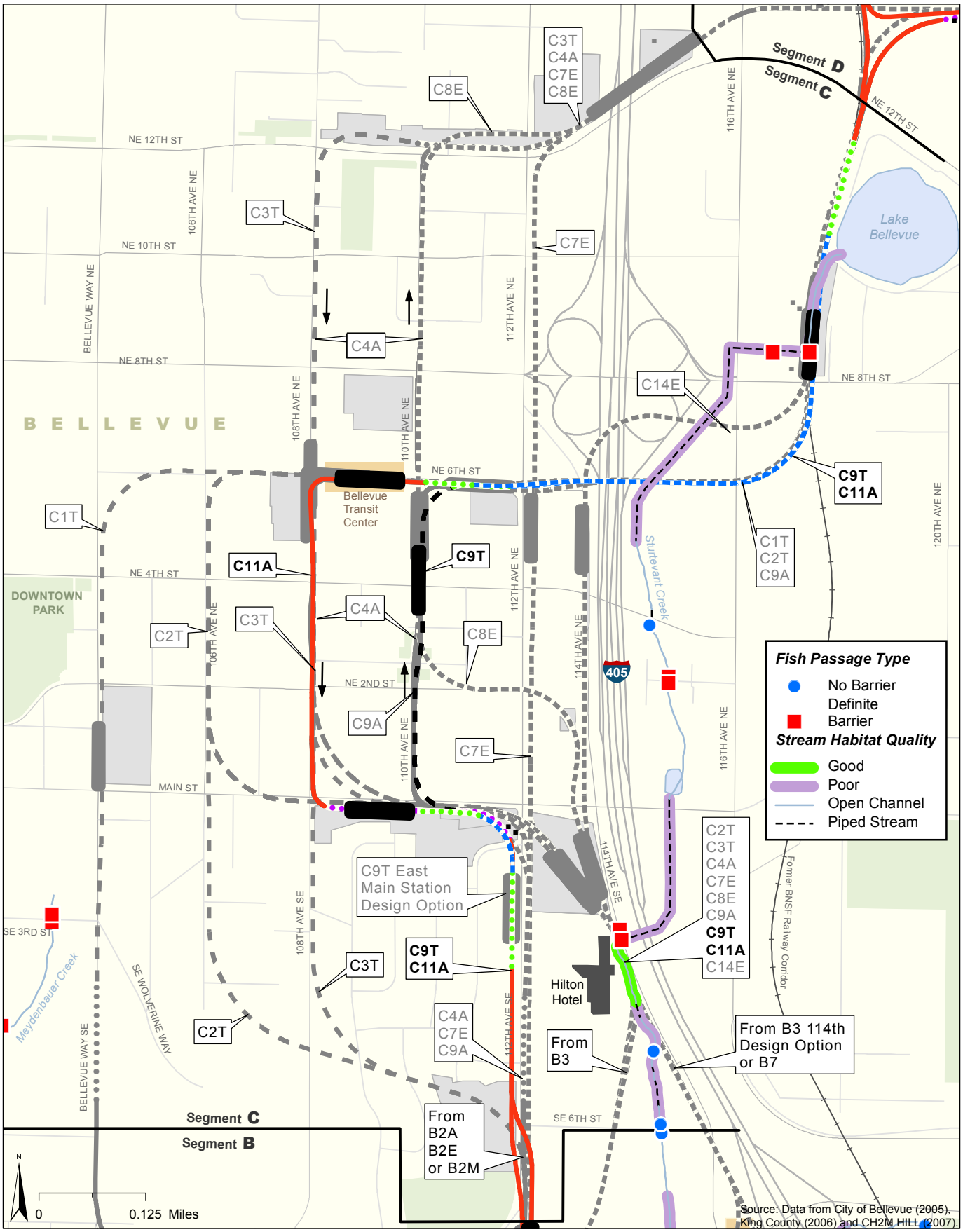



Exhibit 3-3 **Streams and Fish Passage Features Segment C**
*East Link Project*

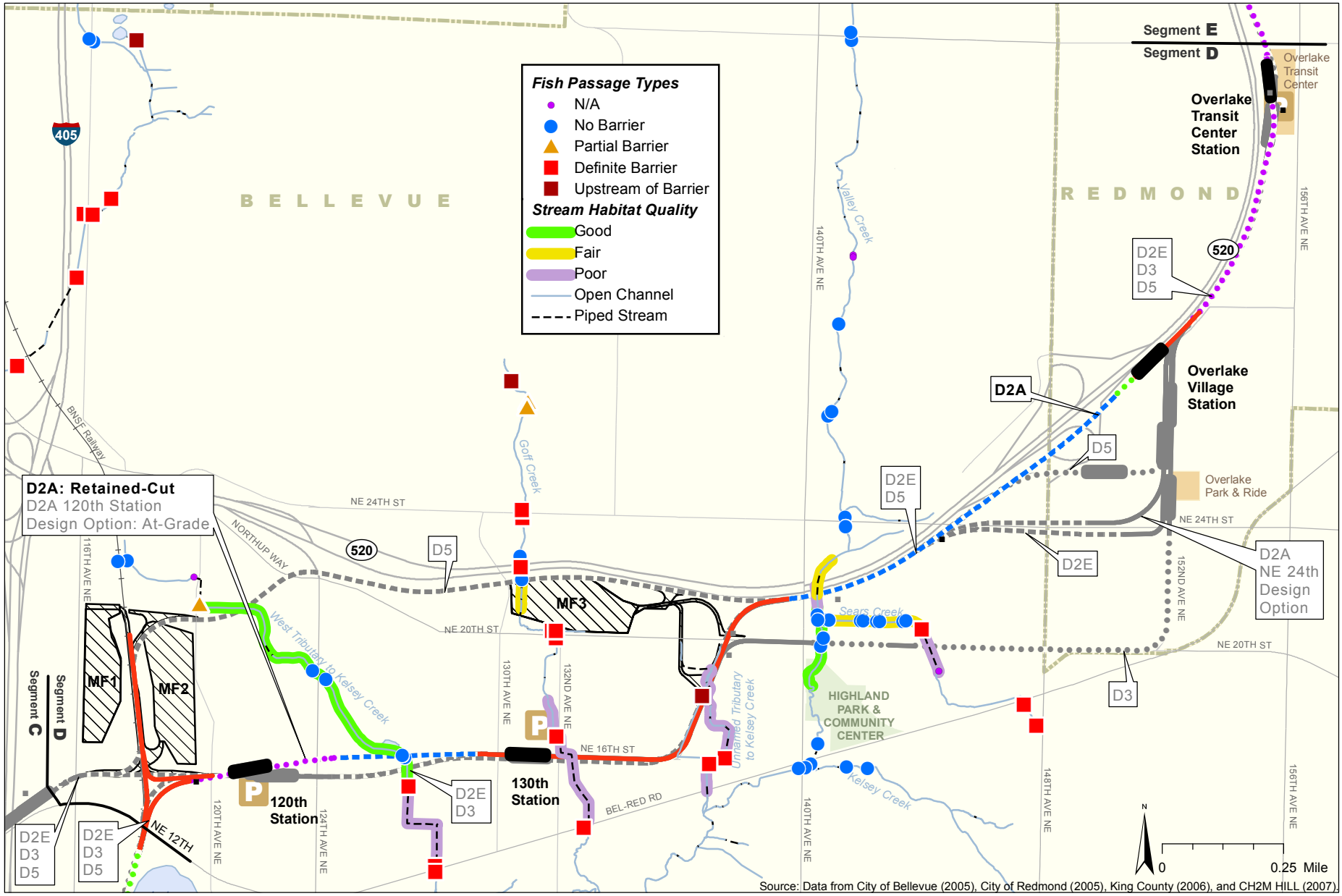
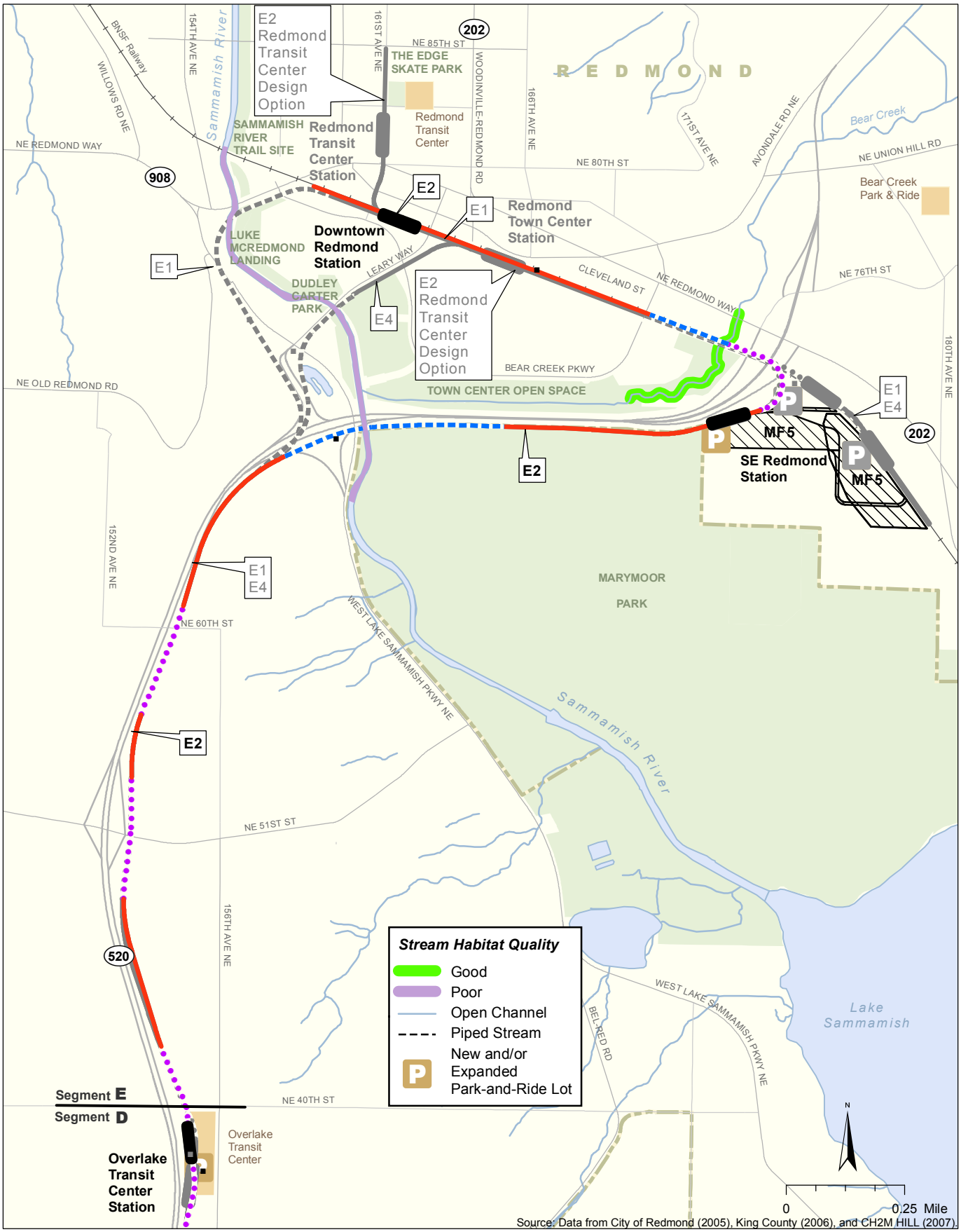



Exhibit 3-4 **Streams and Fish Passage Features Segment D**
*East Link Project*




Source: Data from City of Redmond (2005), King County (2006), and CH2M HILL (2007).

***Preferred Alternative***
- At-Grade Route (E2)
- Elevated Route
- Retained-Cut Route
- Retained-Fill Route
- Tunnel Route

***Other Alternatives***
- At-Grade Route (E1)
- Elevated Route
- Retained-Cut or Retained-Fill Route
- Tunnel Route

- Traction Power Substation
- Proposed Station
- Maintenance Facility and Access Track

Exhibit 3-5 **Streams and Fish Passage Features Segment E**
*East Link Project*

TABLE 3-2
Resident Fish Species Found in Lake Washington

| Common Name | Scientific Name | Resident Fish Status |
|---|---|---|
| Kokanee salmon | *Oncorhynchus nerka* | Native |
| Cutthroat trout | *Oncorhynchus clarki* | Native |
| Rainbow trout | *Oncorhynchus mykiss* | Native |
| Northern pikeminnow | *Ptychocheilus oregonensis* | Native |
| Rocky Mountain whitefish | *Prosopium williamsoni* | Native |
| Peamouth | *Mylocheilus caurinus* | Native |
| Large-scale sucker | *Catostomus macrocheilus* | Native |
| Coast range sculpin | *Cottus aleuticus* | Native |
| Prickly sculpin | *Cottus asper* | Native |
| Riffle sculpin | *Cottus gulosus* | Native |
| Three-spined stickleback | *Gasterosteus aculeatus* | Native |
| Longfin smelt | *Spirinchus thaleichthys* | Native |
| Pacific lamprey | *Entosphenus tridentatus* | Native |
| Brook lamprey | *Lampetra planeria* | Native |
| River lamprey | *Lampetra fluviatilis* | Native |
| Redside shiner | *Richardsonius balteatus* | Native |
| Largemouth bass | *Micropterus salmoides* | Introduced (non-native) |
| Smallmouth bass | *Micropterus dolomeiui* | Introduced (non-native) |
| Yellow perch | *Perca flavescens* | Introduced (non-native) |
| Common carp | *Cyprinus carpio* | Introduced (non-native) |
| Brown bullhead | *Ictalurus nebulosus* | Introduced (non-native) |
| Black crappie | *Pomoxis nigromaculatus* | Introduced (non-native) |
| White crappie | *Pomoxis annularis* | Introduced (non-native) |
| Bluegill | *Lepomis macrocheilus* | Introduced (non-native) |
| Tench | *Tinca tinca* | Introduced (non-native) |
| Atlantic salmon | *Salmo salar* | Introduced (non-native) |
| Goldfish | *Carassius auratus* | Introduced (non-native) |
| Pumpkinseed sunfish | *Lepomis gibbosus* | Introduced (non-native) |

Source: Pfeifer and Bradbury, 1992.

TABLE 3-3
Summary of Stock Status in Lake Washington Watershed: Anadromous Salmonids

| Species | Stock[a] | Stock Status | Stock Origin | Escapement Range[b] | Escapement Average | Production Notes |
|---|---|---|---|---|---|---|
| Summer/fall Chinook | Issaquah | Healthy | Non-native | 500 – 5,000 | 2,000 | Composite production[c] |
| Summer/fall Chinook | Cedar River | Unknown | Native | 600 – 4,300 | 1,900 | Wild production |
| Sockeye | Lake Washington | Healthy | Non-native | 76,000 – 625,000 | 275,000 | Wild production |
| Coho | Lake Washington/ Sammamish tributaries | Depressed | Mixed | Unknown | Unknown | Composite production[c] |
| Coho | Cedar River | Healthy | Mixed | Unknown | Unknown | Wild production |
| Steelhead | Lake Washington Basin | Depressed | Mixed | 470 – 1,820 | Unknown | Composite production |
| Cutthroat trout | Lake Washington Basin | Healthy | Native | Unknown | Unknown | Wild production |

Source: WDFW et al. (1992); Kerwin (2001)
[a] A stock is an interbreeding population.
[b] Escapement = Number of fish that make it to the spawning grounds.
[c] Composite production: Hatchery plus wild production. Hatchery production is at the WDFW hatchery in Issaquah and to a lesser degree at the University of Washington hatchery.

Adult spawner coho (*Oncorhynchus kisutch*) begin entering Lake Washington around mid-August and continue through the end of January. Their residence time is variable. Spawning occurs in nearly all tributaries, including Bear Creek, Kelsey Creek, and Kelsey Creek tributaries. Juveniles enter the lake in April and May on their way out of the system after rearing in streams for 1.5 years. A few juveniles are thought to rear in the lake as well. A large number of coho are produced at the WDFW salmon hatchery in Issaquah, but most coho in the system are from natural production.

Steelhead and resident rainbow trout *(Oncorhynchus mykiss)* are present in the Lake Washington system but are not abundant. Adult spawner steelhead enter the lake starting in December and continue to enter the lake until April. They spawn in late winter and spring in tributary streams and rivers, including Bear Creek. Wild juvenile steelhead rear in tributaries for two years. Hatchery steelhead reared in the Issaquah hatchery rear for one year. Steelhead smolts move into Lake Washington from tributary streams in April on their way out of the system. They stay in the lake for a month or two, migrating out before mid-June (Kerwin, 2001). Resident rainbow trout are present in the lake all year long.

Coastal cutthroat trout in both resident and anadromous forms are present in Lake Washington in moderate abundance. Resident fish are present in the lake all year long. Sea-run cutthroat enter the lake in late winter and early spring to spawn in spring in tributary streams. Juveniles return to the lake at one to two years of age. The resident fish stay, and the anadromous smolts migrate out later in spring and early summer to rear in Puget Sound. Resident cutthroat trout are found in the smallest streams that can support salmonids.

Bull trout (*Salvelinus confluentus*) have been observed entering Lake Washington through the fish ladder viewing area at the locks, where every year, one or two fish are seen traveling into the lake. Many researchers believe that these fish are seasonal transient strays (i.e., not residents) rather than fish produced within the system. However, the USFWS assumes for regulatory purposes that natural production is possible in the system.

#### 3.1.2.2 Segment B

Exhibit 3-2 shows the streams and fish passage features in Segment B. The primary features are discussed in the following subsections.

## Mercer Slough

Mercer Slough is a remnant of a much larger embayment that was left after Lake Washington was drawn down 10 feet when the Montlake Cut connection between Lake Washington and Lake Union was established in 1916. Exhibit 3-2 shows the current location and extent of the slough. The Mercer Slough Nature Park (which contains most of the Mercer Slough water body and associated wetland complex) was part of this former bay of Lake Washington. The upper half mile of the slough is split into two channels—Mercer Slough East and West—by a large island with an office park on it. The distance from the Kelsey Creek outlet to Lake Washington is about 1.75 miles. The area that drains into Mercer Slough through Kelsey Creek is about 19,200 acres. The impervious surface area ranges from 32 to 68 percent of the drainage area. The slough is at the same elevation as Lake Washington, so the water input from Kelsey Creek does not result in any perceptible flow.

EXHIBIT 3-6
Mercer Slough along 112th Avenue SE

Mercer Slough averages about 40 feet wide and is probably no more than 8 feet deep (Exhibit 3-6). Although the bottom could not be observed due to turbidity during the study, it is reasonable to assume that the bottom is composed largely of organic material and silt. The upper end of Mercer Slough, just downstream of the Kelsey Creek outlet, may have some gravel and sand deposits from the creek. The habitat character would be better described as lake or lacustrine habitat rather than pool habitat morphology. There are no riffles, runs, or glides. The riparian area on the west side of Mercer Slough West is narrow in the vicinity of the office park (along 112th Avenue SE), averaging about 30 to 200 feet wide. Along the western bank of Mercer Slough West, the dominant vegetation is Himalayan blackberry (*Rubus armeniacus*), which is a state-listed noxious weed, and mowed lawn with only a few scattered shrubs and trees such as red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), willow (*Salix* sp.), and Douglas-fir (*Pseudostuga menziesii*) or Sitka spruce (*Picea sitchensis*). The eastern bank of Mercer Slough West closest to the office park is dominated by lawn or a very narrow strip of vegetation such as Douglas spirea (*Spiraea douglasii*) and weeds such as reed canarygrass (*Phalaris arundinacea*). In the lower mainstem of the slough, south of where the east and west channels join, Mercer Slough is bordered on both sides by the Nature Park and the riparian area is very wide and largely dominated by native trees, shrubs, emergents, and some non-native noxious weeds.

Overall salmonid habitat quality, however, is poor due to the lack of riffles and gravel as well as high summer water temperatures. Salmon runs throughout the Kelsey Creek drainage pass through Mercer Slough as a migratory corridor. Some rearing function is possible, especially for coho during the cooler months. Run size varies from year to year. In 2006, escapement (the number of fish returning to the stream) was 229 Chinook, 503 sockeye, and 5 coho. Steelhead and cutthroat numbers are unknown because they were not surveyed.

## Kelsey Creek

Kelsey Creek is one of the largest independent tributaries to Lake Washington. It has a drainage area of 2,816 acres. The mainstem is about 8.6 miles long, with headwaters at Phantom Lake in east Bellevue. Including tributaries, there are about 19 miles of open stream channels in the drainage. Kelsey Creek first flows north until the vicinity of Bel-Red Road, where it turns west, then south before flowing into Mercer Slough in south Bellevue. The impervious surface area is about 42 percent of the drainage area. Topographic relief through the drainage is 300 feet for an average slope of 0.7 percent, which is fairly gradual. Kelsey Creek has a number of tributaries, including the West Tributary, Goff Creek, Unnamed Tributary, Valley Creek, Sears Creek, Sunset Creek, and Richards Creek.

Kelsey Creek supports runs of anadromous salmonids, including Chinook salmon, coho salmon, sockeye salmon, and sea-run cutthroat trout. Steelhead are presumed to be present in this system, but this has not been confirmed. Resident fish include rainbow trout, cutthroat trout, sculpins, lampreys, and suckers. Peamouth migrate in from Lake Washington to spawn in lower Kelsey Creek, numbering in the thousands. Chinook are known to occur as far upstream as Larson Lake. Coho salmon are known to occur where Chinook occur, and probably farther upstream as well. Sockeye are known to spawn up to river mile 5.0 (which is upstream of the study area). A 2006

spawner survey for Kelsey Creek and tributaries estimated run size at 200 Chinook, 5 coho, and 503 sockeye (Watershed Company, 2007). Factors limiting the production of salmonids in Kelsey Creek and all its tributaries are those common to urban streams. Fine sediment levels are high in spawning riffles, which impairs egg survival and aquatic insect production. Logging and urban development have lowered pool density and channel complexity. Hydrology has been altered due to an increase in the amount of impervious surfaces, which causes higher peak flows and lower summer base flows. Stormwater draining from roadways and degraded riparian areas, which reduces shading, have caused water temperature to increase. Kelsey Creek is on the Ecology 303(d) list of streams with impaired water quality for exceeding allowable levels of fecal coliform bacteria and three pesticides: dieldrin, heptachlor epoxide, and dichloro-diphenyl-trichloroethane (DDT).

Overall salmonid habitat quality, however, is only fair due to sand embeddedness in riffles and gravel, low abundance of large woody debris (LWD), and high summer water temperatures. Salmon runs throughout the Kelsey Creek drainage pass through Mercer Slough as a migratory corridor.

In the vicinity of where the proposed BNSF Alternative (B7) would cross Kelsey Creek at 118 Avenue SE, the creek is in a culvert (Exhibit 3-7). On the upstream side of the Alternative B7 crossing, the creek is in a long but fish-passable culvert under I-405. On the downstream side of the crossing at 118th Avenue SE, the culvert outlet drops into a concrete fish ladder that empties directly into Mercer Slough. Habitat value in this reach is limited to a fish migratory corridor and is considered poor.

EXHIBIT 3-7
Kelsey Creek Fish Ladder downstream of culvert at 118th Avenue SE and I-405

#### Sturtevant Creek

Sturtevant Creek is a small, highly urbanized stream draining 773 acres of Bellevue, including much of the downtown area. This drainage is 1.9 miles long, starting in the vicinity of Lake Bellevue. The stream flows generally south, with its outlet at Mercer Slough. The topographic drop is 120 feet. All tributary inflow is through piped systems. The impervious surface area is 68 percent of the drainage area. As a result of the high percentage of impervious surface area and general lack of stormwater detention facilities, Sturtevant Creek has a highly "flashy" flow regime, meaning it is quick to peak after a rainfall event then a quick to drop back to base flow. Much of the drainage, including the mainstem, is in pipes and culverts. Chinook salmon, sockeye salmon, and cutthroat trout are known to use Sturtevant Creek up to I-405, where there is an impassable culvert next to the Hilton Hotel. The stream also supports peamouth spawning.

The SE 8th Street crossing is through a large-diameter, fish-passable culvert set into grade with a flat gradient and natural sand/silt substrate surface. The reach downstream is a short, deep glide backwatered by Mercer Slough. Banks are stable, and the narrow riparian area is moderately thick with mixed conifer and alder trees. The reach upstream between SE 8th Street and SE 6th Street is largely an unstable, narrow, incised glide with a silty bottom. It has the appearance of a channel that was once channelized straight through a wetland area then no longer maintained, and it is readjusting to site conditions by side-cutting to meander. It breaks into multiple channels in the wetland as a result of beaver activity. Riparian vegetation is patchy, alternating between willow and reed canarygrass. Spawning and rearing habitat quality is poor in this reach.

### 3.1.2.3 Segment C

Exhibit 3-3 shows the main streams and fish passage features in Segment C.

#### Sturtevant Creek

The reach of Sturtevant Creek beginning from SE 6th Street and moving northward up to I-405 improves in habitat quality steadily in the upstream direction until reaching the impassable culvert at I-405. Just upstream from the SE 6th Street crossing, the creek is generally a shallow, wide glide on sandy substrate. In this reach, the creek flows next to one office building and under another. There is no riparian vegetation in much of this reach. Spawning and rearing habitat quality is poor. Large woody debris is generally absent (one piece observed).

In the short reach adjacent to the Hilton Hotel, north of the SE 6th Street crossing (see Exhibits 3-3 and 3-8, where an elevated guideway might be located depending on alternative, the gradient increases and transforms into a pool/riffle complex (Exhibit 3-8). There is abundant gravel in the riffles, although the gravel is embedded 25 to 50 percent with sand, which reduces the quality of this spawning area. Although there is ample shade due to large bordering trees, all of the streamside cover of trees or shrubs have been cleared and lawn has been established on both sides. Despite this, stream habitat quality is considered good because there are pools and riffles with moderately clean gravel. This reach represents virtually the only usable spawning habitat in Sturtevant Creek for salmonids. The upstream end of this reach ends at the impassable I-405 culvert. Also, peamouth are known to spawn in Sturtevant Creek. The habitat components are as follows: 32 percent riffle, 42 percent glide, 12 percent pool, and 14 percent culvert. Most of the glide habitat is in the reach downstream of the Hilton Hotel (Exhibit 3-8).

EXHIBIT 3-8
Sturtevant Creek upstream of NE 8th Street

Sturtevant Creek leaves Lake Bellevue as a featureless glide in the ditch alongside of the former BNSF Railway tracks (Exhibit 3-9). Riparian vegetation is sparse and mostly grasses or blackberries. There is also a group of willows and cottonwood just below Lake Bellevue. The bottom substrate composition is silt and organic material. Habitat quality is poor. This reach is above two fish passage blocks.


EXHIBIT 3-9
Sturtevant Creek next to Hilton Hotel at 114th Avenue SE

#### Lake Bellevue

Lake Bellevue is a small lake that forms the headwaters to Sturtevant Creek. It is entirely surrounded by offices and businesses, most of which are built on pilings in the lake. The only fish species known to be present in the lake is goldfish (*Carassius auratus*).

### 3.1.2.4 Segment D

Exhibit 3-4 shows the streams and fish passage features in Segment D.

#### West Tributary to Kelsey Creek

The West Tributary to Kelsey Creek starts in the vicinity of the I-405/SR 520 interchange. It flows southeast, then south, entering Kelsey Creek at river mile 2.6. There are 2.8 miles of open channel with many long culverts in this 1,001-acre drainage area. The average channel slope is gradual at 0.8 percent. The drainage is close to completely built out, with industrial areas in the upper reaches and residential developments elsewhere. The impervious surface area is 44 percent of the drainage area. Chinook salmon, coho salmon, sockeye salmon, and cutthroat trout have been reported in the lower reaches of the West Tributary. The current upstream limit to migratory fish is at Bel-Red Road. The City of Bellevue conducted electro-fishing at two upstream locations and caught no fish. They did, however, catch a Pacific giant salamander (*Dicamptodon tenebrus*).


EXHIBIT 3-10
West Tributary to Kelsey Creek at detention pond (also Wetland WR-7)

***Preferred NE 16th At-Grade Alternative (D2A) Crossing***

*Preferred Alternative D2A* would cross the West Tributary to Kelsey Creek along the southern edge of a stormwater detention facility pond (Exhibit 3-10). The stormwater detention facility

consists of a large concrete dam and associated spillway. The area upstream of the dam floods periodically and has abundant signs of beaver activity. There is a narrow strip of riparian willow and alder trees bordering the southern edge of the pond. The depth of water along the proposed guideway ranges from zero to several feet, depending on how the facility is managed at any given time. There is no salmonid spawning habitat in this reach. If fish have access, rearing habitat is good.

**NE 16th Elevated (D2E) and NE 20th (D3) Alternatives Crossing**

Alternatives D2E and D3 would cross the West Tributary to Kelsey Creek at a location downstream of the *Preferred Alternative* between the flood control dam and a concrete weir (Exhibit 3-11). The weir is about 3 feet high and causes the channel to pond in this reach. The weir is an impassable barrier to fish movement. The water in the pond is 2 to 3 feet deep with a bottom composition of silt and organic material. The riparian vegetation is composed of medium to large red alder and willow. The width of the riparian area is very narrow, with a building on one side and a commercial parking lot on the other. There is no salmonid spawning in this reach, but rearing habitat quality is good if fish have access to it. The West Tributary enters a culvert immediately downstream of the concrete weir and remains in a pipe system the remaining distance downstream to Bel-Red Road.


EXHIBIT 3-11
West Tributary to Kelsey Creek at weir, which forms the southern end of Wetland WR-8SE

**SR 520 Alternative (D5) Crossing**

Alternative D5 would cross the West Tributary to Kelsey Creek in a narrow ponded reach with a riparian area that is tightly confined (i.e., 100 feet wide) between a bus parking lot and a Safeway bakery (Exhibit 3-12). The riparian area, while narrow, is forested with mature alder and willow. The channel is completely impounded by beaver dams throughout the entire reach, and during field reconnaissance, a beaver was observed swimming in a pond. The bottom of the West Tributary in this area could not be seen, so the depth is unknown but is at least 3 feet. The bottom is probably silt and organic material. There is no spawning habitat for salmonids. Rearing habitat is good, if salmonids have access to it.

EXHIBIT 3-12
West Tributary to Kelsey Creek (also Wetland WR-8NW) at the proposed crossing of Alternative D5

## Goff Creek

The 680-acre Goff Creek drainage is small and narrow. Its headwaters are in Bridle Trails State Park. The stream flows south for about 1.4 miles, entering the West Tributary to Kelsey Creek just south of Bel-Red Road. The drainage is suburban/rural in the upper reach, residential in the middle reach, and commercial in the reach south of SR 520. The impervious surface area is 30 percent of the drainage area. The drainage overall has a slope of 2 percent.

Cutthroat trout are known to inhabit Goff Creek throughout its length. Sockeye and Chinook salmon use the lower reach for spawning. During the 2006 spawner survey, 12 live Chinook and 8 carcasses were observed in Goff Creek (City of Bellevue, 2007a). An impassable culvert at Bel-Red Road prevents fish access to upstream reaches.

***Preferred NE 16th At-Grade Alternative D2A, NE 16th Elevated (D2E), and NE 20th (D3) Alternatives Crossing***

Goff Creek is confined in a culvert for over 200 feet in either direction of the crossing centerline of *Preferred Alternative D2A* and Alternatives D2E and D3. The City of Bellevue lists this piped segment as impassable. Habitat for salmonids was rated as poor in this reach.

**SR 520 Alternative (D5) Crossing**

Alternative D5 crosses Goff Creek on the highway fill slope of SR 520 (Exhibit 3-13). The culvert under the crossing is perched with a 5-foot drop and is thus impassable to fish. The 200-foot reach upstream from the crossing is all in a culvert under SR 520. The reach downstream from the crossing is tightly confined between a parking lot and a commercial building. The stream is confined on each side with 4- to 6-foot-high rock walls because the streambed is set below the parking lot and building. There is no riparian vegetation other than planted ornamental ivy and a few low shrubs, but the channel receives afternoon shading from the building. Channel morphology is mostly riffle on fairly clean small gravel. Substrate conditions are suitable for trout spawning. There are only two pools in the survey reach. Overall spawning and rearing habitat quality was rated as fair during the survey.

EXHIBIT 3-13
Goff Creek downstream of SR 520

## Unnamed Tributary to Kelsey Creek

The Unnamed Tributary to Kelsey Creek is very small (with a channel less than 4 feet wide) and sometimes intermittent. It is located between Goff Creek and Valley Creek and runs north-south parallel to them. This watercourse's base flow is greater than 0.05 cubic feet per second (cfs). The entire drainage lies within a commercial district. The creek exits a pipe system just south of NE 20th Street on the shoulder of 136th Place NE. The creek then flows south for about 500 feet, where it enters a piped system. It remains in that piped system most of the way to its confluence with Kelsey Creek at Bel-Red Road. With no spawning habitat and a fish passage blockage at the confluence with Kelsey Creek, the Unnamed Tributary cannot currently support salmonids.

***Preferred NE 16th At-Grade Alternative D2A, NE 16th Elevated (D2E), and NE 20th (D3) Alternatives Crossing***

In the vicinity of the *Preferred Alternative D2A* and Alternatives D2E and D3 crossings, this watercourse is a grass-lined ditch (Exhibit 3-14). There are no habitat features such as pools or riffles. The gradient is flat, and substrates consist of grass, silt, and sand. Riparian vegetation consists of mowed grasses. There are a few pools downstream of culvert outlets. The habitat components are 76 percent glide, 2 percent pool, and 22 percent culvert. The 849 feet surveyed represent the entire open channel in this stream system. Spawning habitat is absent and rearing habitat was rated as poor. As the creek flow crosses 136th Place, most but not all of the water is intercepted by a pipe system that conveys the water south to NE 16th Street, then east until it reconnects with the creek's natural channel.


EXHIBIT 3-14
Unnamed Tributary to Kelsey Creek at 136th Place NE

## Valley Creek

Valley Creek originates in Redmond just north of the Bellevue/Redmond city limits. The drainage area is 1,391 acres. The creek flows through commercial areas between SR 520 and Bel-Red Road. It flows in a southerly direction for 2.5 miles to enter Kelsey Creek at Bel-Red Road and 140th Avenue NE. The drainage is mostly built out, with single-family residences dominating the land use. The impervious surface area is approximately 32 percent of the drainage area. The drainage slope is gradual at 1.1 percent. Historical information shows sockeye, Chinook, and coho salmon present throughout the mainstem of Valley Creek as far upstream as the Bellevue Municipal Golf Course outfall culvert. Cutthroat and steelhead trout are assumed to be present throughout the drainage as well.

**NE 20th Alternative (D3) Crossing**
The Alternative D3 route crosses Valley Creek at NE 20th Street (Exhibit 3-15). The reach downstream of the crossing is riffle/run morphology with a few pools. The wetted width was about 6 to 10 feet at the time of survey in March 2007. Substrate character is mostly small gravel with excessive sand, thus making spawning conditions marginal to poor. Riparian vegetation is mature red alder and willow, starting at 20 feet wide and getting much wider in the downstream direction. Bank condition is good and overall spawning and rearing habitat quality is rated as good.

***Preferred NE 16th At-Grade (D2A), NE 16th Elevated (D2E), and SR 520 (D5) Alternatives Crossing***
These alternatives' routes cross Valley Creek over the SR 520 culvert. The reach downstream from SR 520 is confined between buildings and parking lots. The reach between SR 520 and NE 21st Street is a shallow, featureless glide with a sand/silt bottom. There are no pools, riffles, or LWD. The riparian community is mostly mowed grasses with building structure or asphalt within 10 to 20 feet of the channel. Part of the reach has a 10-foot-wide cluster of willow shrubs on the west side of the channel. Spawning and rearing habitat quality is poor in this reach.


EXHIBIT 3-15
Valley Creek downstream of SR 520

The reach between NE 21st Street and NE 20th Street is a diverse mixture of habitat types (Exhibit 3-16). The stream has a meandering character, thereby forming a few good pools; at the pools, the banks are undercut. There is a riffle with clean gravel of a size suitable for salmon (Exhibit 3-17). The riparian community on the west side of the creek is almost entirely dominated by blackberries, with some small alder trees. The riparian community on the east side is mostly reed canary grass, with a few blackberry patches. A mayfly hatch occurred while the survey was being conducted. Mayflies are an indicator of good water quality conditions. Habitat in this reach is considered to be good.

EXHIBIT 3-16
Valley Creek downstream of NE 20th Street

Overall, the two reaches together have fairly good spawning and rearing habitat based on the in-stream characteristics. The pool/riffle ratio is 50/50, which is considered optimal. The habitat components are 35 percent pool, 31 percent riffle, 7 percent run, 15 percent glide, and 12 percent culvert.

## Sears Creek

Sears Creek is a small, 577-acre drainage. Most of the drainage's surface water flows through a piped system, with only a small fraction in an open channel. Although the drainage is 1.5 miles long, the length of open channel is only about 1,100 feet. The impervious surface is 64 percent of the drainage area. The average slope in the drainage is 4.3 percent. Considerable use by Chinook salmon, coho salmon, and cutthroat trout occurs up to the NE 20th Street culvert.

**NE 20th Alternative (D3) Crossing**
The Alternative D3 route would cross Sears Creek at NE 20th Street. The culvert under NE 20th is approximately 450 feet long. The outlet is about 150 feet downstream from the street and about 8 to 10 feet lower than the street. The City of Bellevue GIS


EXHIBIT 3-17
Valley Creek between NE 20th and NE 21st Streets

database indicates that this culvert is a fish passage blockage. The stream in this reach is tightly confined between NE 21st Street and a parking lot for a strip mall; NE 21st Street is only about 15 feet from the channel and the parking lot is only 3 to 5 feet from the channel (Exhibit 3-18). The riparian area is composed of bare, bark-mulched ground and a few small, scattered alder trees and blackberry vines. The banks in this reach consist entirely of riprap. Despite these deficiencies, the reach was rated as fair spawning and rearing habitat quality because there are several pools formed intentionally with riprap boulders, and there are patches of clean gravel in short riffles. The channel is straight, but there is a fair amount of channel complexity.

EXHIBIT 3-18
Sears Creek downstream of NE 20th Street

### 3.1.2.5 Segment E

Exhibit 3-5 shows the streams and fish passage features in Segment E.

#### Sammamish River

The Sammamish River is 13.8 miles long, extending from the outlet of Lake Sammamish in Redmond to the inlet of Lake Washington in Kenmore. The subbasin drains 240 square miles, of which 97 are in the Lake Sammamish drainage, 50 in the Bear Creek drainage, and the balance in the Swamp Creek, North Creek, and Little Bear Creek drainages. The Sammamish River once looked very different from how it does today. Prior to Euro-American settlement, the Sammamish River was twice as long and had a complex, highly sinuous, meandering channel with abundant associated forested wetlands. Much of the lower river was backwater from Lake Washington. The area was logged from the 1870s through the early twentieth century. When Lake Washington was lowered by 10 feet in 1916, the overall gradient in the Sammamish River was increased accordingly, and many wetland areas were drained. As agriculture expanded in the Sammamish Valley, more wetlands were drained and turned into farmed fields. Farmers began to straighten the channel around 1911. In 1962, the USACE deepened and channelized the river to its present location.

At present, habitat in the Sammamish River is highly degraded. In the vicinity of the three potential river crossings, river character is essentially the same. Channel morphology is all glide habitat, which is one of the least desirable habitat types for salmonids. Glides make up 98.2 percent of the river's length (R2 Resource Consultants, 1999). When the river was dredged, all of the LWD was removed, and the only LWD present today was installed in a few locations. When the land was cleared, the riparian trees were removed as well. The current riparian community is composed primarily of Himalayan blackberry vines and reed canarygrass, both of which are non-native and invasive. The trees are mostly young alder. This leaves the river exposed to sunlight, which causes high temperatures in the summer. The river is on Ecology's 303(d) list for violation of state temperature and oxygen standards. Substrate consists of sand and silt, and it probably never contained much gravel due to the low gradient and position below Lake Sammamish.

The Sammamish River provides little rearing or spawning function for salmonids but serves as an important migratory corridor for tributaries. Holly Coccli, Muckleshoot Indian Tribe biologist, cites a personal communication with Jim Mattila as reporting that cutthroat trout spawn at the mouths of tributaries where there is gravel (Muckleshoot Indian Tribe, 2009). The river is known to seasonally contain Chinook salmon, coho salmon, sockeye salmon, and Kokanee salmon, steelhead, and cutthroat trout. Most of the sockeye are bound for Bear Creek and most of the Chinook are bound for the WDFW hatchery in Issaquah.

EXHIBIT 3-19
Sammamish River at SR 520

***Preferred Marymoor Alternative (E2) Crossing***

The *Preferred Alternative E2* route would cross the Sammamish River to the south and just upstream of the SR 520 bridge (Exhibit 3-19). Most of the habitat found in the vicinity of this

crossing is glide, which is typical for the entire Sammamish River. The exception to this is 200 feet upstream of the Bear Creek confluence, where there is a large pool. Substrates are uniformly sand and silt except directly under the SR 520 Bridge, where it is cobble and riprap. The banks under the bridge are also riprap. The riparian area is about 30 to 50 feet wide and mostly vegetated by blackberry vines and young alder trees. There are some young conifer plantings on the north side of the bridge. Overall spawning and rearing habitat conditions are poor. Some afternoon shade would be provided in the future when the young riparian trees grow taller.

**Redmond Way Alternative (E1) Crossing**

The Alternative E1 crossing is located on the upstream (south) side of the Redmond Way bridge (Exhibit 3-20). Habitat is all glide except for a short riffle on either side of a manmade gravel bar. The gravel bar is enhanced by two large rootwads. There are other log clusters on the banks as well, which has the appearance of a habitat enhancement project. The riparian area is a narrow band of mixed deciduous trees on the west bank of the river and a narrow band of blackberries or grasses on the east bank. Except for the gravel bar, bottom composition is sand and silt and overall spawning and rearing habitat quality is poor.

EXHIBIT 3-20
Sammamish River at Redmond Way

**Leary Way Alternative (E4) Crossing**

The Alternative E4 crossing is located to the south and upstream of the Leary Way bridge (Exhibit 3-21). As elsewhere in the Sammamish River, glide habitat is dominant in this reach. However, there is a short, manmade riffle composed of riprap on the north, downstream side of the existing bridge. Other than this artificial riffle, substrate is composed of sand and silt. The riparian area is narrow with asphalt trails on either side of the river and has only 40 to 50 feet of width on steep banks. The riparian vegetation is composed almost entirely of blackberry vines with a few scattered small alder trees. Just upstream from the bridge, there is a group of larger red alder trees on the south bank that provides some afternoon shade. Overall spawning and rearing habitat quality in this reach is poor.

EXHIBIT 3-21
Sammamish River at Leary Way

## Bear Creek

The Bear Creek drainage drains about 50 square miles of suburban and rural land. The drainage has three subdrainages: Bear Creek, Cottage Lake Creek, and Evans Creek. Throughout the drainage, there are more than 100 miles of streams, 9 lakes, and over 2,000 acres of wetlands. Urban development is spreading throughout the drainage, with an associated shift from forest to impervious surfaces and landscaped areas; however, Bear Creek remains one of the most productive systems in the region. The diversity and number of aquatic resources in the Bear Creek drainage distinguished it as one of the top six natural resource areas in King County in the Waterways 2000 Program (Kerwin, 2001).

The Bear Creek drainage is known to support Chinook salmon, coho salmon, sockeye salmon, Kokanee salmon, steelhead, and cutthroat trout. The drainage also might support bull trout, although none have been found to date. Spawner counts have not been made in the drainage, but WDFW operates a smolt trap at the location of the potential rail crossing under the East Link Project Segment E alternatives. In 1999, the estimated number of smolt or fry outmigrants was 14,525 Chinook smolts, 1,772 steelhead smolts, 3,413 cutthroat smolts, and 1,514,669 sockeye fry; the count for coho in 1997 was 64,102 smolts (Seiler, 2000).

***Preferred Marymoor Alternative (E2), Redmond Way (E1), and Leary Way (E4) Alternatives Crossing***
The crossing of Bear Creek by *Preferred Alternative E2* and Alternatives E1 and E4 is at the same location as the existing abandoned former BNSF Railway timber bridge (Exhibit 3-22). Habitat in the vicinity is a mixture of pools and runs. Substrates are gravel and cobble. This is a known sockeye spawning area. Blackberry vines dominate the riparian area upstream of the bridge. Downstream from the crossing, riparian vegetation on the north bank is medium-sized mixed conifer and deciduous trees. On the south bank, vegetation is patchy mixed conifer and deciduous trees and grassy areas planted with willow and conifer trees. This area serves as an overflow channel/wetland area. It was built in association with a major channel relocation/habitat enhancement project downstream of the crossing. There are more than 100 logs with rootwads embedded in the banks of the meandering channel. Beaver activity is apparent, and the willow plantings are suffering from it. Habitat values of the riparian community will be good when the plantings mature. Overall spawning and rearing habitat quality in this reach is good.

EXHIBIT 3-22
Bear Creek at former BNSF Railway crossing

## 3.1.3 Tribal Fishing

There are no non-tribal commercial fisheries in the study area, but there are tribal fisheries, most of which are commercial in nature. Sound Transit consulted with the Muckleshoot Indian Tribe about Usual and Accustomed Treaty Rights that provide Tribes with unique fishing, hunting, and gathering rights. The Tribe expressed concern about the effects of the project on their fisheries (Walter, 2008). Their fisheries are set (species, harvest numbers, and dates) through consultation with the Pacific Salmon Fisheries Commission and can span between July and December. The Tribe asked to be notified if and when in-water work was planned in Lake Washington.

## 3.1.4 Federal and State Threatened, Endangered, and Candidate Species

Table 3-4 lists the federal- and state-threatened, endangered, and candidate aquatic species known to occur in the study area. The following subsections describe the distribution of these species.

TABLE 3-4
Federal and State Threatened, Endangered, and Candidate Aquatic Species Known to Occur in the Study Area

| Species | Federal Status | State Status |
|---|---|---|
| Puget Sound Chinook salmon | Threatened | Candidate |
| Puget Sound steelhead | Threatened | None |
| Coastal-Puget Sound bull trout | Threatened | Candidate |
| River lamprey | Species of concern | Candidate |
| Western toad | Species of concern | Candidate |

### 3.1.4.1 Puget Sound Chinook Salmon

Chinook salmon are present in a number of the larger streams in the study area. Their known distribution in the project vicinity is as follows:

- Lake Washington
- Mercer Slough
- Kelsey Creek: At outlet, in Mercer Slough, and upstream of study area
- Sturtevant Creek up to the I-405 culvert

- West Tributary to Kelsey Creek: Up to Goff Creek
- Goff Creek: Up to Bel-Red Road
- Valley Creek: Up to the Bellevue Golf Course (above SR 520)
- Sears Creek: Up to NE 20th Street
- Sammamish River
- Bear Creek: In and north of the study area

#### 3.1.4.2 Puget Sound Steelhead

Steelhead are present in low numbers throughout the Lake Washington basin in the larger tributaries. Their known distribution within the study area is as follows:

- Lake Washington
- Mercer Slough
- Kelsey Creek: Currently not known to be present in the entire drainage; however, their presence historically is probable and assumed for purposes of ESA consultation
- Sammamish River: Throughout the study area and upstream
- Bear Creek: In and upstream from the study area

#### 3.1.4.3 Coastal-Puget Sound Bull Trout

Bull trout are only known to use Lake Washington and possibly tributaries as seasonal rearing areas. Spawning and early rearing areas have not been found to date. Such areas may be present, however, in upper tributaries to the Cedar River and possibly coldwater tributaries to Bear Creek.

#### 3.1.4.4 River Lamprey

Although there are no direct observations of river lampreys in the study area, their presence is likely. They are known to exist in tributaries to Lake Washington and Lake Sammamish such as the Cedar River and Issaquah Creek.

#### 3.1.4.5 Western Toad

Western toads (*Bufo boreas*) use three different types of habitat: breeding habitats, terrestrial summer range habitat, and winter hibernation sites. Their preferred breeding sites are permanent or temporary water bodies that have shallow sandy bottoms. After breeding, adult western toads disperse into terrestrial habitats such as forests and grasslands. They may roam far from standing water, but they prefer damp conditions. Western toads spend much of their time underground; although they are capable of digging their own burrows in loose soils, they generally shelter in small mammal burrows, beneath logs, and within rock crevices. They hibernate in burrows below the frost line, up to 3.6 feet underground. The PHS database for the study area did not have sighting evidence for the western toad. However, they are known to exist in the region and may be present in small numbers within the study area. Suitable habitats may exist in Mercer Slough; along larger, low-gradient rivers and streams; and in adjacent undeveloped uplands.

### 3.1.5 WDFW Priority Habitats and Species

The list of WDFW priority species and habitats shown in Table 3-5 was obtained from the WDFW PHS database. The list was reduced to species documented or believed to be present in water bodies in the study area. Reports of green sturgeon *(Acipenser medirostris)* in Lake Washington are old. Channel catfish *(Ictalurus punctatus)* are rare and non-native. Only a few bull trout have been documented in Lake Washington, and they were observed entering the lake through the fish ladder at the locks.

TABLE 3-5
WDFW Priority Species and Habitats Occurring in Specific Water Bodies in the Study Area

| Species | Present in Specific Water Body[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **LW** | **MS** | **KC** | **StC** | **WT** | **GC** | **UT** | **VC** | **SrC** | **SR** | **BC** |
| River lamprey *(Lampetra fluviatilis)* | | X | X | | | | | | | X | X |
| Green sturgeon *(Acipense medirostris)* | X | | | | | | | | | | |
| Channel catfish *(Ictalurus punctatus)* | X | X | | | | | | | | | |
| Longfin smelt *(Spirinchus thaleichthys)* | X | | | | | | | | | | |
| Bull trout *(Salvelinus confluentus)* | X | | | | | | | | | Unk | Unk |
| Dolly Varden char *(S. malma malma)* | X | | | | | | | | | Unk | Unk |
| Chinook salmon *(Oncorhynchus tshawytscha)* | X | x | X | X | X | X | | X | X | X | X |
| Coho salmon *(O. kisutch)* | X | X | X | X | X | X | | X | X | X | X |
| Sockeye salmon *(O. nerka)* | X | X | X | | X | X | | | | X | X |
| Kokanee salmon *(O. nerka)* | X | | | | | | | | | X | X |
| Cutthroat trout *(O. clarki)* | X | X | X | X | X | X | | X | X | X | X |
| Rainbow trout/Steelhead *(O. mykiss)* | X | X | X | | | | | X | | X | X |
| Western toad *(Bufo boreas)* | X | Unk | Unk | Unk | Unk | Unk | Unk | Unk | Unk | Unk | Unk |
| **Habitats** | | | | | | | | | | | |
| In-stream | X | X | X | X | X | X | X | X | X | X | X |
| Riparian | X | X | X | X | X | X | X | X | X | X | X |

[a] Water body codes: LW= Lake Washington; MS = Mercer Slough; KC = Kelsey Creek; StC = Sturtevant Creek; WT = West Tributary to Kelsey Creek; GC = Goff Creek; UT = Unnamed Tributary to Kelsey Creek; VC = Valley Creek; SrC = Sears Creek; SR = Sammamish River; BC = Bear Creek.
Unk – Possible presence of species, but verification is unknown.

## 3.2 Vegetation and Wildlife Resources

The urban nature of the project vicinity negatively affects species diversity, thus favoring species that can use altered environments and are more tolerant of human activity. However, the project vicinity also includes a few areas with large, established habitats that support an array of wildlife species, more than are typically found in highly urbanized areas.

The investigation identified nine vegetation types, including wetlands and open water, within the East Link study area, using color aerial photographs and field verification. Table 3-6 provides descriptions of these vegetation types and examples of where they occur within the study area. Exhibits 3-23 to 3-26 show the mapped vegetation types.

TABLE 3-6
Vegetation Types Identified in East Link Vegetation and Wildlife Study Area

| Vegetation Type | Habitat Value | Examples of Occurrence | Description |
|---|---|---|---|
| Riparian forest | High | South end of Mercer Slough Nature Park | Vegetated banks along river edges. Often dominated by willow and red alder. Large big-leaf maple, black cottonwood, and red alder trees may occur. Non-native shrubs (Himalayan blackberry and Scot's broom), grasses, thistles, and other weeds are common. Areas dominated by blackberry were classified separately from riparian forest because of the much lower habitat value of blackberry-dominated areas. |
| Urban mostly vegetated – Coniferous forest | High | West side of Bellevue Way | Forest patches generally dominated by Douglas-fir with lesser amounts of black cottonwood, big-leaf maple, red alder in the overstory, and occasionally shore pine and red cedar. Canopy cover variable but generally greater than 40 percent. Douglas-fir trees mostly taller than 50 feet. Shrub layer often dominated by Himalayan blackberry but also includes salmonberry, snowberry, salal, Indian plum, rhododendron, and other shrubs. Herb layer, when present, includes grasses, sword fern, fringe cup, and nettles. |
| Urban mostly vegetated – Deciduous forest | High | East side of Bellevue Way | Forest patches with black cottonwood, big-leaf maple, red alder (40 to 70 feet tall) and few conifers in the overstory. Canopy cover 40 to 80 percent. Understory tree cover may include big-leaf maple, black cottonwood, red alder, and Pacific madrone. Shrubs similar to those of coniferous forest type. |
| Urban mostly vegetated – Mixed forest (deciduous/coniferous) | High | East side of the BNSF Railway | A few small areas with a roughly even mix of deciduous trees and conifers in the overstory. |
| Urban moderately vegetated | Moderate | Areas of parks that have been planted with trees and shrubs, as in Marymoor Park | Dominated by open mowed lawns. Large native and ornamental trees (generally 40 to 70 feet tall) also present. Some patches of ornamental and native shrubs may occur. Tree and shrub canopy cover values generally less than 30 percent. |
| Urban sparsely vegetated | Low | Landscaping along highways | Commercial and industrial properties, road rights-of-way, and neighborhoods with a few or small patches of ornamental and native trees and considerable human activities. |
| Blackberry | Low | Along roads and highways | Areas dominated by blackberry with little or no tree canopy. |
| Open water | High | Lake Washington | Highly variable community including saline and fresh waters, deep or shallow waters, rivers, creeks, and large water bodies. |

- The relative function of each vegetation type in providing habitat for wildlife are described based on reconnaissance-level field observations, literature review (including *Wildlife-Habitat Relationships in Oregon and Washington* [Johnson and O'Neil, 2001]), professional opinion, and agency consultation. The following habitats provide high-value habitat:
- Urban mostly vegetated – coniferous forest
- Urban mostly vegetated – deciduous forest
- Urban mostly vegetated – mixed forest (deciduous/coniferous)
- Riparian forest

### 3.2.1 Beneficial Habitats

Wildlife use of urban habitats depends on the general location of the habitat, the size and type of undisturbed habitats, the degree of connectivity and extent of travel corridors between and among these habitats, and the types and levels of human activity. Much of the East Link Project would occur in commercial, industrial, and residential areas that provide habitat only for adaptable species such as sparrows, finches, doves, rats, mice, raccoons, opossums, and squirrels. Larger habitat patches and those connected to other natural areas or heavily vegetated residential neighborhoods support a larger variety of species, including several species of songbirds,

black-tailed deer, and raptors such as American kestrel *(Falco sparverius)*, red-tailed hawk *(Buteo jamaicensis)*, and great horned owl *(Bubo virginianus)*. Species such as the American robin *(Turdus migratorius)*, song sparrow *(Melospiza melodia)*, Steller's jay *(Cyanocitta stelleri)*, American crow *(Corvus brachyrhynchos)*, spotted towhee *(Pipilo maculates)*, black-capped chickadee *(Poecile atricapillus)*, white-crowned sparrow *(Zonotrichia leucophrys)*, northern flicker *(Colaptes auratus)*, Bewick's wren *(Thryomanes bewickii)*, and red and white breasted nuthatches *(Sitta spp.)* are also fairly common. Streams and larger water bodies provide habitat for many waterfowl species, including Canada goose *(Branta canadensis)*, belted kingfisher *(Megaceryle alcyon)*, red-breasted merganser *(Mergus serrator)*, common merganser *(M. merganser),* western grebe *(Aechmophorus occidentalis)*, double-crested cormorant *(Phalacrocorax auritus)*, mallard *(Anas platyrhynchos)*, lesser scaup *(Aythya affinis)*, American coot *(Fulica Americana)*, as well as many of the species associated with wetlands.

There are several large areas of native habitat in East Link Project study area, the largest of which is Mercer Slough Nature Park. However, this park is surrounded on all sides by residential and commercial developments, roads, and highways, which limits its value for wildlife species that require large undisturbed areas and undeveloped travel corridors.

Patches of deciduous, coniferous, and mixed forests occur in Segments B, D, and E. Most of these areas are fragmented and separated from surrounding habitat areas by commercial, urban, and residential developments and roads. Despite their isolation, these areas still provide habitat for forest-associated resident and migratory songbirds, as well as for hawks, owls, great blue herons *(Ardea herodias)*, woodpeckers, reptiles, and small mammals. These areas include the Mercer Slough I-90 wetland (WR-4) in Segment B, the forested area located in the southern portion of the BNSF Matrix wetland (WR-6) in Segment D, the Redmond Center forest in Segment E, and small forested patches along SE Leary Way and West Sammamish Parkway in Segment E. These habitat areas are described below and shown in Exhibits 3-23 to 3-26 and Exhibits 3-1 to 3-5 in Section 3.1. Many of these sites are recognized as WDFW priority habitats. There is no beneficial habitat in Segment C; therefore, it is not discussed in the following sections.

#### 3.2.1.1 Segment A

Lake Washington supports a wide variety of aquatic and semi-aquatic fish and wildlife species. More than 15 species of waterfowl use the lake at different times of the year. It is also used by foraging bald eagles, osprey, peregrine falcons *(Falco peregrinus)*, and great blue herons, among many other species.

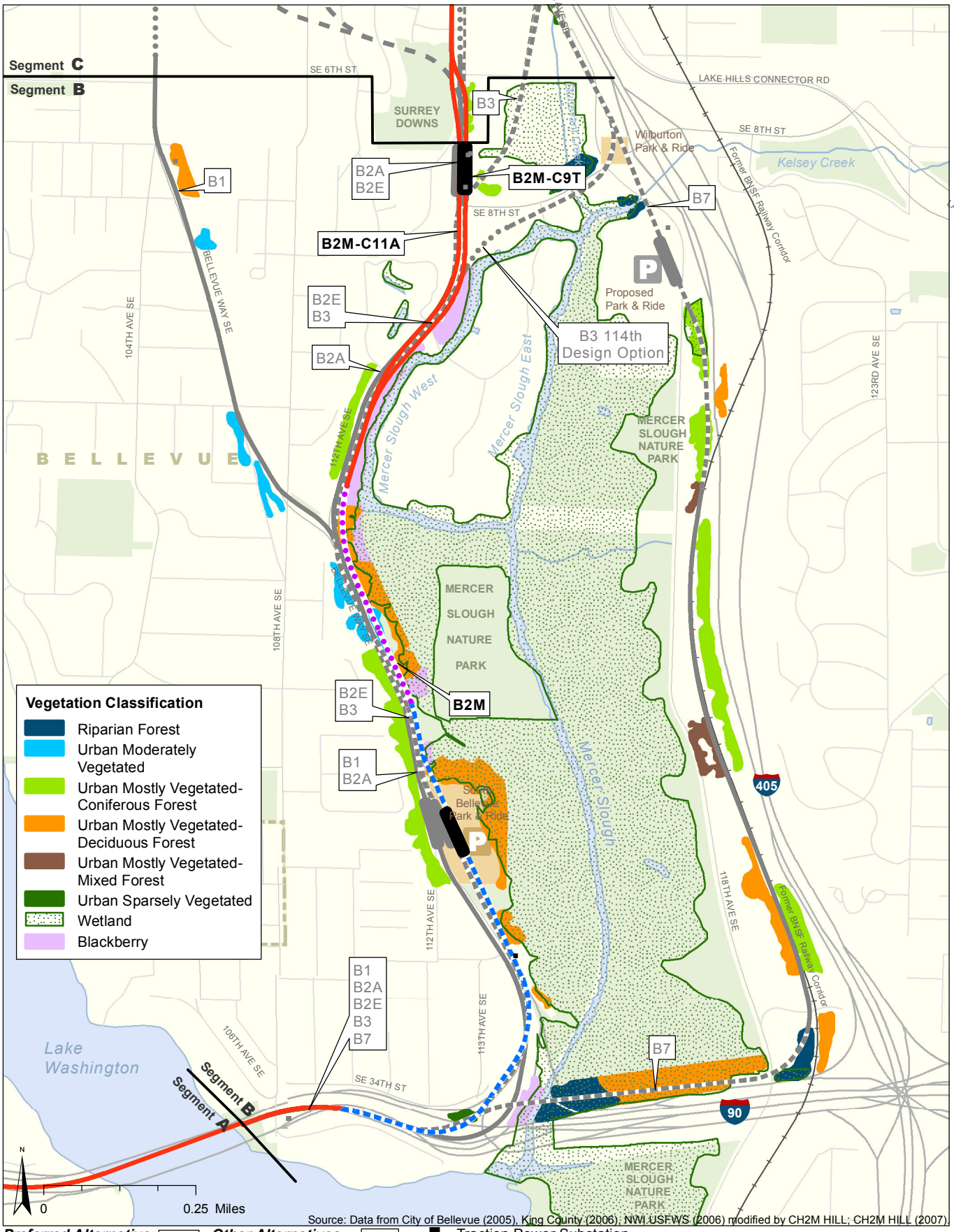
#### 3.2.1.2 Segment B

Mercer Slough Nature Park in Segment B is the largest freshwater wetland remaining along the shores of Lake Washington. The park encompasses 320 acres and is composed of herbaceous, scrub-shrub, and forested wetlands; upland forests; meadows; and a blueberry farm. More than 170 bird species are listed as breeding, foraging, or migrating through the park. Amphibians, reptiles, and a number of small mammal species, including red-winged blackbird *(Agelaius phoeniceus)*, yellow-rumped warbler *(Dendroica coronata)*, common yellowthroat *(Geothlypis trichas)*, violet-green swallow *(Tachycineta thalassina)*, cliff swallow *(Petrochelidon pyrrhonota)*, barn swallow *(Hirundo rustica)*, Anna's hummingbird *(Calypte anna)*, and several species of wading birds, in addition to several bat species, are also found within the park's boundaries. Red-tailed hawks and great blue herons are also regularly seen in this area.

#### 3.2.1.3 Segment D

Wetlands with some ponding water and riparian areas with small-stemmed emergent vegetation provide habitat for amphibians. In Segment D, these areas include West Tributary to Kelsey Creek Ponded (WR-7), West Tributary to Kelsey Creek Riparian (WR-8NW, WR-8N, and WR-8SE), East of 140th Avenue NE (WR-10W), West of 140th NE (WR-11), and BNSF Matrix (WR-6) wetlands (see Exhibit 3-28 in Section 3.3, Wetlands).

The West Tributary to Kelsey Creek runs through the study area, eventually flowing into Kelsey Creek. The Creek is surrounded by commercial and urban development for most of its length. A flood control dam next to the Metro bus maintenance facility off of 124th Avenue NE creates a large ponded area before the creek exits the other side of the road. An active beaver dam is located just upstream from the dam in a forested riparian corridor, dominated by deciduous trees. The habitat just downstream from the water control device is a mixed emergent, scrub-shrub, and riparian area. This area supports breeding and migratory songbirds and waterfowl and likely supports amphibians and small mammals.



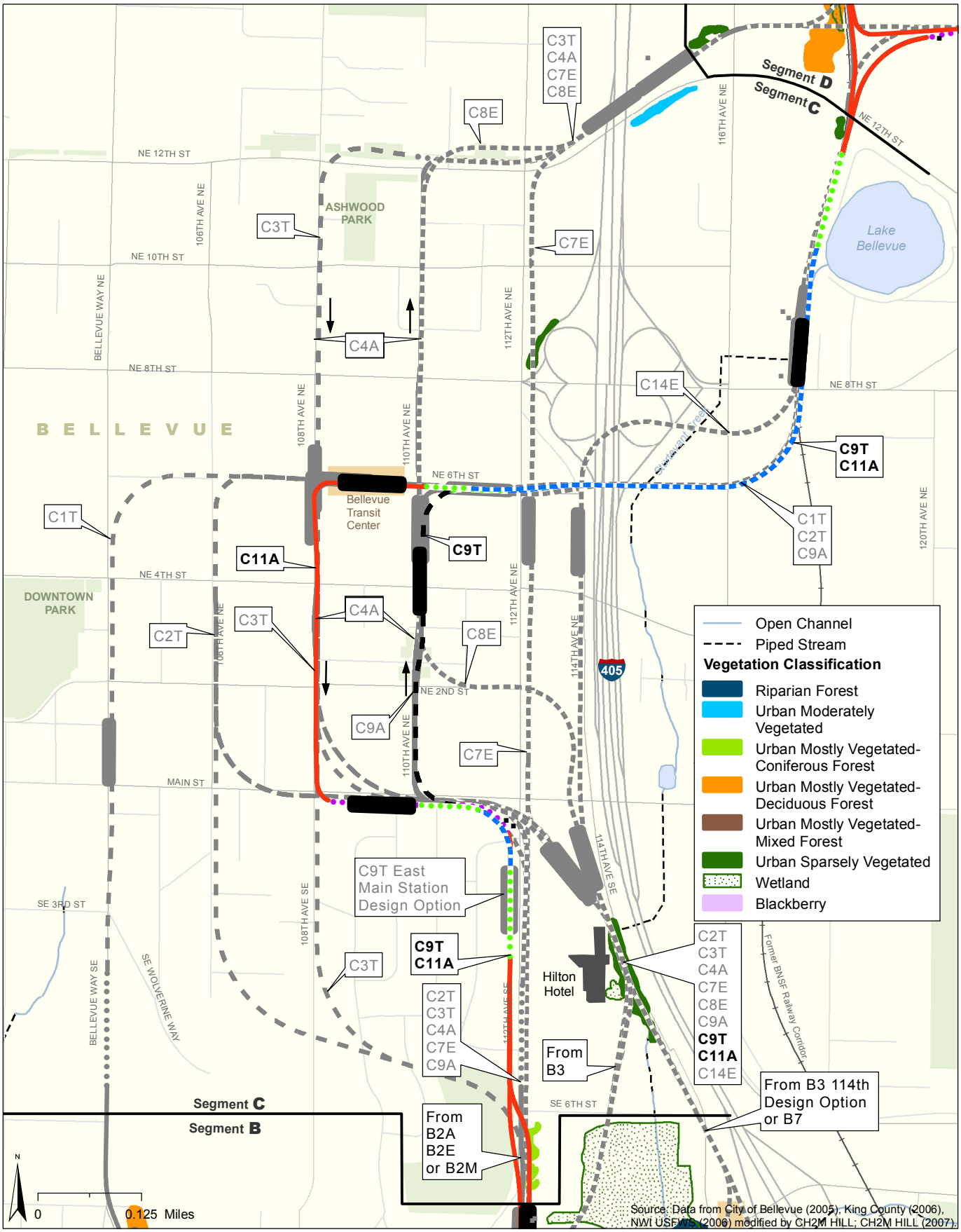

Source: Data from City of Bellevue (2005), King County (2006), NWI USFWS (2006) modified by CH2M HILL; CH2M HILL (2007).

***Preferred Alternative*** B2M
- At-Grade Route
- Elevated Route
- Retained-Cut Route
- Retained-Fill Route
- Tunnel Route

***Other Alternatives*** B2A
- At-Grade Route
- Elevated Route
- Retained-Cut or Retained-Fill Route
- Tunnel Route

- Traction Power Substation
- Proposed Station
- City Limits

Exhibit 3-23
**Vegetation and Wildlife Habitat**
**Segment B**
*East Link Project*




***Preferred Alternative*** C9T
- At-Grade Route
- Elevated Route
- Retained-Cut Route
- Retained-Fill Route
- Tunnel Route

***Other Alternatives*** C14E
- At-Grade Route
- Elevated Route
- Retained-Cut or Retained-Fill Route
- Tunnel Route

- Traction Power Substation
- Proposed Station
- City Limits

Exhibit 3-24
**Vegetation and Wildlife Habitat**
**Segment C**
*East Link Project*

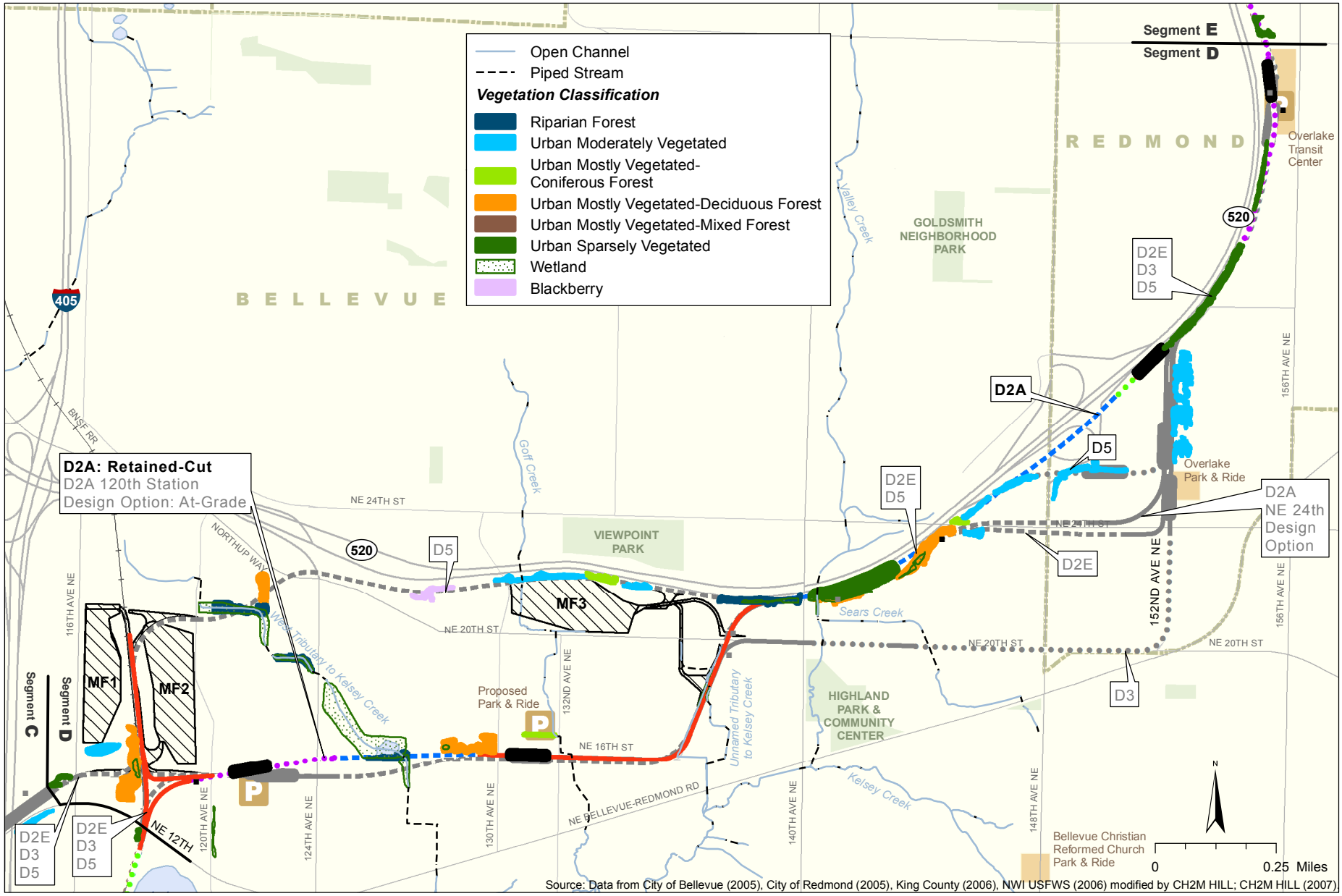



Exhibit 3-25
**Vegetation and Wildlife Habitat**
**Segment D**
*East Link Project*

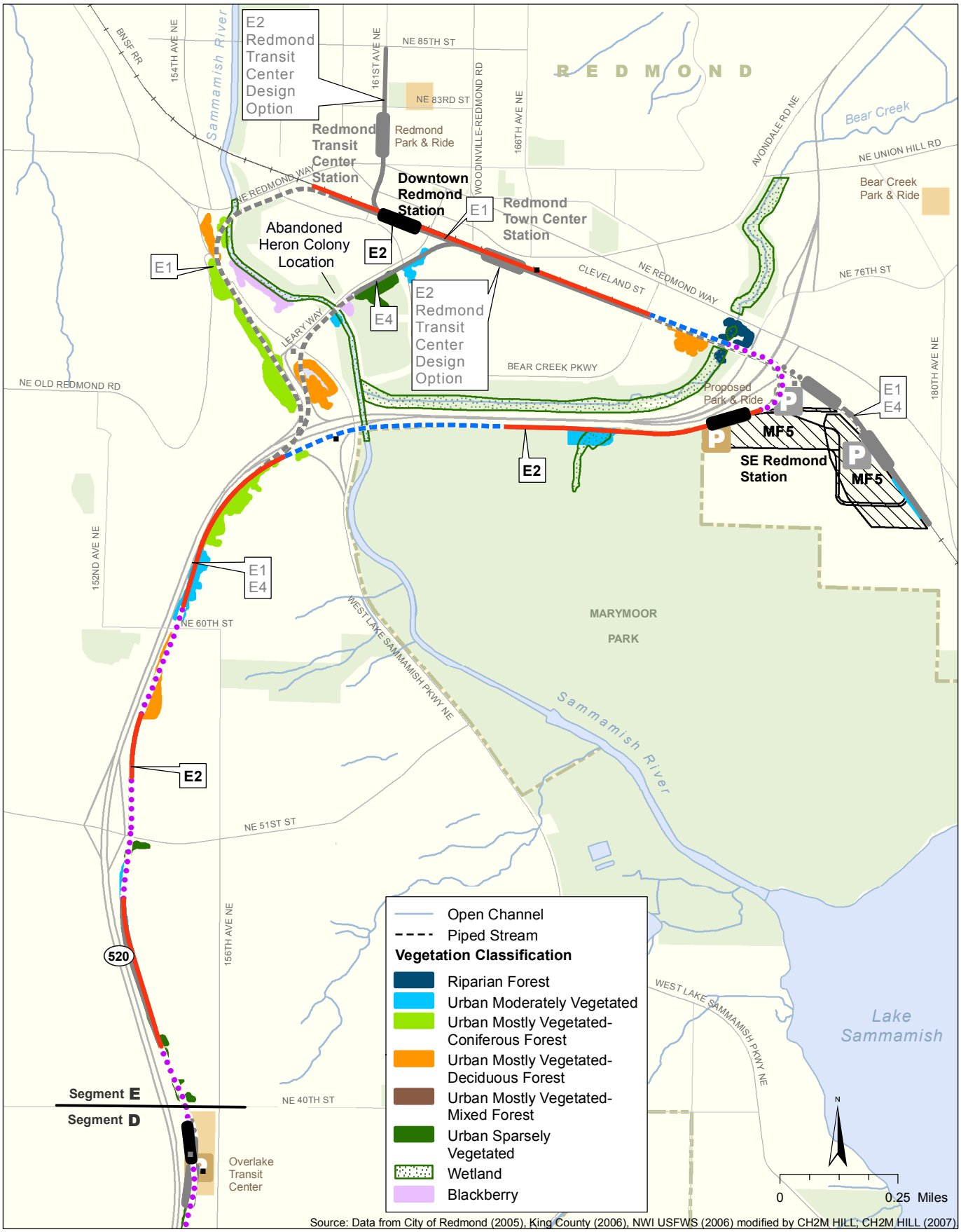



Exhibit 3-26
**Vegetation and Wildlife Habitat**
**Segment E**
*East Link Project*

#### 3.2.1.4 Segment E

In Segment E, the Sammamish River (also known as Sammamish Slough) is bordered by a mowed grass park with widely planted ornamental trees to the east and by roads and residential and commercial development to the west. The riparian corridor south of the NE Redmond Way Bridge is dominated by Himalayan blackberry from the top of the bank down to the water's edge. Although the bank offers little habitat for wildlife, the watercourse is still used by a variety of waterfowl. Canada geese, mallards, great blue herons, and double-crested cormorants were observed in the slough during visits in May 2007. Signs of beaver activity were also observed along the slough near the NE Redmond Way Bridge. South of the SR 520 bridge, a red-breasted merganser, common merganser, belted kingfisher, and lesser scaup were observed during site visits in mid-April 2007. In addition, approximately 36 double-crested cormorants use two cottonwood trees behind SE Leary Way as a winter roost. The roost is located just above the western bank of the Sammamish River.

There is a small coniferous forested area located adjacent to SE Leary Way and the Sammamish River. The Redmond Center heronry was located in this forested section until its abandonment in 2004 due to bald eagle harassment and the increase in development immediately adjacent to the forest stand. The forest is dominated by Douglas-fir trees and has an understory of Indian plum and Himalayan blackberry. Since 2004, portions of the forested stand have been cleared for road improvements and building construction. Continuing development adjacent to the forested stand, coupled with the continued presence of bald eagles in the area, have discouraged the birds from returning.

Beaver and other small mammals, as well as woodpeckers, forest- and wetland-associated songbirds, common waterfowl, hawks, and owls occur along Bear creek and its associated riparian habitats. Special-status avian species observed at Bear Creek include great blue heron, osprey, and bald eagle. One or more bat species may forage in and around the creek and riparian area. A restoration project along the banks of Bear Creek exists downstream from the proposed light rail crossing of the creek. Non-native vegetation has been removed and replanted with native shrubs and tree saplings.

Marymoor Park was once part of the floodplain of Lake Sammamish. Currently, the Sammamish River runs through a portion of the park and enters Lake Sammamish at the southern boundary of the park. Marymoor Park is 640 acres and has a variety of habitats, including herbaceous, scrub-shrub and forested wetlands, riparian corridors, deciduous upland forests, and grassy fields. Two bald eagle nests, an osprey nest, and a red-tailed hawk nest are located within the park's boundaries. Three pairs of red-tailed hawks were observed at several locations at Marymoor Park during the vegetation surveys conducted in April 2007. Several nest boxes are set up for purple martins at the south end of the park, and they have used these nest boxes in the past. However, since 2008, use of these boxes by purple martins is uncertain (Hobbs, 2011). More than 195 bird species have been recorded, primarily breeding and migratory songbirds and waterfowl. Reptiles and a variety of small mammals and deer also occur in the park. Although habitat exists within the park boundaries for several bat species, none are listed as occurring at Marymoor Park and no formal bat surveys have been conducted. Salmon migrate up the Sammamish River destined for spawning areas upstream. During the salmon spawning runs, groups of juvenile bald eagles congregate in Marymoor Park along the Lake Sammamish shoreline. Approximately 31 juvenile bald eagles were counted one evening in September 2006. A small mitigation wetland is located on the northern end of the park, abutting the park's boundary with SR 520.

### 3.2.2 WDFW Priority Habitats and Vegetation Types

Table 3-7 lists the types of WDFW-designated priority habitats that occur in the East Link Project study area and the location of key habitats.

TABLE 3-7
WDFW Priority Habitats That Occur in East Link Project Study Area

| WDFW Priority Habitat Type | WDFW Criteria for Designation as a Priority Habitat Type | Corresponding Project Vegetation Types and Locations[a] |
|---|---|---|
| Freshwater Wetlands and Fresh Deepwater | Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration | Wetland and open water, including Lake Washington (*Preferred A1*) and much of Mercer Slough Nature Park (*Preferred B2M*, B1, B2A, B2E, B3, B7) |
| In-stream | Comparatively high fish and wildlife density and species diversity, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration, dependent species | Kelsey Creek, West Tributary to Kelsey Creek, Valley Creek (*Preferred D2A*, D2E, D3, D5)<br>Goff Creek (D5)<br>Bear Creek and Sammamish River (*Preferred E2*, E1, E4) |
| Riparian | High fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important wildlife seasonal ranges, important fish and wildlife movement corridors, high vulnerability to habitat alteration, unique or dependent species | Riparian areas along:<br>Mercer Slough (B7)<br>West Tributary to Kelsey Creek (*Preferred D2A*, D2E, D3, D5)<br>Bear Creek *(Preferred E2*, E1, E4) |
| Biodiversity Areas and Corridors | Areas of habitat that are relatively important to various species of native fish and wildlife. | Urban mostly vegetated – coniferous forest and deciduous forest (*Preferred B2M*, B1, B2A, B2E, B3, B7) |

Source: WDFW Priority Habitats and Species (http://wdfw.wa.gov/conservation/phs/)

[a]Alternative Designations:

*Preferred A1 = I-90*
*Preferred B2M =112th SE Modified*
B1 = Bellevue Way
B2A = 112th SE At-Grade
B2E = 112th SE Elevated
B3 = 112th SE Bypass
B7 = BNSF
*Preferred D2A = NE 16th At-Grade*
D2E = NE 16th Elevated
D3 = NE 20th
D5 = SR 520
*Preferred E2 = Marymoor*
E1 = Redmond Way
E4 = Leary Way

## 3.2.3 Federal and State Threatened, Endangered, and Candidate Species and Species of Concern

Other than the aquatic species discussed in Section 3.1 of this report, there is one ESA-listed species (marbled murrelet *[Brachyramphus marmoratus]*), which is listed but not likely present, and four federal candidate or species of concern that are likely to be present in the study area. These species are described herein. Other state-priority species known or likely to be present in the study are identified in Table 3-8. Appendix C lists the ESA-listed and state-priority species that are known in the study area and that are likely present and possibly present within the project vicinity based on the known or general distribution of the species, their habitat preferences, and the presence of potentially suitable habitat for the species. This report does not discuss wildlife species "possibly present" other than by way of addressing the high-value habitats that may be suitable habitat for these species.

Site-specific distribution data are available for only a few of these species, and no species-specific surveys or habitat assessments were conducted for this project. The USWFS Threatened and Endangered Species System website for species and habitats listed in King County indicated that there is a federally threatened wildlife species under the ESA: the marbled murrelet. ESA-listed fisheries resources that may potentially occur within the study area were addressed in Section 3.1, Aquatic Resources, of this report. Database searches indicated that there are no federal-listed nor state-listed plants in the study area. Based on the available known and general distribution data, habitat requirements, and habitats present in the vicinity of the study area, no priority terrestrial small mammal, large mammal, reptile, or insect species other than butterflies occur or are likely to occur within a half mile of any of the project segments.

TABLE 3-8
State Priority Species Likely or Known to Occur in East Link Project Study Area

| Name | State Status[a] | Presence, Preferred Habitat, and Probable Location in Study Area |
|---|---|---|
| **Bird** | | |
| Pileated woodpecker (*Dryocopus pileatus*) | State candidate | Known in the study area. Typically found in forests with a component of dead and dying trees and snags for foraging and nesting. Found at Marymoor Park and throughout the study area. One bird observed near I-405 south of SE 8th Street. Likely habitat along the BNSF (B7) and *Preferred Marymoor (E2)* alternatives due to larger clusters of larger trees and snags. |
| Purple martin (*Progne subis*) | State species of concern | Known in the study area. Nests in structures over water bodies, including natural cavities, pilings, and manmade housing structures. Forages over open water or wet areas for insects while in flight. Nesting observed at Marymoor Park in 2003 (*Preferred Alternative E2*). Habitat may also be present in Segment B. |
| Western grebe (*Aechmophorus occidentalis*) | State species of concern | Known in the study area. Nests in colonies numbering up to several hundred birds east of the Cascade Mountains and is a winter resident on Lake Washington and Puget Sound The highest likelihood of occurrence is in Segment A. |
| Merlin (*Falco columbarius*) | State species of concern | Likely present in the study area. Seen during the nesting season at Marymoor Park. Commonly found throughout western Washington, including urban areas, in winter and during migration. Might occur in Segments A, B, D, and E. |

[a] Washington priority species include only native Washington fish and wildlife species that are listed as endangered, threatened, or sensitive, or as candidates for these designations as established in the Washington Administrative Code.

#### 3.2.3.1 Marbled Murrelet

The marbled murrelet is listed as a federal and state threatened species and might occur in Segment A. The population is rapidly declining, and the USFWS has determined that the population is currently not self-sustaining (Csuti et al., 1991; Ralph et al., 1995; Wahl et al., 2005). During the nonbreeding season, marbled murrelets are rare and infrequent visitors to Lake Washington that have been observed on the lake in the past but have not been documented to use the lake since the early 1990s and only once in the last 50 years. As such, they are not expected to be in the project vicinity.

#### 3.2.3.2 Bald Eagle

Bald eagles were listed as threatened under the ESA until July 2007, when they were delisted because the successful recovery efforts. However, bald eagles are still protected by two other federal laws: the Bald and Golden Eagle Protection Act and the MBTA. Both laws prohibit killing, selling, or otherwise harming eagles, their nests, or eggs. On June 5, 2007, the USFWS clarified its regulations implementing the Bald and Golden Eagle Protection Act and published a set of National Bald Eagle Management Guidelines. These actions are designed to give landowners and others clear guidance that actions they take on their property are consistent with the Bald and Golden Eagle Protection Act and the MBTA. The Bald Eagle Protection Act requires the establishment of rules defining buffers around bald eagle nest and roost sites. If the activity is within a half mile of an eagle nest or within a quarter mile of an eagle roost, WDFW is notified and works with the landowner to develop a Bald Eagle Management Plan (see WAC 232-12-292, Section 4.4).

There are no communal bald eagle roosts, winter concentration areas, or buffers for such areas within a half mile of any of the proposed alternatives or project elements. However, there are five active eagle territories located within a half mile of one or more of the alternatives (eagle territories vary in size depending upon the amount of food available and the density of eagles in the area). Three of the territories were known to be active with incubating adults in April 2007. The other two territories were active in 2006, but their status for 2007 is unknown. Bald eagles have strong site fidelity, so it is likely the birds are still within their territories and may have built new nests nearby. Therefore, all five nesting territories were included in this analysis. Table 3-9 presents the location of bald eagle nests in relation to the project alternatives and the results of the VIEWSHED analysis.

Four bald eagle nests are located either on the shoreline of Lake Washington or near the lake. Bald eagles are sighted in Segments A, B, and E. WDFW and the bald eagle recovery plan designated 800-foot-wide buffers around nests and shoreline foraging areas (see Appendix D for detailed WDFW management recommendations). The USFWS also designated larger territories around bald eagle nests and foraging areas. The buffers and territorial designations include relatively large areas of Lake Washington shoreline. None of the alternatives is

located within any of the 800-foot-wide nest or shoreline buffers. *Preferred Interstate 90 Alternative (A1)* and Bellevue Way (B1), 112th SE At-Grade (B2A), 112th SE Elevated (B2E), 112th SE Bypass (B3), and BNSF (B7) Alternatives are within the larger territories of three nests.

TABLE 3-9
Location of Bald Eagle Nests in Relation to Project Alternatives, Visibility from Nests, and Distance from Nest to Alternative

| WDFW PHS Bald Eagle Nest Number | Segments Within Half Mile of Nest | Shortest Distance, Nest to Segment (miles) | Segments Likely Visible from Nest | Minimum Distance to Visible Part of Segment (miles) | Area Visible from Nest |
|---|---|---|---|---|---|
| 4712252059 | *Preferred A1*, I-90 | 0.4 | *Preferred A1*, I-90 | 0.4 | Short sections of Mercer Island |
| 4712252952 | *Preferred A1*, I-90 | 0.6 | *Preferred A1*, I-90 | 0.6 | Short sections of Mercer Island |
| 4712252056 | *Preferred A1*, I-90<br>B1, Bellevue Way | 0.5 | *Preferred A1*, I-90 | 0.5 | Much of Mercer Island |
| 4712252017 | B1, Bellevue Way | 0.5 | None | > 1 | Much of Mercer Island and east quarter of Lake Washington |
| 4712261026 | E1, Redmond Way<br>E4, Leary Way | 0.5 | None | > 1 | None |

There is an additional bald eagle nest located just over a half mile from SR 520 and *Preferred Marymoor Alternative (E2)*. This nest is very hard to see because it is hidden in a fork in a large maple or cottonwood tree in a densely forested area of Marymoor Park. Neither the highway nor *Preferred Alternative E2* would be visible from this nest site because of its location below the top of the forest canopy and the dense surrounding forest.

As many as 33 bald eagles, all but 2 of them juveniles, and several herons have been reported foraging along the shore of Lake Sammamish during the fall period (Norman, 2007b). The shortest distance between the study area and Lake Sammamish is about 0.75 mile, and there is no direct line of sight between the lake and the study area. Bald eagles are suspected of foraging for salmon along Bear Creek during the fall and winter.

### 3.2.3.3 Peregrine Falcon

Peregrine falcons are a federal-species of concern and state-monitored species. The WDFW PHS database indicates that there are three peregrine falcon nests within a half mile of the study area. One is located under the I-90 bridge across Lake Washington just above the Seattle shoreline, and the second is located under the East Channel bridge on the Mercer Island side. This nest was confirmed in 2006 and 2009 by WDFW (WDFW, 2010). Recent nesting activity is unknown. A third nest is located in Downtown Bellevue (WDFW, 2010). Sightings and potential viable habitat occur in Segments A, B, and E.

### 3.2.3.4 Olive-Sided Flycatcher

The olive-sided flycatcher (*Contopus borealis*) is a federal species of concern. It nests in coniferous forest and mixed coniferous-deciduous forests and woodland, often with service berry and mountain-mahogany. They also are attracted to burned-over areas with standing dead trees. Most nesting sites contain dead standing trees, which are used as singing and feeding perches. The cause of precipitous declines in their populations across known distributions is not fully understood. The small brood size, climate changes, deforestation in wintering areas, and declines in insect populations might all play a role in olive-sided flycatcher decline. It breeds in coniferous forests in North America. The olive-sided flycatcher is common in most forest openings throughout Washington and is sometimes found in city parks or suburban areas, especially during migration. This species might have potential habitat in Segments B and E.

### 3.2.3.5 Willow Flycatcher

Willow flycatchers *(Empidonax traillii)* are a federal species of concern. Willow flycatchers are strongly tied to brushy areas of willow, alder, and similar dense stands of riparian shrubs, especially where such riparian areas are bordered by open stands of cottonwood. They prefer thickets, open second growth with brush, swamps, wetlands, stream sides, and open woodlands. Water and deciduous shrubs appear to be their essential habitat elements for nesting areas. This species is declining because of several factors, including loss of riparian vegetation cover from recreational uses and grazing pressure, and heavy nest parasitism by cowbirds. Water

diversions and flood control that prevent willow and alder regeneration and deforestation on wintering grounds are also likely factors in their long-term population instability. The willow flycatcher breeds in deciduous thickets, especially in willow thickets. Nest sites are often close to water. They are known to be present in Segments B and E.

### 3.2.4 Critical Area Ordinances

Title 21A of the GMA requires counties and cities in Washington to designate and protect critical areas, in accordance with RCW 36.70A.170. The GMA requires local jurisdictions to designate and protect critical areas using the best available science in developing policies and regulations to protect critical area functions and values. The GMA is intended to protect the public's health and safety by requiring county and city governments to create locally based plans and regulations that are centered on land use and natural resource issues as guided by the state legislature. Critical areas are one of the two primary natural resource areas addressed in the GMA planning process. Critical areas include wetlands, critical recharge areas for potable water aquifers, frequently flooded areas, geological hazard areas, and fish and wildlife habitat conservation areas.

Fish and wildlife habitat conservation areas are the primary way the WDFW works to conserve wildlife habitat in Washington. While WDFW is charged with protecting and maintaining fish and wildlife populations, WDFW has little authority over the habitats used by fish and wildlife species. Protection is primarily achieved through the voluntary actions of landowners and through existing state regulations, including SEPA, the GMA, the Forest Practices Act, and the SMA. WDFW primarily serves an advisory role by reviewing proposals for development and offering guidelines for species management on private property. WDFW has written management guidelines for all state- and priority-listed species. Priority species include species and wildlife congregations that are priorities for conservation due to their population status, sensitivity to disturbance, and economic, recreational, or tribal importance. These species may or may not be listed as an endangered, threatened, sensitive, or candidate species by the state or federal government. The management recommendations are generalized guidelines and are not enforceable regulations, except through CAOs enforced by local jurisdictions.

In order to meet the requirements established by the GMA, King County and the Cities of Bellevue, Mercer Island, and Redmond created CAOs to ensure the management and protection of lands used by listed and locally important species. The details of these ordinances and management recommendations are available in Appendix E.

The following paragraphs summarize applicable ordinances within the study area:

- Section 198 of the King County Comprehensive Plan requires the county to protect the active breeding sites of these species, as well as the immediate area surrounding each site to prevent any disturbance to breeding activities. The species include the bald eagle, great blue heron, osprey, peregrine falcon, northern spotted owl (*Strix occidentalis*), marbled murrelet, Townsend's big eared bat (*Corynorhinus townsendii)*, Vaux's swift, red-tailed hawk, and goshawk (*Accipiter gentilis*).
- The City of Mercer Island Comprehensive Land Use Plan includes Ordinance No. 05C-12, which details its critical areas regulations. In order to streamline its critical areas regulations, the City of Mercer Island adopted WDFW's PHS program in its entirety in 1998.
- Under Bellevue's Land Use Code 20.25H.025, any habitat associated with a species of local importance is to be designated a critical area. Furthermore, if a habitat associated with a species of local importance is impacted by a proposed development, the proposal shall implement the WDFW wildlife management recommendations designed for that species. If the habitat does not include a critical area or critical area buffer, but is occupied by a locally important species, then only the guidelines in the wildlife management recommendations need to be followed. Species of local importance include great blue heron, red-tailed hawk, bald eagle, peregrine falcon, osprey, pileated woodpecker, purple martin, common loon (*Gavia immer*), western grebe, merlin, great egret, green heron, Vaux's swift, Townsend's big-eared bat, and western toad.
- The City of Redmond's Critical Areas Ordinance (Ordinance #2259) applies species protection to state species of concern, Priority species designated by WDFW, and locally important species. The only locally important species is the great blue heron.

# 3.3 Wetland Resources

The 17 wetlands identified in the study area are discussed in Section 3.3.2. No wetlands were found in Segment A, so this segment is not included in exhibits or discussions of wetlands. Exhibits 3-27 through 3-29 illustrate the wetlands found in the study area. Most of these wetlands are associated with Mercer Slough, Sturtevant Creek, the West Tributary to Kelsey Creek, or Bear Creek. In addition to these larger systems, several smaller wetlands were found in the study area in the vicinity of Valley Creek and near the former BNSF Railway corridor in the Bel-Red corridor. All wetlands in the study area have been altered and are surrounded by urban and residential environments.

## 3.3.1 Analysis of Wetland Determinations

### 3.3.1.1 Soils

The Natural Resources Conservation Service (NRCS) soil survey map for King County lists 20 soil series in the study area (Table 3-10). Of these 20 series, six are classified as hydric soils: Bellingham silt loam, Norma sandy loam, Puget silty clay Loam, Seattle muck, Snohomish silt loam, and Tukwila muck (USDA SCS, 1988).

TABLE 3-10
Soil Series Found within East Link Project Study Area

| Soil ID | Soil Name and Description | Soil Location | Hydric? |
|---|---|---|---|
| AgC | Alderwood gravelly sandy loam 6 – 15% slope | Steep slope west of West Sammamish Parkway | No |
| AgD | Alderwood gravelly sandy loam 15 – 30% slope | 118th Avenue SE | No |
| AmC | Arents, Alderwood material 6 – 15% slope | Bus parking lot | No |
| Bh | Bellingham Silt Loam | Between 152nd Avenue NE and 156th Avenue NE in Overlake | Yes |
| Ea | Earlmont silt loam | Along Bear Creek Parkway | No |
| EvB | Everett gravelly sandy loam 0 – 15% slope | Redmond | No |
| EwC | Everett-Alderwood gravelly sandy loams 6 – 15% slope | West of Bellevue Way | No |
| InA | Indianola loamy fine sand 0 – 4% slope | Along 520 in Redmond | No |
| KpB | Kitsap silt loam 0 – 8% slope | 118th Avenue SE | No |
| KpC | Kitsap silt loam 8 – 15% slope | 118th Avenue SE | No |
| KpD | Kitsap silt loam 15 – 30% slope | 118th Avenue SE | No |
| No | Norma sandy loam | Downtown Bellevue | Yes |
| Ur | Urban land | Bellevue, Overlake, Redmond | No |
| Pc | Pilchuck loamy fine sand | On the upper banks of the Sammamish River | No |
| Pu | Puget silty clay loam | Bellevue, Redmond | Yes |
| Re | Renton silt loam | Segment C west of Lake Bellevue | No |
| Sk | Seattle muck | West Tributary to Kelsey Creek Riparian area, Mercer Slough | Yes |
| So | Snohomish silt loam | Southwest Mercer Slough | Yes |
| Su | Renton silt loam | By the horseshoe-shaped detention pond | No |
| Tu | Tukwila muck | BNSF Matrix Wetland and north of Sturtevant Creek | Yes |

Source: USDA (2008).

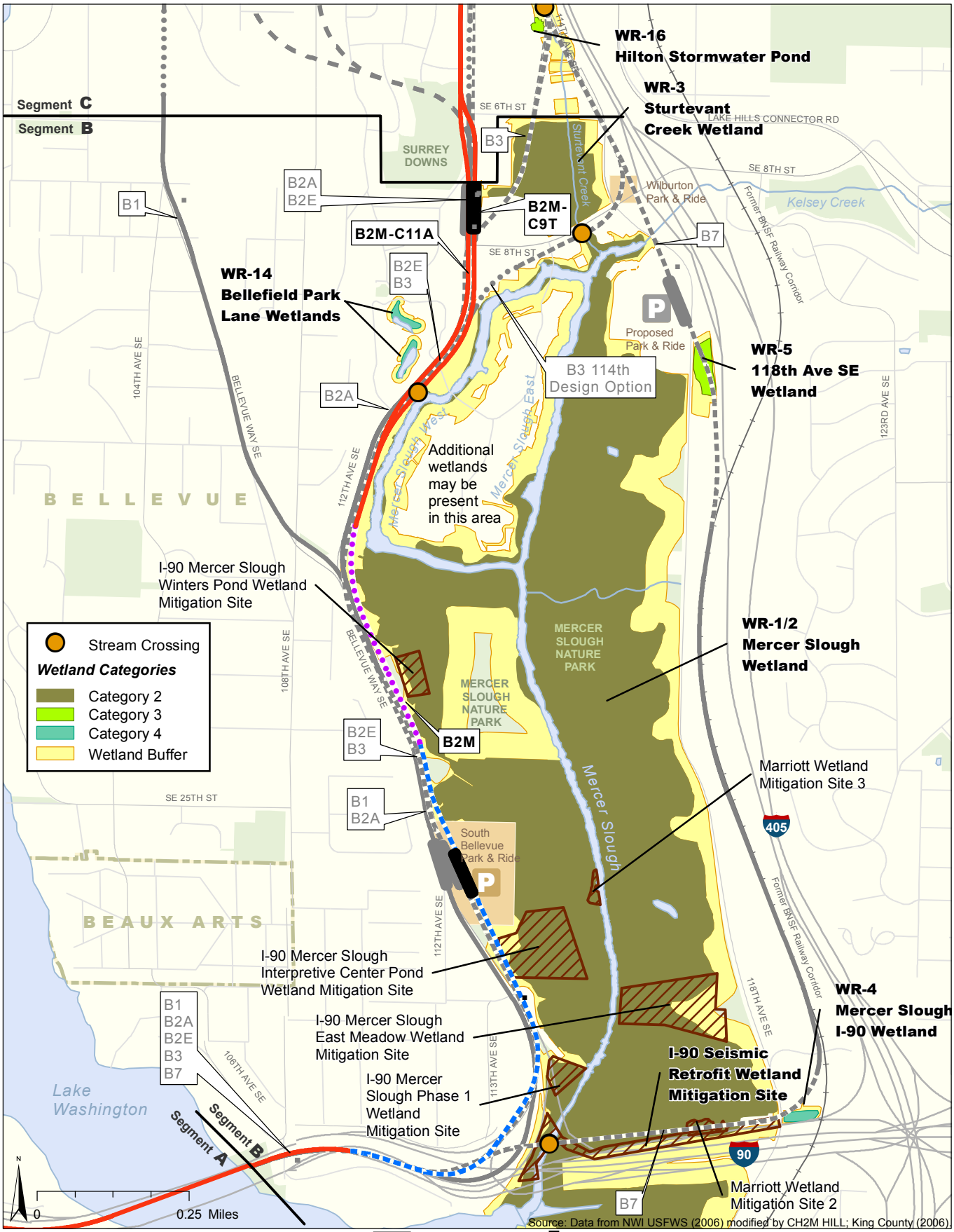



Exhibit 3-27
**Wetland Resources**
**Segments B and C**
*East Link Project*

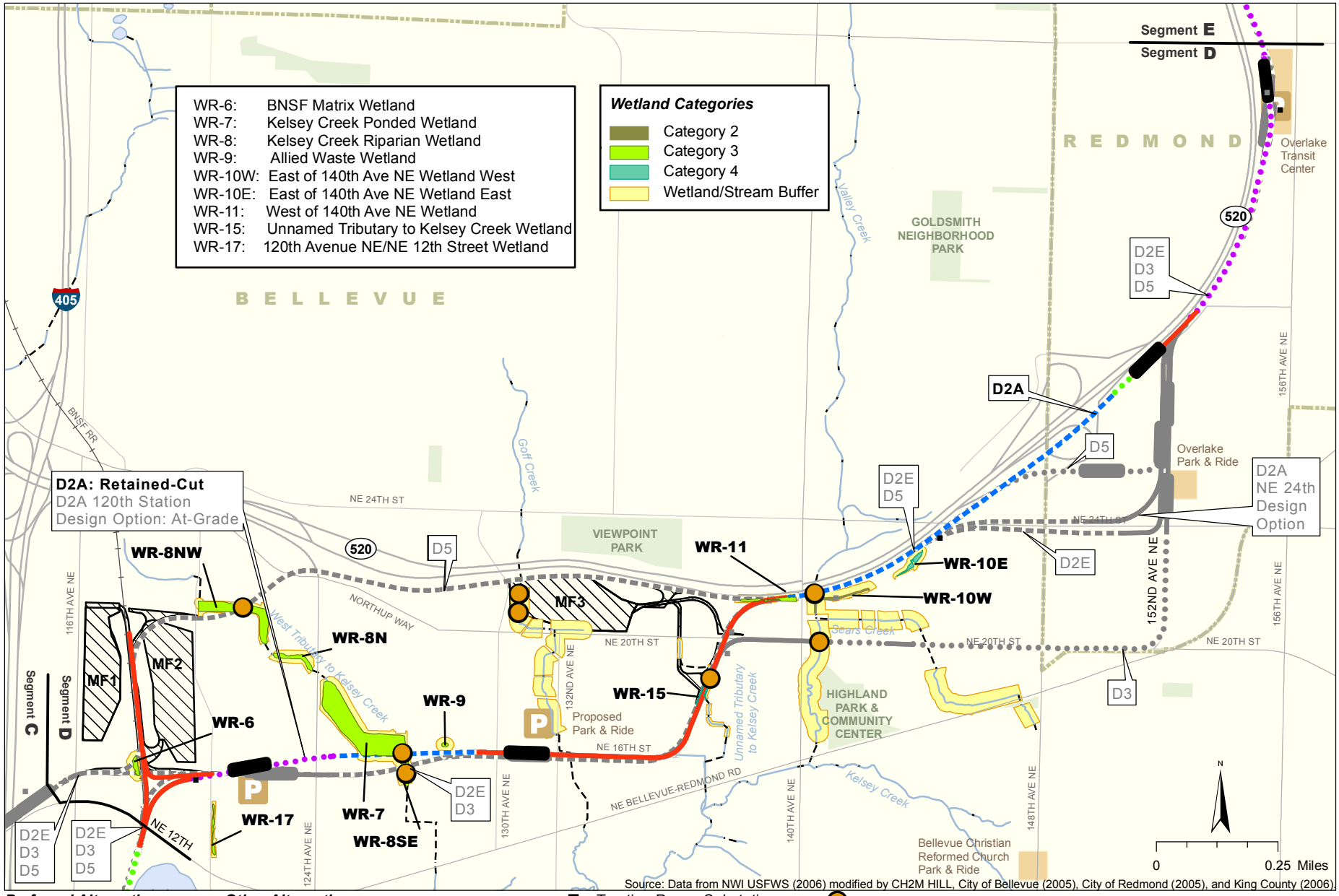
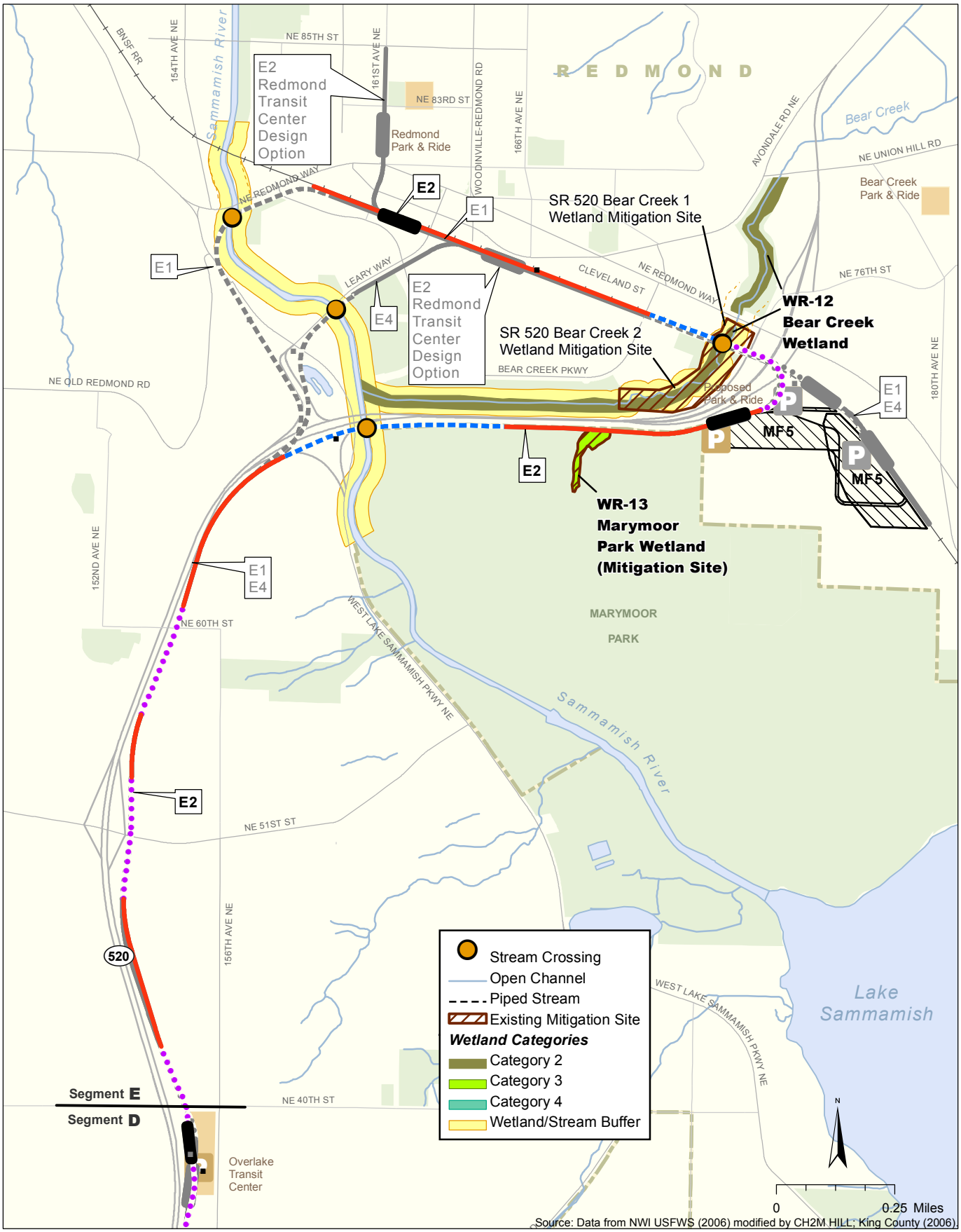



Exhibit 3-28
**Wetland Resources**
**Segment D**
*East Link Project*




**Preferred Alternative**
- At-Grade Route (E2)
- Elevated Route
- Retained-Cut Route
- Retained-Fill Route
- Tunnel Route

**Other Alternatives**
- At-Grade Route (E1)
- Elevated Route
- Retained-Cut or Retained-Fill Route
- Tunnel Route

- Traction Power Substation
- Proposed Station
- Maintenance Facility
- City Limits

Exhibit 3-29
**Wetland Resources**
**Segment E**
*East Link Project*

All the hydric soils listed in Table 3-10 have a seasonal water table that reaches above or just below the surface. Runoff is slow for these soils, and available water capacity is high. In addition, the hazard of stream overflow is severe. Soil descriptions can be found at the King County Conservation District website (http://www.kingcd.org/pub_soil_des.htm) and the USDA website that is the source for Table 3-10.

#### 3.3.1.2 Vegetation

Invasive non-native and opportunistic native plant species dominate the wetlands within the study area. These species tolerate many disturbances and can out-compete less tolerant native species and thus dominate a wetland. This cycle lowers wetland diversity, habitat complexity, and the range and level of functions the wetland provides. Disturbances that can lead to wetland dominance by invasive non-native and opportunistic native plant species include altered water regimes, filling, and disturbance to soils. Non-native species that are dominant in the study area include Himalayan blackberry, evergreen blackberry *(Rubus laciniatus)*, reed canarygrass, and purple loosestrife *(Lythrum salicaria)*. Portions of Mercer Slough and Bear Creek, and the small Mercer Slough tributary is dominated by a solid Himalayan blackberry monoculture. The riparian emergent stratum at Sturtevant Creek is solid reed canarygrass that reaches nearly 4 feet in height. Native opportunistic plant species include soft rush (*Juncus effusus*) and horsetail (*Equisetum arvense* and *E. telmatiea*). Both of these species were present in most of the wetlands surveyed.

#### 3.3.1.3 Hydrology

Signs of altered hydrology were evident throughout the study area. Along Segment B, portions of wetland that were once a part of the main Mercer Slough complex are separated by paved roads, office complexes, and medium-density residential communities. Hydrologic connection between these wetlands and Mercer Slough still exists via culverts that run beneath 118th Avenue SE as well as via groundwater movement. In addition, several wetland complexes have been created or enlarged due to human activities in the study area. Both drainage wetlands adjacent to Valley Creek in Segment D (WR-10E, WR-10W, and WR-11) receive most of their source water from SR 520 runoff and other impervious surface runoff from surrounding office and retail buildings and parking lots. In Segment E, the Marymoor Park mitigation wetland (WR-13) was built in a historic floodplain area of Bear Creek. The surface and floodwater connection between the area south of SR 520 and Bear Creek, however, has been severed due to road and building construction in the Redmond area.

#### 3.3.1.4 Jurisdictional Determination

Sound Transit has not requested formal wetland jurisdictional determinations from the local, state, or federal regulatory agencies. Some jurisdictions may not regulate all the wetlands. During permitting of the preferred alternatives, Sound Transit will request jurisdictional determinations of those wetlands that are likely to be affected along the preferred alternative routes.

### 3.3.2 Wetland Descriptions

The following section describes the wetland complexes located in the study area by segment as illustrated in Exhibits 3-27 through 3-29 and listed in Table 3-11.

#### 3.3.2.1 Segment B

**Mercer Slough Wetland (WR-1/2)**

The Mercer Slough wetland complex is located in the southwestern quadrant of Bellevue. One hundred and fifty years ago, Mercer Slough and its wetlands were a mix of swamps, marshes, and shallow watered areas along Lake Washington. When the Lake Washington Ship Canal and Hiram Chittenden Locks were completed in 1916, the water level in Lake Washington dropped approximately 10 feet, exposing most of the banks now seen along Mercer Slough. Today, the 326-acre Mercer Slough Nature Park encompasses most of the remaining wetland complex and the slough. For this study, the Mercer Slough wetland includes WR-1/2, and four smaller sub-wetlands that are hydrologically connected to Mercer Slough and exist outside the park's boundaries—Sturtevant Creek wetland (WR-3) to the north, 118th Avenue SE wetland (WR-5) to the east, the Mercer Slough/I-90 wetland (WR-4) to the southeast near 118th Avenue SE and I-90 overpass, and the Bellefield Lane Park wetland (WR-14) to the northwest. Bellevue (2008) prepared an inventory of the shoreline-associated wetlands surrounding Mercer Slough as part of an update to their Shoreline Master Plan (SMP).

EXHIBIT 3-30
Mercer Slough Wetland (WR-1/2)

The Mercer Slough wetland is a mixture of palustrine forested (PFO), palustrine scrub-shrub (PSS), and palustrine emergent marsh (PEM) wetlands. Many, if not most, of the wetlands in the Mercer Slough complex grow in deep organic soils. PEM dominates the east and west tributaries of Mercer Slough. Throughout Mercer Slough Nature Park, reed canarygrass dominates the understory. Dominant tree species of PFO/PSS include black cottonwood (*Populus balsamifera*) and red alder, with an understory of willow (*Salix* spp.), red-osier dogwood (*Cornus sericea*), and salmonberry (*Rubus spectabilis*). In disturbed areas, Himalayan blackberry is also common in the shrub layer, primarily along the West Tributary to Mercer Slough, near the I-90 overpass at the southern end of the park, and along the park boundary adjacent to Bellevue Way SE (see Exhibit 3-30).

The southern and mid-section of Mercer Slough Nature Park support several different wetland types. Lake Washington forms the southern boundary of the park. Emergent vegetation with patches of shrubs and small trees dominate the wetlands just north of the lake. Labrador tea (*Ledum groenlandicum*) with a shrub overstory of Pacific willow (*Salix lasiandra*) dominates the PEM/PSS situated in the central portion of the park. Soils found in this area of Mercer Slough Nature Park are peat and Seattle muck.

The northern section of the park is highly fragmented and disturbed. Office complexes are located within 20 feet of Mercer Slough West. Himalayan blackberry and other non-native plant species dominate the banks of the slough. A portion of the wetland on the west side of the park remains drained and pumped for the production of blueberries. The City of Bellevue (2008) rated Mercer Slough wetland as Category 2. In addition there are five WSDOT wetland mitigation sites and two Marriott mitigation sites within Mercer Slough Nature Park (see Table 3-12 and Exhibit 3-27).

### Mercer Slough/I-90 Wetland (WR-4)

Located where I-90 crosses 118th Avenue SE, the Mercer Slough/I-90 wetland receives runoff from I-90 and an office park complex adjacent to the wetland. Water quality observed during field visits in March 2007 was low. The water emitted a faint sulfidic odor, and thick mats of orange bacteria were present throughout the length of the watercourse. Salmonberry is the dominant shrub, and the forest canopy is well established with red alder and black cottonwood. This site has patches of Japanese knotweed *(Polygonum cuspidatum)* along its southern bank. Sound Transit rated this wetland as Category 4 (see Exhibit 3-31).

EXHIBIT 3-31
Mercer Slough/I-90 Wetland (WR-4)

### 118th Avenue SE Wetland (WR-5)

This forested depressional wetland is located between I-405 and 118th Avenue SE on property that formerly housed a WSDOT facility. The wetland discharges to Mercer Slough through a culvert under 118th Avenue SE. As part of the *I-405 Bellevue Nickel Improvement Project* in 2006, WSDOT (2006) rated this wetland as Category 2 (referred to in their document as Wetland 12.4L). Willow and red alder dominate the wetland, and it also contains reed canarygrass (see Exhibit 3-32).

EXHIBIT 3-32
118th Avenue SE Wetland (WR-5)

### Sturtevant Creek Wetland (WR-3)

Sturtevant Creek emerges from Lake Bellevue and travels southwest towards Mercer Slough. Just north of Mercer Slough, a riparian wetland complex has developed on the east and west banks of Sturtevant Creek. This wetland complex has good diversity of shrubs established within its boundary, including Pacific ninebark (*Physocarpus capitatus*), Douglas spirea, red-osier dogwood, Indian plum *(Oemleria cerasiformis)*, salmonberry, willow, and cottonwood and alder saplings. The herbaceous layer is a monoculture of reed canarygrass. Himalayan blackberry is also found in several thickets. Bellevue (2008) rated this wetland as Category 2 (see Exhibit 3-33).

### Bellefield Park Lane Wetland (WR-14)

According to the City of Bellevue (2008), the Bellefield Park Lane Wetland is an approximately 0.6-acre depressional wetland surrounded by an apartment complex. It is located west of 112th Avenue SE, which separates the wetland from the Mercer Slough wetland. Water drains from the wetland through a culvert beneath 112th Avenue SE and cascades approximately 10 to 15 vertical feet down a channel into Mercer Slough West. The wetland contains a large, permanently inundated pond, surrounded by saturated areas. Reed canarygrass, buttercup, and lady fern grow along banks of the inundated area with some black cottonwood, weeping willow, and alder interspersed occasionally. Bellevue (2008) rated this wetland as Category 4.

EXHIBIT 3-33
Sturtevant Creek Wetland (WR-3)

## 3.3.2.2 Segment C

### Hilton Stormwater Pond (WR-16)

This small (0.2-acre) depressional stormwater pond is located between the Hilton Hotel and Sturtevant Creek (Exhibit 3-34). Wetland characteristics were observed around the pond. Vegetation consists of a band of unmowed, thick-stemmed emergent and mowed bird's foot trefoil (*Lotus corniculatus*) around three sides of the open water pond. One red alder tree is located on the west side of the pond. Water marks observed on the wall that forms the northern side of the pond indicate that the water surface elevation rises approximately 18 inches above the summer low. The wetland offers no special habitat features and has only mowed park-like and developed

EXHIBIT 3-34
Hilton Hotel Stormwater Pond (WR-16)

buffers. Sound Transit rated the wetland as Category 3. Some or all of the jurisdictions may not regulate this pond as a wetland. Sound Transit will discuss the jurisdictional determination of this pond with the regulatory agencies during the permitting process.

#### 3.3.2.3 Segment D

**BNSF Matrix Wetland (WR-6)**

In January 2008 the Watershed Company (2008a) conducted a wetland delineation study for the Children's Hospital project that has been constructed and is now operating. This wetland information was incorporated into the database for the East Link Final EIS because it is more current and more detailed than the initial reconnaissance that Sound Transit conducted for the Draft EIS. According to the report prepared by the Watershed Company (2008a), WR-6 is a depressional palustrine forested wetland, which flows to an adjacent drainage ditch east of the property boundary along the neighboring former BNSF Railway corridor (Exhibit 3-35). Groundwater and precipitation are the primary sources of hydrology. Dominant vegetation in the wetland consists of black cottonwood, Pacific willow, hardhack, and Himalayan blackberry. The Watershed Company (2008a) rated this wetland as Category 3.

EXHIBIT 3-35
BNSF Matrix Wetland (WR-6)

**120th Avenue NE/NE 12th Street Wetland (WR-17)**

In July of 2010, the City of Bellevue conducted a delineation of the 120th Avenue NE/NE 12th Street wetland (WR-17) on the east side of 120th Avenue NE and immediately north of NE 12th Street (City of Bellevue, 2010a). This long, narrow depressional wetland is located at the toe of a disturbed slope between 120th Avenue NE and an industrial building (see Exhibit 3-36). Moist, hydric soils were found in the wetland. Hydrology appears to enter the wetland via surface and ground water and drain slowly through culverts to the south into Lake Bellevue. Dominant vegetation in this scrub-shrub wetland includes Pacific willow (*Salix lasiandra*), Douglas spirea, and an emergent stratum of bentgrass (*Agrostis* sp.). The wetland is roughly 0.2 acre in size and was rated Category 3.

EXHIBIT 3-36
120th Avenue NE/NE 12th Street Wetland (WR-17)

**West Tributary to Kelsey Creek Riparian (WR-8NW, WR-8N, and WR-8SE) and Ponded (WR-7) Wetlands**

The four wetlands identified in the study area along the West Tributary to Kelsey Creek are largely narrow, fringe wetlands growing along the creek and encroached by surrounding development. Riparian uplands extend for several more feet upslope of the fringe riparian wetlands.

Four ponds exist along the West Tributary to Kelsey Creek in the study area near the King County Metro Maintenance Base along 124th Avenue NE. A beaver dam at the road culvert forms a small pond to the west of 124th Avenue NE (wetland WR-8N). Just northwest of this wetland and upstream from a private road, is another similar riparian wetland (WR-8NW), which is formed by a beaver dam at the culvert that crosses under the private road (Exhibit 3-12). To the east of 124th Avenue NE, a flood control dam installed at the south end of the pond system has converted this reach of the West Tributary to Kelsey Creek into a stormwater detention pond (wetland WR-7), and several snags and weakened trees remain in the center of this pond (Exhibit 3-10). Shallow water and low-lying banks of the detention pond support a thick growth of reed canarygrass, while the upper banks are covered with shrubs and trees. Downstream of the detention pond dam, water collects in a small pond with an associated PEM/PSS wetland WR-8SE dominated by reed canarygrass, red-osier dogwood, and black cottonwood. The creek flows out

of this pond over a weir and into a pipe system (Exhibit 3-11). All three ponded sections of the West Tributary are rated as Category 3 wetlands (see Exhibit 3-37).

### Allied Waste Wetland (WR-9)

During field investigations, a small Category 4 wetland was located to the east of the Allied Waste Facilities parking lot. The wetland is located behind a retail office complex between 124th Avenue NE and 130th Avenue NE, and heavy industrial and retail development surround the site. The wetland measures roughly 30 feet by 30 feet and is dominated by reed canarygrass and Himalayan blackberry. Stormwater from the surrounding buildings drains into the wetland by following a 1- to 3-foot-wide drainage channel. The drainage ditch supports wetland plants tolerant of disturbances, including horsetail and soft rush. Soils in the canarygrass/blackberry patch were fill soils that met hydric soil criteria because mottles were present within 10 inches of the surface.

EXHIBIT 3-37
West Tributary to Kelsey Creek Riparian Wetland (WR-8SE)

### East of 140th Avenue NE Wetlands (WR-10E and WR-10W)

In May 2009, Sound Transit delineated two separate wetlands east of 140th Avenue NE. The western wetland (WR-10W) is a riverine wetland with forested, shrub, and emergent vegetation classes associated with Valley Creek that flows from the north through two culverts under SR 520, and a small drainage swale that enters from the east (Exhibit 3-38). Valley Creek is the primary source of hydrology for the side of this wetland west of Valley Creek; the drainage swale receives stormwater runoff from adjacent parking lots, office buildings, and retail complexes. Dominant vegetation in the wetland included black cottonwood, red alder, Sitka and Pacific willow, Douglas spirea, and reed canarygrass. An unusual building at this location was constructed within the Valley Creek floodplain. The structure is built to allow floodwaters to flow under the building, although shading prevents vegetation from growing. The emergent vegetation in this wetland is regularly mowed. Sound Transit rated wetland WR-10W as Category 2.

EXHIBIT 3-38
East of 140th Avenue NE Wetland (WR-10W)

The eastern wetland (WR-10E) is a long, narrow, forested depression that forms a drainage swale between the SR 520 embankment and the fill from parking lots and building foundations (Exhibit 3-39). The drainage swale receives stormwater runoff from adjacent parking lots, office buildings, and retail complexes. Dominant vegetation in the wetland includes black cottonwood, red alder, Sitka willow, Douglas spirea, salmonberry, and reed canarygrass. Sound Transit rated wetland WR-10E as Category 4.

EXHIBIT 3-39
East of 140th Avenue NE Wetland (WR-10E)

### West of 140th Avenue NE Wetland (WR-11)

In May 2009, Sound Transit delineated a long, narrow, forested depressional wetland west of 140th Avenue NE that forms a drainage between the SR 520 embankment and the fill from parking lots and building foundations (Exhibit 3-40). Dominant vegetation in the wetland included black cottonwood, red alder, Sitka and willow, Douglas spirea, red-osier dogwood, salmonberry, and reed canarygrass.

No surface connection of this wetland to Valley Creek was observed. Brown water observed in the wetland suggests water quality concerns. Trash was also abundant in the wetland, the likely result of stormwater draining directly to the wetland, and/or littering from adjacent business parking lots. Sound Transit rated this wetland as Category 3.

EXHIBIT 3-40
West of 140th Avenue NE Wetland (WR-11)

### Unnamed Tributary to Kelsey Creek Wetland (WR-15)

In October 2009, Sound Transit delineated several narrow riverine emergent wetlands associated with the roadside ditches along 136th Place NE that convey the Unnamed Tributary to Kelsey Creek (Exhibits 3-41 and 42). Water was flowing in the ditches at the time of the field visit. These ditches appeared to be connected by several culverts under 136th Place NE. In ditch segments that were mowed, vegetation was dominated by reed canarygrass, bird's-foot trefoil, and buttercup. Japanese knotweed was also observed. Woody vegetation was generally absent. At the time of the field visit, BMW of Bellevue was under permit to widen an existing vehicle entry off of 136th Place NE, and this affected a portion of a roadside biofiltration swale. Mapping of this riparian bioswale was obtained from the Sensitive Areas Study prepared for that project by Talasaea Consultants (2007).

## 3.3.2.4 Segment E

### Bear Creek Wetland (WR-12)

Bear Creek is part of the greater Lake Washington-Cedar River drainage, which includes Lake Sammamish and the Sammamish River and extends to Lake Washington. The Bear Creek drainage is 14,300 acres, and the creek itself is 12.4 miles long. Wetlands along the creek receive floodwaters regularly during the winter as well as during spring rain and snowmelt events. There are extensive restoration and flood detention projects along Bear Creek. The wetland and buffer areas along the creek where the *Preferred Alternative E2* and Redmond Way (E1) and Leary Way (E4) Alternatives are proposed to cross are heavily infested with reed canarygrass and Himalayan blackberry. In several areas, these two plant species exclude all other plant growth. Restoration activities downstream have removed the blackberry and most of the canarygrass and replaced non-native plants with native shrubs and tree saplings. A floodplain enhancement project along the south side of Bear Creek at the former BNSF Railway crossing buffers the creek from SR 520 and prevents any overbank flooding into surrounding upland areas. Willow cuttings and other shrubs have been planted to slow water flow through the detention area during flood events. The Bear Creek wetland is a Category 2 wetland.

EXHIBIT 3-41
Unnamed Tributary to Kelsey Creek Wetland (WR-15)

EXHIBIT 3-42
View of Unnamed Tributary to Kelsey Creek Wetland (WR-15)

### Marymoor Park Mitigation Wetland (WR-13)

Historically, Marymoor Park received flood water from Bear Creek. In the late 1800s, pioneers drained and farmed the area. Today, Marymoor Park is a 630-acre facility with several natural wetlands and a mitigated wetland located on the property. The park's mitigation wetland is located adjacent to the Velodrome and is bordered to the north by SR 520. The wetland was created to compensate for impacts

on a natural wetland that occurred in the early 1990s during the widening of the SR 520. The mitigation wetland was planted with a variety of native trees and shrubs, and site visits in March and April of 2007 found the plantings thriving and in good health, with red alder, black cottonwood, and wild rose dominating the site. However, reed canarygrass is invading the site and competing with the native plants for resources. The Marymoor Park mitigation wetland is a Category 3 wetland.

### 3.3.3 Wetland Mapping

The 17 wetlands identified in the East Link Project wetland analysis are expected to be jurisdictional wetlands regulated by the local jurisdictions, Department of Ecology, and/or the USACE. Exhibits 3-27 to 3-29 show the 17 wetlands. Table 3-11 shows the location for each wetland resource and indicates where each resource is located in reference to the project alternatives. In Appendix F, Attachment 1, the wetlands are labeled as WR-1 through WR-17.

### 3.3.4 Wetland Ratings

Of the 17 delineated wetlands in the study area, five are Category 2, eight are Category 3, and four are Category 4 (Table 3-12).

Listed below are the highest category wetlands in the study area (Category 2), which are the larger, more complex wetlands and are mostly associated with streams:

- Mercer Slough Wetland (WR-1/2)
- Sturtevant Creek Wetland (WR-3)
- 118th Avenue SE Wetland (WR-5)
- East of 140th Avenue NE Wetland (WR-10W)
- Bear Creek Wetland (WR-12)

## 3.4 Wetland Function Assessment

The existing functions and attribute levels vary among project wetlands for several reasons: the location of the wetland in the landscape, the surrounding land use activities, and the past type and level of disturbances the wetland experienced. The scores for each wetland function (i.e., hydrologic, water quality, and habitat) are shown in Table 3-13.

Based on the *Rating System*, most of the wetlands that would be affected generally provide a moderate "potential" to improve water quality, and all have the "opportunity" to provide this function. These wetlands on average have a moderate potential to provide hydrologic functions, and the majority have the opportunity to provide these functions. All these wetlands have a moderate potential to provide habitat functions, and vary from low to moderate in their opportunity to provide habitat functions. Table 3-13 summarizes the potential and opportunity for each wetland to provide these functions. Using the scores obtained from the rating forms for each wetland, a qualitative functional rating (high, moderate, or low as defined in Table 3-14) is included in Table 3-13 and was based on the supplemental guidance provided by Ecology (2006a).

TABLE 3-11
List of Wetlands and Wetland Buffers Located within the East Link Project Study Area by Alternative

| | | **Wetland and Buffer Located along Proposed Alternatives** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Segment B** | | | | | | | | | | | | | | | |
| | | ***Preferred B2M*** | | ***Preferred B2M*** | | **B1** | | **B2A/B2E** | | **B3** | | **B3 114th DO** | | **B7** | |
| **Wetland #/Name** | **Location** | ***Preferred C11A* Wetland** | ***Preferred C11A* Buffer** | ***Preferred C9T* Wetland** | ***Preferred C9T* Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** |
| WR-1/2<br>Mercer Slough Wetland (includes existing mitigation sites: I-90 Mercer Slough interpretative center pond, I-90 Mercer Slough East Meadow, I-90 Mercer Slough Phase 1, and I-90 seismic retrofit) | Mercer Slough | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| WR-3<br>Sturtevant Creek | Mercer Slough | | | | | | | | | X | X | | | | |
| WR-4<br>Mercer Slough/I-90 | Mercer Slough | | | | | | | | | | | | | X | X |
| WR-5<br>118th Avenue SE | Mercer Slough | | | | | | | | | | | | | X | X |
| WR-14<br>Bellefield Park Lane | Mercer Slough | | | | | | | | | | | | | | |
| **Segment C** | | | | | | | | | | | | | | | |
| **Wetland #/Name** | **Location** | **C3T-B3 Wetland** | **C4A-B3 Wetland** | **C9A Wetland** | **C14E Wetland** | | | | | | | | | | |
| WR-16<br>Hilton Stormwater Pond | Sturtevant Creek | X | X | X | X | | | | | | | | | | |

TABLE 3-11 CONTINUED
List of Wetlands and Wetland Buffers Located within the East Link Project Study Area by Alternative

| | | Wetland and Buffer Located along Proposed Alternatives | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Segment D** | | | | | | | | | | | | | | | |
| | | ***Preferred D2A* 6th and 12th** | | ***Preferred D2A* with 120th Station Design Option** | | ***Preferred D2A* with NE 24th Design Option** | | **D2E 6th and 12th** | | **D3 6th and 12th** | | **D5 6th and 12th** | | | |
| **Wetland #/Name** | **Location** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | | |
| WR-6<br>BNSF Matrix | Mercer Slough | X | X | X | X | X | X | X | X | X | X | X | X | | |
| WR-7<br>West Tributary to Kelsey Creek – Ponded | Kelsey Creek | X | X | X | X | X | X | | | | | | | | |
| WR-8 (NW, N, SE)<br>West Tributary to Kelsey Creek – Riparian | Kelsey Creek | X | X | X | X | X | X | X | X | X | X | X | X | | |
| WR-9<br>Allied Waste | NE 15th Place Wetland | | X | | X | | X | | | | | | | | |
| WR-10E<br>WR-10W<br>East of 140th Avenue NE | Valley Creek | X | X | X | X | X | X | X | X | | | X | X | | |
| WR-11<br>West of 140th Avenue NE | Valley Creek | X | X | X | X | X | X | X | X | | | X | X | | |
| WR-15<br>Unnamed Tributary to Kelsey Creek | 136th Place NE | X | X | X | X | X | X | X | X | X | X | | | | |
| WR-17<br>120th Avenue NE/NE 12th Street | 120th Avenue NE /NE 12th Street | X | X | | | | X | | | | | | | | |

TABLE 3-11 CONTINUED
List of Wetlands and Wetland Buffers Located within the East Link Project Study Area by Alternative

| | Wetland and Buffer Located along Proposed Alternatives | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Segment E** | | | | | | | | | | | | | | |
| | | ***Preferred E2*** | | ***Preferred E2* with Redmond Transit Center Station Design Option** | | **E1** | | **E4** | | **E1** | | | | | |
| **Wetland #/Name** | **Location** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | **Wetland** | **Buffer** | | | | |
| WR-12 Bear Creek (includes SR 520 Bear Creek 1 and 2 wetland mitigation sites) | Bear Creek | X | X | | | X | X | X | X | X | X | | | | |

Wetlands assumed to be regulated by local jurisdiction (City of Bellevue or Redmond), Department of Ecology, and U.S. Army Corps of Engineers

A/E = At grade and elevated
WR = Wetland Resource
Project Alternatives:

Segment B
*Preferred B2M = 112th SE Modified*
B3 = 112th SE Bypass
B3 - 114th Extension Design Option
B1 = Bellevue Way
B2A = 112th SE At-Grade
B2E = 112th SE Elevated
B7 = BNSF

Segment C
*Preferred C11A = 108th NE At-Grade*
*Preferred C9T = 110th NE Tunnel*
C3T = 108th NE Tunnel
C4A = Couplet
C9A = 110th NE At-Grade
C14E = 114th NE Elevated

Segment D
*Preferred D2A = NE 16th At-Grade*
D2A -120th Station Design Option
D2A - NE 24th Design Option
D2E =NE 16th Elevated
D3 = NE 20th
D5 = SR 520

Segment E
*Preferred E2 = Marymoor Alternative*
E2 - Redmond Transit Center Station Design Option
E1 = Redmond Way
E4 = Leary Way

TABLE 3-12
Cowardin Classification, HGM Classifications, Category, and Acreage of Wetlands Located in the Study Area

| Locator | Wetland | Cowardin Class | HGM Class | Category[a] | CAO Buffer Width (feet)[b] | Acreage |
|---|---|---|---|---|---|---|
| WR-1/2 | Mercer Slough | PEM/PSS/PFO | Riverine<br>Depressional<br>Lacustrine Fringe | 2 | 225 | 301 |
| WR-3 | Sturtevant Creek | PEM/PSS/PFO | Riverine | 2 | 110 | 12.2 |
| WR-4 | Mercer Slough/I-90 | PSS | Depressional | 4 | 40 | 0.5 |
| WR-5 | 118th Avenue SE | PFO | Depressional | 2 | 75 | 1.5 |
| WR-6 | BNSF Matrix | PFO | Depressional | 3 | 60 | 0.2 |
| WR-7 | West Tributary to Kelsey Creek – Ponded | PEM | Depressional | 3 | 60 | 5.8 |
| WR-8 (NW, N, SE) | West Tributary to Kelsey Creek – Riparian | PEM/PSS | Riverine | 3 | 60 | 3.1 |
| WR-9 | Allied Waste | PEM | Depressional | 3 | 60 | 0.1 |
| WR-10E | East of 140th Avenue NE | PFO | Depressional | 4 | 40 | 0.2 |
| WR-10W | East of 140th Avenue NE | PEM/PSS/PFO | Riverine | 2 | 75 | 0.4 |
| WR-11 | West of 140th Avenue NE | PFO | Depressional | 3 | 60 | 0.3 |
| WR-12 | Bear Creek | PSS | Riverine | 2 | 50 | 25 |
| WR-13 | Marymoor Park | PSS | Depressional | 3 | 75 | 2.0 |
| WR-14 | Bellefield Park Lane | PEM | Depressional | 4 | 40 | 1.0 |
| WR-15 | Unnamed Tributary to Kelsey Creek | PEM | Riverine | 4 | 40 | 0.1 |
| WR-16 | Hilton Stormwater Pond | PEM | Depressional | 3 | 60 | 0.2 |
| WR-17 | 120th Avenue NE/NE 12th Street | PSS | Depressional | 3 | 60 | 0.2 |

[a] Category is based on Ecology's rating system (Hruby, 2006), which the cities of Bellevue and Redmond adopted without modification.
[b] Buffer width required by Critical Areas Ordinance for City of Bellevue or Redmond.
PEM = palustrine emergent marsh; PSS = palustrine scrub-shrub; PFO= palustrine forested

TABLE 3-13
Functions of Wetlands within the Project Study Area – Rating System

| Wetland | Water Quality Functions—Qualitative Rating (numerical score in parentheses)[a] | | Hydrologic Functions—Qualitative Rating (numerical score in parentheses)[a] | | Habitat Functions—Qualitative Rating (numerical score in parentheses)[a] | | Total Score | Ecology Rating [b] |
|---|---|---|---|---|---|---|---|---|
| | Potential | Opportunity | Potential | Opportunity | Potential | Opportunity | | |
| WR-1/2 | moderate (10) | Yes | moderate (7) | No | high (17) | moderate (12) | 56 | 2 |
| WR-3 | high (12) | Yes | high (13) | No | high (15) | moderate (8) | 60 | 2 |
| WR-4 | moderate (7) | Yes | low (3) | No | moderate (8) | low (4) | 29 | 4 |
| WR-5 | moderate (9) | Yes | moderate (8) | Yes | moderate (13) | low (4) | 51 | 2 |
| WR-6 | moderate (9) | Yes | moderate (8) | Yes | low (6) | moderate (6) | 46 | 3 |
| WR-7 | low (5) | Yes | moderate (9) | Yes | moderate (8) | low (5) | 41 | 3 |
| WR-8 (NW, N, SE) | moderate (8) | Yes | low (5) | Yes | moderate (9) | low (4) | 39 | 3 |
| WR-9 | moderate (10) | Yes | low (2) | No | low (4) | low (4) | 30 | 3 |
| WR-10E | low (5) | Yes | low (2) | No | low (6) | moderate (6) | 26 | 4 |
| WR-10W | moderate (8) | Yes | high (13) | Yes | moderate (7) | moderate (9) | 58 | 2 |
| WR-11 | moderate (7) | Yes | moderate (5) | No | moderate (7) | moderate (6) | 37 | 3 |
| WR-12 | moderate (8) | Yes | moderate (9) | Yes | moderate (10) | moderate (8) | 52 | 2 |
| WR-13 | moderate (10) | Yes | low (4) | Yes | moderate (10) | moderate (10) | 48 | 3 |
| WR-14 | low (2) | Yes | low (4) | Yes | moderate (7) | moderate (8) | 27 | 4 |
| WR-15 | low (3) | Yes | low (4) | Yes | low (3) | moderate (7) | 24 | 4 |
| WR-16 | moderate (7) | Yes | low (5) | Yes | low (4) | moderate (8) | 36 | 3 |
| WR-17 | high (12) | Yes | moderate (8) | No | moderate (7) | moderate (7) | 46 | 3 |
| Total | 132 | N/A | 109 | N/A | 141 | 118 | 650 | N/A |
| Average Score | 7.8 (moderate) | N/A | 6.4 (moderate) | N/A | 8.3 (moderate) | 6.9 (moderate) | 38.2 | 3 |

[a] See Table 3-14 for definitions of qualitative grouping of wetland functions.
[b] Hruby (2004)

TABLE 3-14
Qualitative Grouping of Wetland Functions Based on Numerical Scores from Washington State Wetland Rating System

| Qualitative Grouping of Wetland Function | Improving Water Quality POTENTIAL (Total for Question D1, R1, L1, or S1 on the rating form depending on HGM Class) | Hydrologic Functions POTENTIAL (Total for Question D3, R3, L3, or S3 on the rating form depending on HGM Class) | Habitat POTENTIAL (Total for H1 on the rating form) | Habitat OPPORTUNITY (Total for H2 on the rating form) |
|---|---|---|---|---|
| High | 12-16 | 12-16 | 15-18 | 14-18 |
| Moderate | 6-11 | 6-11 | 7-14 | 6-13 |
| Low | 0-5 | 0-5 | 0-6 | 0-5 |

HGM = hydrogeomorphic classification
Source: Ecology (2008)

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*Chapter 4*

# Environmental Consequences

This section describes the expected temporary construction and permanent operational impacts of the East Link Project on the following resources:

- Aquatic resources (see Section 4.1)
- Vegetation, wildlife habitat, and wildlife resources, including Washington PHS, threatened and endangered species, and species of concern (see Section 4.2)
- Wetland resources (see Section 4.3)

The discussion of project impacts assumes that the BMPs described in Appendix A would be implemented and performed as expected to avoid and minimize certain impacts during construction. For potential mitigation measures, see Chapter 5.

During the Final EIS process, Sound Transit prepared a Biological Assessment for ESA consultation. Sound Transit expects that the Biological Assessment's effects determination for ESA-listed species will be a "may affect, not likely to adversely affect" and that there will be no adverse effects to Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

## 4.1 Aquatic Resources

Sound Transit considered the following potential impacts on aquatic resources:

- Direct fish mortality
- Permanent loss of physical habitat
- Permanent degradation of in-stream physical habitat, such as shading, chronic sedimentation, removal of boulders or LWD from the channel, and loss of riparian vegetation function (loss of nutrient inputs, LWD recruitment, and shade)
- Temporary loss of physical habitat (dewatering)
- Temporary degradation of habitat (sedimentation, removal of riparian vegetation, disturbance to stream banks)
- Altered hydrology (higher peak flows = increased scour/deposition downstream; decreased percolation from impervious surfaces = lower base flows)
- Permanent degradation of water quality (increased temperature, increased turbidity, increased loading of heavy metals and hydrocarbons)
- Lighting
- Temporary or permanent degradation of water quality (turbidity, temperature, toxicants)
- Impacts on fish passage at culverts and new culverts
- Facilitation of urban development
- Stray electric current field in Lake Washington
- Beneficial impacts associated with in-stream and riparian restoration, and daylighting existing culverts

Not all of these types of potential impacts would occur from the East Link Project. Impacts that are not discussed in this section are not expected to occur.

The analysis focuses on salmonids because it is the group of species of greatest concern in Pacific Northwest freshwater environments. Because the habitat requirements and mode of potential impacts are so similar for the salmonid species present, the analysis is generic and combined for all salmonid species. Species-specific impacts are identified where appropriate. The federally listed threatened and endangered aquatic species present in the study area are all salmonids and covered under in the combined analysis. The discussion herein is thus limited to the potential for impacts to each species based on the proximity of their known habitat in the project vicinity to sources of potential impacts from the project. A discussion of impacts relative to the MSA is similarly lumped into the generic analysis and not discussed separately.

## 4.1.1 Impacts Common to Most or All Build Alternatives

Table 4-1 summarizes potential temporary construction and permanent operational impacts, by segment and alternative, common to most or all the build alternatives.

### 4.1.1.1 Temporary Construction Impacts

#### Sedimentation and Turbidity

Any earthwork conducted within a watershed has the potential to cause sedimentation that would adversely affect the streams in the watershed downstream of the work. The most obvious situation in which sedimentation could occur is where earthwork construction occurs in or next to a stream channel. However, any earthwork in a watershed might contribute to the already serious sedimentation problems that exist in the streams in the project vicinity. This is because most stormwater in urban settings is collected in a system of pipes or ditches and conveyed directly to the nearest stream. An exception to this is in newer developments, where stormwater detention facilities trap much of the sediment carried by upstream sources before discharging into streams. But even in these developments, some of the finer particulates might be discharged to streams as the ponds fill with stormwater and overflow.

As defined in Section 1.4.1.1, sedimentation risk is the inherent potential for erosion to cause sediment-related impacts on aquatic resources based on the proximity of earthwork to streams and site conditions. The closer the earthwork is to a stream, the higher the risk of sediment delivery into the stream. In addition, earthwork that occurs during the wet season has a higher risk of delivering sediment to streams. The likelihood of sedimentation impact is the inherent risk at a given site minus the performance of the BMPs implemented to contain the risk. Impacts from turbidity are lesser than sediment deposition but cover greater areas due to the slower rate of settling out of the water column.

The types of adverse impacts from excessive sediment in streams are well documented, and the range of adverse impacts on salmonid ecosystems is wide. For example, excessive sediment might preclude salmonid spawning or successful egg incubation, or it might lower egg survival. The production and diversity of macrobenthic invertebrates, the primary food source of juvenile salmon and resident trout, is reduced as sediment loading increases. Shelter for juvenile salmonids is decreased as the voids between rocks are filled with sediment. Pools may become full of sediment if loading is high.

Alternatives with more earthworks, such as the alternatives with the most elevated guideways, which require more access roads, have higher sedimentation risk. In addition to more and wider access roads, elevated guideway sections are often required due to traversing steep terrain. Earthwork in steep terrain has the highest sedimentation risk. Tunneling alternatives, where the earthwork is sheltered and isolated from rainfall and stormwater runoff, have the lowest sedimentation risk. However, tunnels are not without sedimentation risk. Tunnels must be dewatered to remove groundwater seepage. This water can be treated to remove most of the particulates, but some may still be present after treatment. After treatment, the water is either discharged; ultimately ending up in streams through stormwater systems, or it is injected back into the ground. The at-grade alternatives, where there would be minimal road widening and access often from paved surfaces, have an intermediate level of sedimentation risk.

Erosion control BMPs are designed to avoid or minimize sediment delivery to streams. The degree to which they are effective depends on correct installation but also on unpredictable circumstances. For instance, conventional BMPs may fail when subjected to extreme rainfall or rain-on-snow events. Examples of BMPs are delineated construction limits; silt fences; protective ground covers such as straw, plastic sheeting, or jute mats; and straw bales in drainage features.

TABLE 4-1
Summary of Temporary Construction and Permanent Operational Impacts on Aquatic Resources

| Segment/Alternative/ Connection | Water Body Affected | Type of Construction Activities and Locations | Potential Temporary Construction Impacts | Potential Permanent Operational Impacts |
|---|---|---|---|---|
| **Segment A** | | | | |
| *Preferred Interstate 90 Alternative (A1)* | Lake Washington | Bridge joint replacement, track installation, possible in-water work for bridge upgrades. | Small potential fuel spilled from heavy equipment. | None. |
| **Segment B** | | | | |
| *Preferred 112th SE Modified Alternative (B2M) to C11A* | Mercer Slough | Elevated and at-grade construction along Bellevue Way, 112th Avenue SE, and SE 8th Street. | Moderate potential for water quality degradation from runoff of sediment and pollutants at Mercer Slough. Stream buffer clearing for 1,690 linear feet (1.2 acre). | Worsened stream buffer encroachment along Mercer Slough for approximately 960 feet. A loss of 0.4 acre of stream buffer. Low-quality vegetation replaced by high-quality vegetation in the remaining buffer. |
| *Preferred Alternative112th SE Modified Alternative (B2M) to C11A* | Mercer Slough | Elevated and at-grade track construction along Bellevue Way and 112th Avenue SE. | Potential water quality degradation from runoff of sediment and pollutants. | Worsened stream buffer encroachment along Mercer Slough for about 350 feet. |
| *Preferred 112th SE Modified Alternative (B2M) to C9T* | Mercer Slough | Elevated and at-grade construction along Bellevue Way and 112th Avenue SE. | Moderate potential for water quality degradation from runoff of sediment and pollutants. Stream buffer clearing for linear 2,110 feet (1.0 acre). | Worsened stream buffer encroachment along Mercer Slough for approximately 1,660 feet. A loss of 1.1 acre of stream buffer. Blackberries replaced by quality vegetation in the remaining buffer. |
| Bellevue Way Alternative (B1) | Mercer Slough | At-grade track installation and the widening of Bellevue Way SE between I-90 and 12th Street intersection. | None. | None. |
| 112th SE At-Grade Alternative (B2A) | Mercer Slough | Elevated and at-grade track construction along Bellevue Way SE and at grade construction along 112th Avenue SE. | Small potential water quality degradation from runoff of sediment and pollutants. Stream buffer clearing for 1,380 feet (0.5 acre). | Worsened stream buffer encroachment along Mercer Slough for about 710 feet. A loss of 0.1 acre of stream buffer. Low-quality vegetation replaced by high-quality vegetation in the remaining buffer. |
| 112th SE Elevated Alternative (B2E) | Mercer Slough | Elevated track construction along Bellevue Way and112th Avenue SE. | Small potential water quality degradation from runoff of sediment and pollutants. Clearing 1,540 linear feet of stream buffer (0.7 acre). | Worsened stream buffer encroachment along Mercer Slough for about 1,580 feet. A loss of 0.4 acre of stream buffer. Low-quality vegetation replaced by high-quality vegetation in the remaining buffer. |
| 112th SE Bypass Alternative (B3) | Mercer Slough | Elevated and at-grade track construction along Bellevue Way and 112th Avenue SE. | Small potential water quality degradation from runoff of sediment and pollutants. Stream buffer clearing for 1,260 feet (0.5 acre). | Worsened stream buffer encroachment along Mercer Slough for about 750 feet. A loss of 0.1 acre of stream buffer. Low-quality vegetation replaced by high-quality vegetation in the remaining buffer. |

TABLE 4-1 CONTINUED
Summary of Temporary Construction and Permanent Operational Impacts on Aquatic Resources

| Segment/ Alternative/ Connection | Water Body Affected | Type of Construction Activities and Locations | Potential Temporary Construction Impacts | Potential Permanent Operational Impacts |
|---|---|---|---|---|
| B3 - 114th Extension Design Option | Mercer Slough, Sturtevant Creek | At-grade construction along Mercer Slough, Elevated crossing of Sturtevant Creek. | Moderate potential water quality degradation from runoff of sediment and pollutants. Stream buffer clearing for 1,970 linear feet (1.3 acre). | Worsened stream buffer encroachment along Mercer Slough for about 1,000 feet. A loss of 0.3 acre of stream buffer. Low-quality vegetation replaced by high-quality vegetation in the remaining buffer. Elevated structure over water. |
| BNSF Alternative (B7) | Mercer Slough and Kelsey Creek | Elevated and at-grade track construction between113th Avenue SE and SE 8th Street. | Moderate potential for water quality degradation from runoff of sediment and pollutants. Stream buffer clearing for 300 feet (0.3 acre). | Loss of 0.2 acre of stream buffer. Elevated structure over water. |
| **Segment C** | | | | |
| *Preferred 108th NE At-Grade Alternative (C11A) from B2M* | Sturtevant Creek | At-grade track installation, elevated track construction in the watershed. The channel would be diverted under the BNSF tracks and relocated next to the Hospital Station for approximately 300 feet. | Moderate potential for water quality degradation from runoff of sediment and pollutants. | Channel relocation next to the Hospital Station would be an improvement. |
| *Preferred 108th NE At-Grade Alternative (C11A)* from B3 | Sturtevant Creek | Street widening and elevated track construction within watershed. Elevated guideway construction close to the creek for 420 feet and crosses it twice next to the Hilton Hotel. The channel would be diverted under the BNSF tracks and relocated next to the Hospital Station for approximately 300 feet. | Moderate potential water quality degradation from runoff of sediment and pollutants. | Impacts on stream buffer at creek crossings and where the guideway is close and parallel to the channel. Channel relocation next to the Hospital Station would be an improvement. |
| *Preferred 108th NE At-Grade Alternative (C11A)* from B3 Design Option or B7 | Sturtevant Creek | Street widening and elevated track construction within watershed. Elevated guideway construction close to the creek for 720 feet and crosses it when next to the Hilton Hotel. The channel would be diverted under the former BNSF Railway tracks and relocated next to the Hospital Station for approximately 300 feet. | Moderate potential for water quality degradation from runoff of sediment and pollutants. | Impacts on stream buffer at creek crossings and where the guideway is close and parallel to the channel. Channel relocation next to the Hospital Station would be an improvement. |
| *Preferred 110th NE Tunnel Alternative (C9T ) from B2M* | Sturtevant Creek | Same as *Preferred Alternative C11A* from *B2M.* | Same as *Preferred Alternative C11A* from *B2M.* | Same as *Preferred Alternative C11A* from *B2M.* |
| *Preferred 110th NE Tunnel Alternative (C9T)* from B3 | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. |
| *Preferred 110th NE Tunnel Alternative (C9T),* including East Main Station Design Option, from B3 Design Option or B7 | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. |

TABLE 4-1 CONTINUED
Summary of Temporary Construction and Permanent Operational Impacts on Aquatic Resources

| Segment/ Alternative/ Connection | Water Body Affected | Type of Construction Activities and Locations | Potential Temporary Construction Impacts | Potential Permanent Operational Impacts |
|---|---|---|---|---|
| Bellevue Way Tunnel Alternative (C1T) | Sturtevant Creek | Same as *Preferred Alternative C11A* from *B2M*. | Same as *Preferred Alternative C11A* from *B2M*. | Same as *Preferred Alternative C11A* from *B2M*. |
| 106th NE Tunnel Alternative (C2T) from B2A or B2E | Sturtevant Creek | Same as *Preferred Alternative C11A* from *B2M* | Same as *Preferred Alternative C11A* from *B2M*. | Same as *Preferred Alternative C11A* from *B2M*. |
| 106th NE Tunnel Alternative (C2T) from B3 112th SE | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3 | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. |
| 106th NE Tunnel Alternative (C2T) from B7 | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. |
| 108th NE Tunnel Alternative (C3T) from B2A or B2E | Sturtevant Creek | Tunneling or elevated guideway distant from water bodies. | Negligible. | None. |
| 108th NE Tunnel Alternative (C3T) from B3 | Sturtevant Creek | Tunneling and elevated guideway construction close to the creek for 420 feet and crosses creek twice next to the Hilton Hotel. | Moderate potential water quality degradation from runoff of sediment and pollutants. | Impacts on stream buffer at creek crossings and where the guideway is close and parallel to the channel. |
| 108th NE Tunnel Alternative (C3T) from B7 | Sturtevant Creek | Tunneling and elevated track construction within watershed. Elevated guideway construction close to the creek for 720 feet and crosses creek once next to the Hilton Hotel. | Moderate potential for water quality degradation from runoff of sediment and pollutants. | Impacts on stream buffer at creek crossings and where the guideway is close and parallel to the channel. |
| At-Grade Couplet Alternative (C4A) from B2A or B2E | Sturtevant Creek | Street widening and elevated track construction within watershed. | Minimal potential for water quality degradation from runoff of sediment and pollutants. | None. |
| At-Grade Couplet Alternative (C4A) from B3 | Sturtevant Creek | Street widening and elevated track construction within watershed. Elevated guideway construction close to the creek for 420 feet and crosses it twice next to the Hilton Hotel. | Same as C3T from B3. | Same as C3T from B3. |
| At-Grade Couplet Alternative (C4A) from B7 | Sturtevant Creek | Street widening and elevated track construction within watershed. Elevated guideway construction close to the creek for 720 feet and crosses it once next to the Hilton Hotel. | Same as C3T from B7. | Same as C3T from B7. |
| 112th NE Elevated Alternative (C7E) from B2A or B2E | Sturtevant Creek | Elevated guideway construction in the watershed away from streams. | Minimal potential for water quality degradation from runoff of sediment and pollutants. | None. |

TABLE 4-1 CONTINUED
Summary of Temporary Construction and Permanent Operational Impacts on Aquatic Resources

| Segment/ Alternative/ Connection | Water Body Affected | Type of Construction Activities and Locations | Potential Temporary Construction Impacts | Potential Permanent Operational Impacts |
|---|---|---|---|---|
| 110th NE Elevated Alternative (C8E) from B3 | Sturtevant Creek | Elevated guideway construction close to the creek for 420 feet and crosses it twice next to the Hilton Hotel. | Same as C3T from B3. | Same as C3T from B3. |
| 110th NE Elevated Alternative (C8E) from B7 | Sturtevant Creek | Elevated guideway construction close to the creek for 720 feet and crosses creek twice next to the Hilton Hotel. | Same as C3T from B7. | Same as C3T from B7. |
| 110th NE At-Grade Alternative (C9A) from B2A or B2E | Sturtevant Creek | Same as *Preferred Alternative C11A* from *B2M*. | Same as *Preferred Alternative C11A* from *B2M*. | Same as *Preferred Alternative C11A* from *B2M*. |
| 110th NE At-Grade Alternative (C9A) from B3 | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. |
| 110th NE At-Grade Alternative (C9A) from B7 or B3 - 114th Design Option | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. |
| 114th Avenue NE Elevated Alternative (C14E) from B3 | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. | Same as *Preferred Alternative C11A* from B3. |
| 114th Avenue NE Elevated Alternative (C14E) from B7 or B3 - 114th Design Option | Sturtevant Creek | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. | Same as *Preferred Alternative C11A* from B3 Design Option or B7. |
| **Segment D** | | | | |
| *Preferred NE 16th At-Grade Alternative (D2A)* via BNSF (C1T, C2T), including both D2A – 120th Station and NE 24th Design Options | West Tributary to Kelsey Creek, Goff Creek, Unnamed Tributary to Kelsey Creek, Valley Creek | Elevated and at-grade earthwork in watersheds; elevated crossings at West Tributary; crossing a piped section of Goff Creek; lengthening of a culvert on the Unnamed Tributary. | Minor potential water quality degradation from runoff of sediment and pollutants at the West Tributary. Minimal potential at Unnamed Tributary and Valley Creek. | Impacts on stream buffer on West Tributary. 130 feet of new culvert on the Unnamed Tributary. |
| NE 16th Elevated Alternative (D2E), NE 12th (C3T, C4A, C7E, C14E) and via former BNSF (C1T, C2T) | West Tributary to Kelsey Creek, Goff Creek, Unnamed Tributary to Kelsey Creek, Valley Creek | Same as *Preferred Alternative D2A.* | Same as *Preferred Alternative D2A* except only a minimal potential for sedimentation impacts. | Same as *Preferred Alternative D2A.* |
| NE 20th Alternative (D3), NE 12th (C3T, C4A, C7E, C8E) and via former BNSF (C1T, C2T) | West Tributary to Kelsey Creek, Goff Creek, Unnamed Tributary to Kelsey Creek, Valley Creek | Elevated and at-grade earthwork in watersheds; elevated crossing at West Tributary; at-grade crossing a piped section of Goff Creek; lengthening of a culvert on the Unnamed Tributary; culvert lengthening of Valley Creek and a retained cut crossing over a piped section of Sears Creek. | Minimal potential for water quality degradation from runoff of sediment and pollutants at the West Tributary and Unnamed Tributary. Minor potential impacts at Valley Creek. | Impacts on stream buffer on West Tributary. Loss of all stream function and habitat for 30 feet on Valley Creek. About 130 feet of new culvert on the Unnamed Tributary. |

TABLE 4-1 CONTINUED
Summary of Temporary Construction and Permanent Operational Impacts on Aquatic Resources

| Segment/ Alternative/ Connection | Water Body Affected | Type of Construction Activities and Locations | Potential Temporary Construction Impacts | Potential Permanent Operational Impacts |
|---|---|---|---|---|
| SR 520 Alternative (D5), NE 12th (C3T, C4A, C7E, C8E) and via former BNSF (C1T, C2T) | West Tributary to Kelsey Creek, Goff Creek, and Valley Creek | Elevated structure earthwork in watersheds; elevated crossings at West Tributary. | Minimal potential for water quality degradation from runoff of sediment and pollutants at the West Tributary, Goff Creek and Valley Creek. | Impacts on stream buffer on West Tributary. |
| **Segment E** | | | | |
| *Preferred Marymoor Alternative (E2),* including E2 - Redmond Transit Center Station Design Option | Sammamish River, Bear Creek | Elevated and at-grade construction in watersheds; elevated crossings at the Sammamish River and Bear Creek. | Minimal potential water quality degradation from runoff of sediment and pollutants. | Impacts on stream buffer at Sammamish River and Bear Creek crossings. |
| Redmond Way Alternative (E1) | Sammamish River, Bear Creek | Same as *Preferred Alternative E2.* | Same as *Preferred Alternative E2.* | Same as *Preferred Alternative E2.* |
| Leary Way Alternative (E4) | Sammamish River, Bear Creek | Same as *Preferred Alternative E2.* | Same as *Preferred Alternative E2.* | Same as *Preferred Alternative E2.* |
| **Maintenance Facilities** | | | | |
| 116th Maintenance Facility (MF1) | West Tributary | Earthwork in watershed. | Negligible potential for water quality degradation from runoff of sediment and pollutants. | Few, but potential impacts from hazardous materials spills from facility. New PGIS[a] inputs. |
| BNSF Maintenance Facility (MF2) | West Tributary | Earthwork in watershed. | Negligible potential for water quality degradation from runoff of sediment and pollutants. | Few, but potential impacts from hazardous materials spills from facility. New PGIS[a] inputs. |
| SR 520 Maintenance Facility (MF3) | Goff Creek | Two culverts replaced by two shorter culverts and channel restoration. | Moderate potential for water quality degradation from runoff of sediment. | Gain of 42 feet of new channel function. Low, but potential impacts from hazardous materials spills from facility. New PGIS[a] inputs. |
| SE Redmond Maintenance Facility (MF5) | Bear Creek | Earthwork in watershed. | Negligible potential for water quality degradation from runoff of sediment and pollutants. | Few, but potential impacts from hazardous materials spills from facility. New PGIS[a] inputs. |

[a] PGIS = pollutant-generating impervious surface

### Pollutant Spills

Anywhere heavy equipment is fueled or hydraulic systems are used during construction, fuel or hydraulic fluid has the potential to be spilled. Even though a spill prevention plan would be implemented, there is still a small potential that some of this material could be carried by stormwater and enter a stream. Because stormwater throughout a watershed ends up in a stream, stormwater entering a storm drain far from a stream is eventually carried to it. Spill prevention BMPs are designed to avoid or minimize construction-related pollutants from entering streams; however, despite precautions, there would still be a small potential.

### 4.1.1.2 Permanent Operational Impacts

The light rail system would not be pollution-generating; however, overall, the project would increase the amount of impervious surface area in the study area, and impervious surfaces can, without mitigation measures, increase stormwater runoff rates, volumes, and pollutant loads. These, in turn, can cause higher flows and degrade water quality in streams. However, the project would provide stormwater detention to a level that mimics pristine forested conditions. As a result, flows are not expected to increase in any of the streams in the study area as a result of this project. Project impervious areas include new tracks and guideways, stations, park-and-ride lots, maintenance facilities, and roads. Relocated roads to accommodate the project were also counted as project-associated impervious area. In general, elevated alternatives would result in less new impervious area than at-grade alternatives because they would retain the pervious ground underneath them for the most part. Tunnel alternatives do not add impervious area. Project-related parking lots and road realignments are subject to motor vehicle traffic and are considered to be pollution-generating impervious surfaces (PGIS). The guideway and stations would not be subject to motor vehicle traffic or other sources of potential pollution (except at crossing locations) and are therefore classified as non-PGIS.

The project would essentially retrofit most or all of any roadway that is widened to accommodate the at-grade trackways. Although the light rail system would not cause an increase in pollutant loads, stormwater from roadways relocated as a result of at-grade trackway would be treated as well as other project-related PGIS areas, such as the maintenance facility. Project-related stormwater would receive one of two levels of treatment: basic or enhanced. Basic stormwater treatment removes at least 80 percent of suspended solids, and enhanced treatment removes heavy metals that are toxic to fish and aquatic invertebrates. Basic and enhanced treatments reduce but do not eliminate heavy metal and hydrocarbon contaminants in stormwater.

Stormwater from project-related PGIS would receive at least basic stormwater treatment. The maintenance facility and roadways with traffic volumes greater than 7,500 average daily vehicle trips would receive enhanced treatment. High-traffic street intersections would receive treatment to remove oil. None of the alternatives would substantially degrade water quality compared to existing conditions. The project would result in a reduction of 51.7 acres of PGIS. Much of this reduction would be due to shifting vehicle traffic to the non-HOV lanes of I-90. WSDOT would add stormwater treatment facilities to I-90 to accommodate the new pollutant loading associated with the shift in vehicular traffic. With updated stormwater treatment, retrofitted treatment of existing untreated surfaces, and reduction of PGIS, water quality could improve slightly.

Another more general and nonquantifiable aspect is the nature of the project itself. The light rail system would reduce traffic volume in the study area by an estimated 200,000 vehicle miles per year, thus reducing pollutant inputs associated with motor vehicles. All these factors would more than offset the new PGIS, which include the new park-and-ride lot facilities, other minor parking lots, and the maintenance facility.

Sound Transit's preliminary engineering for the East Link Project includes development of a conceptual layout for major stormwater facilities that are sized to comply with the Ecology's Stormwater Manual. These facilities include stormwater ponds and underground vaults. Additional measures to reduce stormwater runoff, such as low-impact development or other on-site measures would be considered at a more advanced phase of project development.

Peak stream flows would not increase because the stormwater systems built for the project would be designed to simulate predevelopment hydrology. Impervious surfaces, however, preclude natural infiltration of precipitation into the ground and result in less groundwater recharge. There is no practical means for compensating for this loss of infiltration. Less precipitation entering the groundwater aquifers might decrease dry-season base flows by decreasing water inputs to streams from groundwater sources such as springs. Dry-season base flows have been

identified as one of the most important natural limiting factors controlling salmonid production in lowland Puget Sound streams.

The less impervious surface an alternative has, the less impact it would be likely to have on base flows in a given watershed. Thus alternatives with tunnels or elevated tracks would likely have less impact on base flows. Alternatives with at-grade tracks and/or road widening would have more impact. Comparisons of impervious surface areas between alternatives are made in Section 4.9, Water Resources, of the Final EIS. The worst-case alternative impact would, however, have only a small impact at a basin-wide level due to the small proportion of the watershed affected by the project relative to the existing impervious surfaces within the watershed.

Permanent impacts would also occur when stream channels are either enclosed within new or lengthened culverts, or where riparian vegetation under elevated guideways might be within the "rain shadow" or have low vertical clearance (less than 15 feet). It is assumed that shading impacts cover an area represented by the surface area of an overhead structure 30 feet wide extending over riparian vegetation. Generally, the higher an elevated guideway is off the ground, the less impact it would have on the vegetation below it.

## 4.1.2 Specific Impacts of Alternatives in Each Segment

### 4.1.2.1 Fish and Aquatic Species and Habitats

High-value habitats in Washington include all lakes, ponds, streams, and rivers. Special-status species include all salmonids, which are the focus of the analysis described above.

#### Temporary Construction Impacts

The following discussion of potential impacts is segment- and alternative-specific. Potential impacts common to most or all project alternatives (which are covered above) are not listed or discussed below.

**Segment A**

*Preferred Interstate 90 Alternative (A1)*

In Segment A, light rail would be installed on existing road and interstate highway surfaces. The only water body potentially affected would be Lake Washington. There could be a small, temporary direct impact from concrete dust entering Lake Washington while modifying the bridge to accommodate the rail. BMPs such as containment booms and other measure should provide adequate protection.

Sound Transit would need to implement special seismic upgrades to the I-90 floating bridge and I-90 East Channel bridge during the construction period. The seismic upgrades would be in the form of steel jackets installed around the perimeter of the support columns. They would extend from the top of the columns to the top of the footings. The steel jacket sections would be lowered into position by a crane and either bolted or welded together. On the west side of Mercer Island, the support columns of the two non-floating bridge sections (highrises) have footings at or within 1 foot of the water surface of the lake. The East Channel bridge has footings at the bottom of the lake. Divers would fasten the jacket sections on the East Channel bridge on the underwater portion of the columns. This in-water work would need to be conducted during the in-water work window from July 16 to July 31 and from November 16 to December 31. The work window for the floating bridge and its east and west highrises is from July 16 through December 31. Construction activities in this segment would have a very low potential to result in impacts on ESA-listed fish and should not impede the construction schedule. There would be no temporary indirect impacts.

**Segment B**

*Preferred 112th SE Modified Alternative (B2M) to Preferred Alternative C11A*

The *Preferred Alternative B2M to C11A* is similar to *Preferred Alternative B2M to C9T* but would be set farther away from Mercer Slough. Thus the linear distance of stream buffer clearing would less, at 1,600 linear feet. The route does not get as close to the water's edge as described for *Preferred Alternative B2M to C9T*. *Preferred Alternative B2M to C11A* would not have any direct temporary impacts on Mercer Slough West or Sturtevant Creek, but it could result in indirect temporary impacts from vegetation clearing.

*Preferred 112th SE Modified Alternative (B2M) to Preferred Alternative C9T*

*Preferred Alternative B2M to C9T*would have no direct temporary impacts on fish and aquatic species and habitats but it could have some indirect temporary impacts. *Preferred Alternative B2M to C9T* would be closer to the western part of Mercer Slough than most of the other alternatives, and thus would have a higher risk than most of adding sediment to the slough compared with the other alternatives in Segment B. There would be approximately

1,860 linear feet of vegetation-clearing within the 100-foot-wide stream buffer of the slough (Table 4-2). At one location (the Mercer Slough alcove near SE 15th Street) the vegetation would be cleared to the water's edge. Sound Transit would replant approximately 0.5 acre with native riparian vegetation. With BMPs, the short-term temporary impact on the slough should be minimal. Long-term temporary impacts during the tree grow-out period would also be minimal because few riparian trees would be cut, while many would be planted to replace the abundant blackberries that currently form most of the riparian stream buffer.

TABLE 4-2
Potential Temporary Construction Impacts on Stream Buffers along Mercer Slough West or Mercer Slough

| Alternative | Stream Buffer Impact Area of Clearing (acre) [a] | Linear Feet of Clearing within the Stream Buffer during Construction |
|---|---|---|
| ***Preferred 112th SE Modified Alternative (B2M)*** | | |
| *to Preferred Alternative C11A* | 1.2 | 1,680 |
| *to Preferred Alternative C9T*[b] | 1.0 | 2,100 |
| Bellevue Way Alternative (B1) | 0 | 0 |
| 112th SE At-Grade Alternative (B2A) | 0.5 | 1,380 |
| 112th SE Elevated Alternative (B2E) | 0.7 | 1,580 |
| 112th SE Bypass Alternative (B3) | 0.5 | 1,260 |
| B3 - 114th Extension Design Option | 1.3 | 1,970 |
| BNSF Alternative (B7) | 0.3 | 300 |

[a] Some of the impacts on stream buffers overlap with impacts on some wetland buffers. Refer to Table 4-9 and Appendix F.
[b] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.

Bellevue Way Alternative (B1)

This alternative would not have any direct temporary impacts on fish and aquatic species and habitats. This alternative would have the least temporary indirect impacts of any of the South Bellevue (Segment B) alternatives because construction would not occur near water. The one area where Alternative B1 is somewhat near water (at the ramp off of I-90) is isolated by another freeway ramp embankment.

112th SE At-Grade (B2A) and 112th SE Bypass (B3) Alternatives

Alternatives B2A and B3 would not have any direct temporary impacts but could have indirect temporary impacts on fish and aquatic species and habitats. The potential impact of these alternatives would be intermediate among the Segment B alternatives impacts because the section running along 112th Avenue SE would be in the middle of the roadway, while Alternatives B2E and B3, and *Preferred Alternative B2M* would be closer to the water. While 112th Avenue SE would still have to be widened, it would be to both the east and west as opposed to the construction limit being entirely on the east side of 112th Avenue SE. Alternative B2A would clear 1,330 linear feet of stream buffer, and Alternative B3 would clear 1,280 linear feet.

112th SE Elevated (B2E) Alternative

Alternative B2E would not have any direct temporary impacts on fish and aquatic species and habitats. This alternative could, however, have indirect temporary impacts from being entirely elevated, thus having more earthwork than alternatives with more at-grade construction such as Alternatives B1 and B2A. The section with the highest sedimentation risk would be the area close to Mercer Slough along 112th Avenue SE. Approximately 1,540 linear feet of stream buffer would be cleared and replanted. Appropriate BMPs would be implemented to reduce this risk, so short-term construction impacts should be minimal.

B3 - 114th Extension Design Option

This design option is similar to Alternative B3 except that instead of crossing the Sturtevant Creek wetland, the route curves east just north of SE 15th Street, thereby avoiding the wetland, but instead requires an additional elevated crossing of Sturtevant Creek on the south side of SE 8th Street. Assuming that the light rail would cross Sturtevant Creek with a free-spanning guideway structure with the support column borings located outside of the ordinary high water mark (OHWM), impacts would be minimal on aquatic resources. Construction would, however, be close to the water and would damage existing vegetation within the riparian stream buffer and pose

a moderate sedimentation risk to Sturtevant Creek. This alternative is routed closer to Mercer Slough than most alternatives, and would result in 1,770 linear feet of vegetation being cleared within the stream buffer.

BNSF Alternative (B7)
Alternative B7 would not have any direct temporary impacts on fish and aquatic species and habitats. It could result in indirect temporary impacts. Alternative B7 would cross over the mouth of Mercer Slough as an elevated structure. Assuming the slough would be crossed with a free-spanning structure with the support column borings located outside of the OHWM, impacts would be minimal on aquatic ecosystems. Construction would, however, be close to the water and damage riparian vegetation as well as still pose a moderate sedimentation risk to Mercer Slough. A temporary work trestle might be constructed over Mercer Slough to accommodate construction, and a 100-foot-wide corridor would be cleared of vegetation for 240 linear feet of stream buffer. Implementation of appropriate BMPs to isolate the work area would largely avoid impacts. The elevated guideway would cross a portion of Kelsey Creek contained within a culvert, but no impacts on the creek are expected.

**Segment C**
*Preferred 108th NE At-Grade Alternative (C11A) and Preferred 110th NE Tunnel Alternative (C9T), both from Preferred Alternative B2M*
*Preferred Alternatives C11A* and *C9T* from *Preferred Alternative B2M* would connect to the Hospital Station, which would be located on top of the existing Sturtevant Creek channel just north of NE 8th Street. The channel would be relocated to the west side of the station with a fish-passable culvert under the former BNSF Railway tracks for about 300 feet. The new channel would release a short pulse of suspended sediment when the stream flow is reintroduced into the channel. This would be a minor impact on fish and aquatic species and habitats because the flow would be very low at the time of year this action would occur. The route also crosses Sturtevant Creek just south of the NE 8th Street/ I-405 interchange. A bridge column would be placed in the location where the pipe makes a sharp turn. The pipe would be relocated out of the way, resulting in a shorter length. The construction sequence and time of year this would be done makes it highly unlikely that this would result in sediment input to Sturtevant Creek. Impacts would not be different with the C9T - East Main Station Design Option because there are no lakes, ponds, streams, or rivers in the construction area associated with this station.

*Preferred Alternatives C11A and C9T from Alternative B3*
In addition to the potential impact described above at the Hospital Station, these alternatives have a section of elevated guideway that would run close to Sturtevant Creek adjacent to the Bellevue Hilton Hotel. In this short reach of Sturtevant Creek, the guideway would cross the creek twice and run parallel to it for about 420 linear feet. All of the existing, mostly native riparian trees would be removed in this reach during construction and replanted with suitable native riparian vegetation after construction, resulting in a temporary loss of riparian functions such as shade, nutrient inputs from leaf litter and terrestrial insects. Normally these functions would also include LWD recruitment, which would add the habitat complexity and provide in-stream cover. At present, LWD recruitment is precluded due to maintenance activity by the hotel. If a tree falls, it would be cut up and hauled away. This reach is the only productive spawning and rearing habitat in Sturtevant Creek that is accessible to anadromous salmonids due to the presence of gravel, cobble, and pools.

Based on the current preliminary design, there would be no in-water work with this alternative. Three columns would be placed within 15 feet of the stream channel OHWM, and a fourth column within approximately 30 feet of the OHWM. The construction area would be as close as 5 feet to the channel. Although the sedimentation risk would be high, Sound Transit would implement strict BMP measures. If the contractor is careful, they could construct the guideway without directly affecting the channel.

*Preferred Alternatives C11A* or *C9T* from B3 – 114th Design Option or Alternative B7 would have potential impacts identical to the one described above but would add approximately 300 feet of construction close to the stream channel in the reach just downstream of the Hilton Hotel. This reach would also be cleared of riparian vegetation prior to construction and replanted with suitable vegetation after construction. The potential for sedimentation is high at this location due to steep slopes but should be able to be contained with BMPs as described above.

Bellevue Way Tunnel Alternative (C1T)
Alternative C1T would avoid potential impacts on fish and aquatic species and habitats in Sturtevant Creek in the vicinity of the Hilton Hotel and downstream but have the temporary pulse of sediment at the Hospital Station as described above for *Preferred Alternatives C11A* and *C9T*.

106th NE Tunnel (C2T), 110th Avenue NE At-Grade (C9A), and 114th NE Elevated (C14E) Alternatives
Alternatives C2T, C9A, and C14E would have the same potential impacts as described for *Preferred Alternatives C11A* and *C9T* and their various connectors to Segment B with one exception: Alternative C14E does not have an alternate connection to Alternatives B2A or B2E and thus does not avoid the Hilton Hotel reach.

108th NE Tunnel (C3T), At-Grade Couplet (C4A), and 110th NE Elevated (C8E) Alternatives
Except for two differences, Alternatives C3T, C4A, and C8E would have the same potential impacts on Sturtevant Creek as *Preferred Alternatives C11A* and *C9T* with their various Segment B connectors in the vicinity of the Hilton Hotel and downstream. These alternatives would bypass the Hospital Station, and with connections from Alternatives B2A and B2E, these alternatives bypass Sturtevant Creek altogether.

112th SE Elevated Alternative (C7E)
Alternative C7E would have no potential impacts on aquatic habitats under any condition.

**Segment D**

*Preferred NE 16th At-Grade Alternative (D2A)*
*Preferred Alternative D2A* would cross the West Tributary to Kelsey Creek as an elevated guideway where the stream is impounded by a regional stormwater detention facility. Direct temporary impacts on fish and aquatic species and habitats would occur as a result of in-water construction. Up to five support columns would be placed within the OHWM. Sediment transport and turbidity would be contained within cofferdams or an equivalent, which Sound Transit would remove after construction and when the suspended sediment has settled. The ponded water currently extends downstream for approximately 500 feet. While the sedimentation risk is high, the impacts are likely to be minimal as long as the appropriate BMPs are implemented.

Indirect temporary impacts would occur from vegetation clearing within the stream buffer. Approximately 450 linear feet of riparian vegetation would be cleared and replanted. Sedimentation risk would be moderate to high because some of the areas that would be cleared are steep embankment slopes. Only minimal impacts are expected, however, because the adjacent waters are ponded and still.

The *Preferred Alternative D2A* route crosses Goff Creek at a point where the creek runs through a long pipe system; therefore, Sound Transit expects no stream impacts at this location. Sound Transit would construct a three-sided box culvert over the piped section of Goff Creek at the crossing. The purpose of this action would be to allow a fish-friendly crossing to be created if the City of Bellevue's plan to daylight this section of Goff Creek is realized.

The *Preferred Alternative D2A* route crosses the Unnamed Tributary to Kelsey Creek at-grade along 136th Place NE just south of NE 20th Street. There could be a direct temporary impact due to in-channel work. Sound Transit would lengthen the street culvert by 130 feet to accommodate both 136th Place NE and the guideway. Some sediment release could likely occur as a result. However, during the in-water construction window, the creek would have almost no flow, and sediment containment BMPs would likely limit sediment transport to a minimal amount. This stream is not known to support salmonids. There would not be any indirect impacts because the rest of the work area is paved.

*Preferred Alternative D2A* would cross Valley Creek by elevated guideway with no direct impacts. The southern edge of the guideway would be about 20 feet north of the SR 520 culvert outlet, and the rest of the guideway crosses over the culvert on the embankment of SR 520. Sedimentation risk is moderate to high at this location because construction would occur on a steep slope directly adjacent to the stream channel, except it is unlikely that a support column would be placed close to the culvert due to the position of the culvert to the NE 140th Street bridge. Sound Transit would implement BMPs commensurate to the risk, thereby resulting in minimal impacts. Some riparian trees (willow) might be removed, but Sound Transit would replace the trees with the same species after construction.

The potential impacts under the D2A - NE 24th and 120th Station Design Options would be identical to those described for *Preferred Alternative D2A*.

None of the Segment D connection options from Segment C would have differentiable impacts between the alternatives and are thus not discussed below. Construction over streams might affect suitable western toad habitat; these streams are the West Tributary to Kelsey Creek (with *Preferred Alternative D2A* and Alternatives D2E, D3, and D5), and Valley Creek (with *Preferred Alternative D2A* and Alternatives D2E and D5).

NE 16th Elevated Alternative (D2E)
Alternative D2E would have similar impacts on fish and aquatic species and habitats at the Goff Creek and Valley Creek crossings as *Preferred Alternative D2A*. At the West Tributary to Kelsey Creek crossing, Alternative D2E crosses as an elevated guideway at a location south of where *Preferred Alternative D2A* would cross, where the riparian area and channel are relatively narrow. As a result, the impacts would be less. Seventy linear feet of riparian trees would be cleared then replanted after construction. Support column construction could be well away from the water; therefore, potential sedimentation would be minimal. The potential impacts of Alternative D2E would be the same as with *Preferred Alternative D2A* at the Unnamed Tributary to Kelsey Creek.

NE 20th Alternative (D3)
Alternative D3 would have impacts on fish and aquatic species and habitats similar to Alternative D2E at the West Tributary to Kelsey Creek and Goff Creek crossings. Alternative D3 would result in direct temporary impacts on Valley Creek due to in-water work. The channel would be crossed at-grade and would require adding approximately 30 feet of length to the existing culvert under NE 20th Street and replacing the existing culvert with a new, lower, and wider profile. The reason for the new culvert design is that this alternative is a retained cut at the Valley Creek crossing. There would likely be a small pulse of sediment released even with the full implementation of BMPs. The amount would be small and temporary in nature. Valley Creek has anadromous salmonid access to this point and above. The reach potentially affected was rated as good during the habitat survey. Alternative D3 would also cross Sears Creek where the creek is in a long culvert under NE 20th Street. Despite the fact that the route is a retained cut at this location, the culvert is deep enough that the project would not affect it.

SR 520 Alternative (D5)
Alternative D5 would have the same potential impacts as *Preferred Alternative D2A* at Valley Creek. It would cross the West Tributary to Kelsey Creek in a different location but would have similar impacts as described above for Alternatives D2E and D3. It would cross Goff Creek just north of the SR 520 culvert outlet. The potential for sedimentation is moderate because the slope above the culvert is steep. However, there is little woody vegetation to clear upslope, and columns would have to be placed to either side, thus making BMPs effective to contain potential sediment from entering the channel.

**Segment E**
*Preferred Marymoor Alternative (E2)*
*Preferred Alternative E2* would cross the Sammamish River as an elevated guideway next to the SR 520 bridge. Large-volume earthwork, such as retained fill or retained cut activities, would occur at least 500 feet from the river. Support columns would be placed no closer than the top of the riverbank, which is outside of the OHWM. On this flat ground, the erosion sedimentation risk is low. It is assumed that a 100-foot-wide corridor through the existing riparian vegetation (dominated by blackberry and a few small conifer trees) would be cleared within the stream buffer of the Sammamish River to construct the elevated cast-in-place guideway.

*Preferred Alternative E2* would cross Bear Creek as an elevated guideway. No in-water work would be necessary. The ground is flat on either side of the crossing; therefore, the sedimentation risk during construction would be low. No riparian vegetation would need to be cleared, and construction impacts should be minimal.

Potential impacts under the E2 - Redmond Transit Center Station Design Option would be identical to those described for *Preferred Alternative E2*.

Redmond Way Alternative (E1)
Alternative E1 would cross the Sammamish River on a new bridge. The river is narrow enough to be spanned with the support columns outside of the OHWM. Alternative E1 would cross Bear Creek on a new bridge that would be wider than the existing railroad bridge. No in-water work would be necessary at either crossing. Both crossings would have the same potential impacts on fish and aquatic species and habitats as *Preferred Alternative E2*.

Leary Way Alternative (E4)
Alternative E4 would cross the Sammamish River on a new bridge next to the Leary Way bridge. The river is narrow enough to be spanned with the support columns outside of the OHWM. No in-water work would be necessary at either crossing. Both crossings would have the same potential impacts as *Preferred Alternative E2*.

**Maintenance Facility**

116th Maintenance Facility (MF1)

MF1 would be sited in a commercial district well away from the nearest water body. The sedimentation risk would be low because the receiving water (i.e., the upper reaches of the West Tributary to Kelsey Creek) is well away from construction activities and the creek in that area is a series of beaver ponds that would detain and deposit sediment inputs. No riparian vegetation would be disturbed.

BNSF Maintenance Facility (MF2)

Construction impacts on fish and aquatic species and habitats from the MF2 would be similar to those described for MF1.

SR 520 Maintenance Facility (MF3)

The footprint of MF3 would surround approximately 370 feet of the existing Goff Creek channel. There would be direct temporary impacts on fish and aquatic species and habitats due to in-water work. A 56-foot-long culvert would be removed and replaced with a 19-foot-long culvert. In addition, a 43-foot-long culvert would be replaced with two 19-foot-long culverts. The result would be an increase in fish habitat of 42 feet of channel. There would be some sedimentation risk to the channel as a result of in-stream work. No riparian vegetation other than mowed grass and English ivy is present in this reach. Impacts to the Unnamed Tributary to Kelsey Creek would be similar to that described for *Preferred Alternative D2A*.

SE Redmond Maintenance Facility (MF5)

MF5 would be placed on the opposite side of SR 520 from Bear Creek. Stormwater from the facility drains to the Sammamish River some distance away, thus minimizing sediment delivery to the river. Bear Creek would be unaffected.

### Permanent Operational Impacts

**Segment A**

*Preferred Interstate 90 Alternative (A1)*

Because electrically powered light rail systems do not generate any pollutants, stormwater—from both water volume and water quality perspectives—is not an issue for the East Link Project. Operation of rail could discharge stray electrical current into Lake Washington and create electric current fields around the bridge, in addition to fields that would be already possibly created from the bridge's existing cathodic corrosion protection system. Sound Transit estimates that stray current intensity would be one to three orders of magnitude below physiological or behavioral response thresholds for even the most sensitive Lake Washington fish species (see Appendix G). No permanent operational impacts on fish and aquatic species and habitats are expected as a result of *Preferred Alternative A1*.

**Segment B**

*Preferred 112th SE Modified Alternative B2M to Preferred Alternative C11A*

*Preferred Alternative B2M to C11A* would have a small, direct permanent impact on aquatic habitat. It would require the installation of a short bridge over a small, narrow alcove in the shoreline of Mercer Slough West in the vicinity of SE 15th Street. This would cover and shade approximately 18 square feet of water. Permanent indirect impacts would occur due to loss of vegetation within the stream buffer of Mercer Slough West along 112th Avenue SE, north of Bellevue Way (0.4 acre [Table 4-3]). The vegetation in the buffer that would be affected is low-quality habitat because it is dominated by Himalayan blackberry (a state-listed noxious weed) and mowed lawn (see Exhibit 4-1), with few native trees or shrubs. The proposed at-grade footprint (south of SE 15th Street) would permanently affect an approximately 30-foot-wide area of this buffer that ranges in width by approximately 50 to 200 feet. However, the area of construction clearing would be replaced with much higher quality vegetation. At this location there is an opportunity to remove low-quality riparian vegetation (mostly blackberries) and replace it with high-quality,


EXHIBIT 4-1
Mercer Slough buffer along 112th Avenue SE

native woody riparian vegetation, including conifer species that could shade the water as the trees grow, nutrient inputs to the slough from leaf litter and terrestrial insect inputs, pollutant removal, and erosion control. The Bellevue Parks Department has developed a restoration plan to remove the blackberry and restore this buffer area with native trees and shrubs. Implementing this design to restore the buffer area could mitigate for the permanent (and any temporary) buffer impacts on fish and aquatic species and habitats and result in high-quality buffer habitat that would benefit Mercer Slough.

*Preferred 112th SE Modified Alternative (B2M) to Preferred Alternative C9T*

*Preferred Alternative B2M to C9T* would have similar impacts as those described for *Preferred Alternative B2M to C11A* except that more stream buffer would be lost (0.9 acre).

TABLE 4-3
Potential Permanent Operational Impacts on Stream Buffers at Mercer Slough West or Mercer Slough

| Alternative | Stream Buffer Impact Area[a] (acre) |
|---|---|
| ***Preferred Alternative B2M*** | |
| *to C11A* | 0.4 |
| *to C9T*[b] | 1.1 |
| *Bellevue Avenue Alternative (B1)* | 0 |
| 112th SE At-Grade Alternative (B2A) | 0.1 |
| 112th SE Elevated Alternative (B2E) | 0.4 |
| 112th SE Bypass Alternative (B3) | 0.1 |
| B3 - 114th Extension Design Option | 0.3 |
| BNSF Alternative (B7) | 0.2 |

[a] Some of the impacts on stream buffers overlap with impacts on some wetland buffers. See Table 4-10 later in this section and Appendix F.
[b] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.

Bellevue Way Alternative (B1)

Alternative B1 should have no permanent operational impacts on fish and aquatic species and habitats.

112th SE Bypass (B3) and 112th SE At-Grade (B2A) Alternatives

Alternatives B2A and B3 would have no direct permanent impacts on fish and aquatic species and habitats. Indirect permanent impacts would occur due to the increased existing encroachment of 112th Avenue SE into the Bellevue's 100-foot CAO stream buffer along Mercer Slough (0.1 acre each) between Bellevue Way SE and SE 8th Street. This area has few trees and is almost entirely Himalayan blackberries. The impacts would be the same as described for *Preferred Alternative B2M to C11A* but less so in proportion to the acreage involved. The B3 - 114th Extension Design Option would have no direct permanent impacts on fish and aquatic species and habitats. Indirect permanent impacts would occur due to stream buffer loss from the guideway footprint. This loss (1.3 acres) would be the greatest of all the Segment B alternatives. Otherwise, impacts would be similar to *Preferred Alternative B2M to C11A*. The difference in stream buffer loss is due to the curve near the intersection of 112th Avenue SE and SE 8th Street.

112th SE Elevated Alternative (B2E)

The elevated track section along 112th Avenue SE would have no direct permanent impacts on fish and aquatic species and habitats. Indirect impacts from loss of stream buffer would be an improvement due to the replanting plan described for *Preferred Alternative B2M to C11A*. While the guideway might cast shade on the riparian vegetation bordering Mercer Slough, the height of the guideway (approximately 25 feet) would allow enough light for normal tree growth as found along the elevated guideways in Sound Transit's Central Link. The permanent loss of stream buffer would be 0.4 acre. The impact would be more than offset by the improvements made from replanting with native riparian vegetation.

BNSF Alternative (B7)
The elevated track section crossing Mercer Slough would have no direct permanent impacts on fish and aquatic species and habitats**.** While some shade would be cast on the adjacent riparian vegetation, the height of the guideway (65 feet) would allow enough light for normal tree growth. There would be a permanent loss of riparian vegetation in the footprint of two support columns (200 square feet). A loss of riparian function would occur where riparian vegetation would be cleared and replanted (0.2 acre). This area is composed of willow trees and would be replanted with the same. The trees could grow back to the present condition in approximately 10 years.

**Segment C**

*Preferred 108th NE At-Grade Alternative (C11A) and Preferred 110th NE Tunnel Alternative (C9T), from B2M*
With *Preferred Alternatives C11A* or *C9T*, the Hospital Station would be positioned over the top of the existing Sturtevant Creek channel just north of NE 8th Street. To minimize impacts on the creek, the channel would be shifted to the west side of the former BNSF Railway tracks in a new culvert, thereby realigning the channel to the west approximately 30 feet into a landscaped strip next to the station. This reach is approximately 300 feet long. The new channel would be a substantial improvement compared to the existing channel, which is straight, featureless, and lacking any riparian vegetation. The new channel would have riparian vegetative cover, a gravel streambed, and a more natural form. The riparian area would also provide nutrient inputs from leaf litter and insects. However, salmonid presence in this reach is uncertain because the reach is above several fish-passage blockages.

*Preferred Alternatives C11A* and *C9T* from Alternative B3 pass through the Hilton Hotel reach, running along Sturtevant Creek for 420 feet adjacent to the hotel and crossing the channel twice. The existing vegetation along this stream reach, which is a mixture of mature conifer and deciduous trees, would be cleared during construction and replanted with short-growing native species, such as Sitka willow and vine maple. About 150 feet of channel is below the guideway and the rest is adjacent to it. The elevated guideway would be approximately 45 feet above the ground and not effectively shade this riparian area. There would be a temporal loss of riparian function while the new riparian trees re-establish. Because Sound Transit would not alter the creek channel, it would still provide spawning habitat. Even though the riparian trees would be smaller, LWD recruitment potential would not be diminished because this area is an intensively managed landscape. Fallen trees would be removed by hotel landscaping contractors either way.

*Preferred Alternatives C11A* or *C9T* from the B3 – 114th Extension Design Option or Alternative B7 would have the same impacts as described in the prior paragraph but would add approximately 300 feet of clearing within 20 feet of the stream channel to that described for the connection to Alternative B3, 140 feet of clearing to the water's edge, and 130 feet of guideway approximately 25 feet off the ground above the channel. Potential impacts on riparian function would be the same as described above for this additional reach, except that landscaping is not actively managed to the water's edge as it is on the Hilton Hotel property. Because there are no ponds, streams, or rivers in the area of the C9T- East Main Station Design Option, no additional impacts would occur if this option is selected.

Bellevue Way Tunnel Alternative (C1T)
Alternative C1T would avoid potential impacts on fish and aquatic species and habitats in Sturtevant Creek in the vicinity of the Hilton Hotel and immediately downstream. But this alternative would result in the same potential improvements on Sturtevant Creek at the Hospital Station as described above for *Preferred Alternative C11A*.

106th NE Tunnel Alternative (C2T) and 110th NE At-Grade Alternative (C9A)
Alternatives C2T and C9A would have the same potential impacts on fish and aquatic habitat as described for *Preferred Alternatives C11A* and *C9T* connecting to *Preferred Alternatives B2M*. Impacts from Alternatives C2T or C9A connecting to Alternatives B3, B3 – 114th Extension Design Option (with C9A only), or B7 would be similar to that described for *Preferred Alternatives C11A* and *C9T*, except that the guideway would be lower with Alternative C2T and thus cast a shadow on the channel that would likely result in a minor reduction of primary productivity in the reach adjacent to the Hilton Hotel. Approximately 140 linear feet of channel would be under the guideway with an elevation of 15 to 16 feet.

108th NE Tunnel (C3T), At-Grade Couplet (C4A), and 112th SE Elevated (C7E) Alternatives
Alternatives C3T, C4A, and C7E connecting to Alternatives B2E or B2A would avoid aquatic impacts in Segment C entirely. These alternatives when connected to Alternatives B3 or B7 would have the same potential impacts on

fish and aquatic species and habitats in Sturtevant Creek in the vicinity of the Hilton Hotel and immediately downstream as *Preferred Alternatives C11A* and *C9T* connecting to their various Segment B connectors.

110th NE Elevated Alternative (C8E)
This alternative would have potential impacts in the vicinity of the Hilton Hotel similar to those described for *Preferred Alternatives C11A* and *C9T* with connections to B3 or B7.

114th Avenue NE Elevated Alternative (C14E)
This alternative would have potential impacts at the Hospital Station similar to those described for *Preferred Alternatives C11A* and *C9T*. It would have potential impacts in the vicinity of the Hilton Hotel similar to those described for *Preferred Alternatives C11A* and *C9T* connecting to B3, B3 – 114th Design Option, and B7.

**Segment D**
*Preferred NE 16th At-Grade Alternative (D2A)*
*Preferred Alternative D2A* would have a negligible, direct permanent impact on fish and aquatic species and habitats in the West Tributary to Kelsey Creek caused by the placement of approximately five support columns (500 square feet) in the regional stormwater detention pond. The pond does not support salmonids because there are numerous passage blocks downstream and no spawning areas above. This area is artificially flooded for the stormwater detention facility and sometimes is dry. There would be a small, indirect permanent reduction of riparian function where it crosses the West Tributary to Kelsey Creek in a 0.2-acre area. Large trees would be removed and replaced with shorter growing trees and other understory vegetation. There would be a temporal loss of riparian function as well. The new vegetation would likely grow well because shading would be minimal from the guideway, and it would be north of most of the affected riparian vegetation. The loss of shade on the pond from the taller trees would likely be offset by the shadow of the elevated guideway.

During operation of *Preferred Alternative D2A*, there would be no permanent impacts on Goff Creek.

There would be a negligible, direct permanent impact on the Unnamed Tributary to Kelsey Creek from culvert lengthening (130 feet). The existing stream channel is basically a roadside ditch with no riparian vegetation other than grasses. This tributary currently cannot support salmonids because it has no spawning habitat and has an impassable blockage at its confluence with Kelsey Creek.

At Valley Creek, *Preferred Alternative D2A* would result in no permanent impacts. The southern edge of the guideway would be 27 feet above and about 20 feet to the north of the culvert outlet, and the rest of the guideway would be to the north. As a result, there would be no shadow cast on the stream or riparian vegetation close to the channel and thus no shading impacts.

Both D2A - 120th Station and NE 24th Design Options would have potential impacts identical to those described for *Preferred Alternative D2A*.

NE 16th Elevated Alternative (D2E)
Alternative D2E would have no direct permanent impact on the West Tributary to Kelsey Creek because it would span the creek as an elevated guideway 50 to 60 feet off the ground at this location. Indirect permanent impacts on the stream buffer from this alternative at the West Tributary would be similar to those described for *Preferred Alternative D2A* except that the much less area (0.1 acre) would be involved. Impacts at Goff Creek, the Unnamed Tributary to Kelsey Creek, and Valley Creek would be the same as that described for *Preferred Alternative D2A*.

NE 20th Alternative (D3)
In addition to the impacts described above for Alternative D2E, Alternative D3 would have direct permanent impacts at Valley Creek and NE 20th Street. Valley Creek would lose aquatic habitat and riparian function for the 30 linear feet of channel enclosed in the lengthened culvert at 20th Street. This reach of Valley Creek was rated as good habitat. Sears Creek would be unaffected.

SR 520 Alternative (D5)
Alternative D5 would have impacts from the elevated guideway crossing at the West Tributary to Kelsey Creek similar to those described for Alternative D2E. There would be no impact on aquatic habitat at Goff Creek and Valley Creek. It is assumed that the Unnamed Tributary to Kelsey Creek is currently in a pipe where the elevated guideway would cross; therefore, this alternative would not impact aquatic habitat.

**Segment E**

*Preferred Marymoor Alternative (E2)*

*Preferred Alternative E2* would have no direct permanent impacts. This alternative would affect riparian vegetation at the Sammamish River crossing. The guideway would be elevated approximately 55 feet over the west bank, 45 feet over the east bank, and 60 feet over the water. Assuming a cast-in-place bridge, the existing riparian vegetation (dominated by blackberry and a few small conifer trees) would be cleared and replanted after construction with shrubs and shorter-growing trees. This would result in a permanent reduction of potential future LWD input to the river. The guideway would be high enough that tree growth would not be hampered by shading from the guideway. There would be a temporal loss of nutrient inputs to the river while the newly planted trees are growing up. With regard to river temperature, the proposed guideway would provide more shade than the few existing small conifer trees and blackberries provide. The Sammamish River is on the State's 303(d) list for water temperature, so temperature concerns are more important than losing primary vegetation productivity from shade at this location.

With *Preferred Alternative E2*, there would be a permanent loss of riparian vegetation functions for approximately 5 feet on either side of the former BNSF Railway bridge over Bear Creek because the guideway would only be 8 feet above the banks with the sun aspect oblique to the guideway. The primary riparian vegetation productivity would be less under the shadow of the guideway, which would be 15 feet above the water surface.

The E2 - Redmond Transit Center Design Option would have the same potential impacts as *Preferred Alternative E2*.

Redmond Way Alternative (E1)

Alternative E1 would have the same impacts as *Preferred Alternative E2* at the Sammamish River crossing except that more (0.2 acre) riparian vegetation would be affected. At the Bear Creek crossing, there would be no impacts on riparian vegetation because the guideway would be 48 feet above the top of the stream bank and 53 feet above the water surface. There are no tall-growing tree species present.

Leary Way Alternative (E4)

Alternative E4 would have the same impacts as *Preferred Alternative E2* at the Sammamish River crossing. Impacts on the riparian community would be similar to but slightly less than *Preferred Alternative E2* at the Bear Creek crossing because the elevated guideway would be 3 feet higher (18 feet above the water surface).

**Maintenance Facilities**

116th Maintenance Facility (MF1)

MF1 might cause negligible, permanent operational impacts from pollutant loading in the West Tributary to Kelsey Creek.

BNSF Maintenance Facility (MF2)

Impacts with MF2 would be the same as with MF1.

SR 520 Maintenance Facility (MF3)

MF3 would create 42 feet of new fish habitat from culvert replacement in Goff Creek and shortening the length of the culvert. The reach could be improved with the construction of a few pools. The riparian area is currently lacking vegetation other than mowed grass and English ivy; this would be improved with appropriate native vegetation. Pollutant loading impacts would be negligible in Goff Creek.

SE Redmond Maintenance Facility (MF5)

MF5 might cause negligible, permanent operational impacts from minor pollutant loading in the Sammamish River.

#### 4.1.2.2 Federal-Listed Threatened and Endangered Species

The ESA offers protection for three species of fish known to be present in the project vicinity: Puget Sound steelhead, Puget Sound Chinook salmon, and bull trout. NMFS and WDFW have established in-water construction work windows for water bodies that must be adhered to in order to protect ESA species. Table 4-4 shows applicable in-water work windows for these salmonid resources in the project vicinity.

TABLE 4-4
Construction Work Windows for Listed Species

| Water Body | Applicable Alternative | ESA Work Window |
|---|---|---|
| Lake Washington | Segment A Alternative | July 16 – December 31 (I-90 floating bridge and east and west highrises)<br>July 16 – 31 and November 16 – December 31 (East Channel bridge) |
| Kelsey Creek watershed and Bear Creek | All Segment C Alternatives | July 1 – August 31 |
| Sammamish River and lower Bear Creek | All Segment D Alternatives | July 16 – July 31 and November 16 – March 15 |

Although a detailed construction schedule has not been developed yet, the allowable construction work windows should not affect the overall project schedule. The potential impacts apply to the degree that the species or their habitats are found in proximity to project activities. The following text describes the likelihood of exposure and potential impacts of project activities and structures on protected species by project segment.

### Segment A
Chinook salmon, steelhead, and bull trout could be exposed to construction activities. However, construction activities in Segment A would have a very low potential for impacts on these fish. In addition, work window restrictions would minimize their exposure to construction activities.

### Segment B
Construction activities in Segment B would have a low potential impact on Chinook salmon or steelhead because this segment contains no spawning or primary rearing habitat and because there would be no in-water work.

### Segment C
Bull trout are not present in Segment C. Chinook salmon are present in Sturtevant Creek. Steelhead presence is possible. Near-water (but not in-water) work would occur. The appropriate level of BMPs would be implemented to prevent adverse effects on listed species.

### Segment D
Potential impacts on Chinook salmon or steelhead occurring in West Tributary Kelsey Creek would be isolated from downstream habitats by long stretches of ponded water. Potential impacts that might occur in Goff Creek would be far enough upstream from areas of Chinook salmon or steelhead use that impacts would be diminished before reaching downstream habitats. Kelsey Creek, the most important Chinook salmon habitat in this segment, is at least 0.25 mile downstream of the closest project construction.

### Segment E
Potential impacts on both Chinook salmon and steelhead would be low in the Sammamish River because it is only a migratory corridor and the crossings are elevated structures that would not involve in-water work. The Bear Creek crossing would be the most sensitive project element because it is close to Chinook salmon and steelhead rearing habitat.

## 4.2 Vegetation and Wildlife

Construction of the East Link Project could have permanent operational and temporary construction impacts on vegetation and wildlife in the study area. These include mostly direct and some potential indirect impacts. The following sections outline the range of potential impacts that could occur for each segment and alternative. Actual impacts would depend on the final alternative selection and design, construction footprint and methods, BMPs implemented during construction, and performance of post-construction wetland restoration.

Vegetation polygons were classified and mapped regardless of size or upland/wetland designation. As a result, the vegetation polygons might include upland and/or wetland vegetation. Vegetation polygons might overlap with wetland polygons; therefore, affected acreage numbers for wetlands and vegetation/wildlife habitat cannot be added together. This overlap is depicted on Exhibits 3-23 to 3-26.

### 4.2.1 Temporary Construction and Related Impacts

Project construction would require clearing and removal of vegetation from within the construction limits. Affected areas (and associated species) within the construction limits that would be permanently altered by project facilities are addressed under permanent operational impacts in Section 4.2.2. As described in Section 1.4.1.1, the duration of temporary construction impacts would vary depending on the vegetation type and associated habitat functions that would be affected. Impacts associated with disturbance and displacement of wildlife are also described in this section. Alternatives that would result in some level of temporary wildlife displacement are listed in Table 4-5. Alternatives not listed in Table 4-5 would have few or no displacement-related impacts. Impacts on cities' critical areas are noted only in terms of the impacts on high-value habitats that support multiple special-status species. These high-value habitats are described in Section 2.2.2.4.

Construction activities would also temporarily affect wildlife in the general area. Impacts would occur from vegetation and habitat loss, disruption of travel corridors, noise impacts, and displacement of wildlife into potentially less suitable habitats where they might not thrive. Wildlife would likely be displaced when construction begins. Species displaced by construction noise would likely return after construction is complete. However, reestablishing native vegetation would require 2 to 4 years for herbaceous upland and wetland types, and decades for mature forest types. Species that forage on or near the ground, for example, urban-dwelling small mammals or birds such as juncos and song sparrows, would use their preferred habitats first. Species that require mature vegetation, and especially those that use large shrubs and trees, such as wrens, chickadees, and woodpecker, would recolonize their preferred habitats last.

TABLE 4-5
Alternatives with Temporary Wildlife Displacement Expected During Construction

| Alternative | Basis for Determination |
|---|---|
| **Alternatives with Relatively Higher Expected Levels of Wildlife Displacement** | |
| *Preferred 112th SE Modified Alternative (B2M)*<br>Bellevue Way Alternative (B1)<br>112th SE At-Grade Alternative (B2A)<br>112th SE Elevated Alternative (B2E)<br>112th SE Bypass Alternative (B3)<br>B3 - 114th Extension Design Option | Location along Bellevue Way (relatively quieter than near I-405 or I-90) and adjacent to Mercer Slough might result in greater increase in noise over existing conditions compared to Alternative B7. |
| *Preferred Alternative B2M*<br>Alternative B2E<br>Elevated portion of Alternative B7<br>Alternative B3 (along SE 8th Street)<br>B3 - 114th Extension Design Option | Elevated structures adjacent to Mercer Slough Nature Park or through Sturtevant Creek wetland mighty result in more noise near high-value wildlife area. |
| **Alternatives with Intermediate Expected Levels of Wildlife Displacement** | |
| Alternative (B7), at-grade along former BNSF Railway corridor | Farther from Mercer Slough Nature Park than other Segment B alternatives and proximity to noisier I-405 and I-90 reduces potential impacts compared to alternatives on the west side of the park. |
| SR 520 Alternative (D5) | Passes through several relatively large patches of coniferous and deciduous forest. |
| Redmond Way Alternative (E1) | Passes through several relatively large patches of coniferous forest. |
| **Alternatives with Relatively Lower Expected Levels of Wildlife Displacement** | |
| Elevated portion of:<br>*Preferred NE 16th At-Grade Alternative (D2A)*<br>NE 16th Elevated Alternative (D2E)<br>NE 20th Alternative (D3) | Short distance near West Tributary to Kelsey Creek. |
| *Preferred Marymoor Alternative (E2)* | Passes through a few relatively large patches of coniferous forest. Borders on Marymoor Park with large grassy areas and poplar trees. |
| Leary Way Alternative (E4) | Passes through a few relatively large patches of coniferous forest. |
| **Alternatives with very Low Expected Wildlife Displacement** | |
| All Segment C Alternatives | Highly urbanized corridors. |

#### 4.2.1.1 Impacts Common to All or Most Build Alternatives

Impacts that would occur under all or most of the build alternatives are those related to noxious weeds and those resulting from construction noise and human activity. These impacts would occur in all areas where construction occurs.

##### Noxious Weeds

Noxious weeds and exotic plants rapidly colonize disturbed sites such as construction areas. They prevent native species from being re-established following ground disturbance, spread into undisturbed areas where they can affect habitat value on additional lands, and provide very poor wildlife habitat or forage. Several BMPs (included in Appendix A) are intended to avoid, reduce, and control new infestations of noxious weeds through a variety of actions. Consistent and successful application of these measures would reduce potential habitat disturbance and improve existing already-disturbed habitats. However, it is likely that some especially invasive weeds such as Himalayan blackberry would become established in some areas disturbed during construction. This invasive species prevents the re-establishment of native riparian species along streams and substantially reduces wildlife habitat value.

However, the East Link Project could also improve conditions where, in many cases, existing noxious weeds such as Himalayan blackberry, reed canarygrass, and/or Japanese knotweed dominate vegetated areas within the study area. In areas of permanent impact, these weedy areas would be removed. In areas of temporary impact, these weedy areas would likely be restored by native vegetation.

##### Impacts of Noise and Human Activity on Wildlife

Both noise and human activity have been demonstrated to displace wildlife from occupied habitats, interfere with the ability to hear territorial songs in birds, interfere with mating and alarm calls in amphibians and ground squirrels, and interfere with raptor foraging activities. There are numerous studies documenting wildlife avoidance of roads and facilities and wildlife disturbance from human activity at varying distances (Madsen, 1985; Van der Zande, et al., 1980; Fyfe and Olendorff, 1976).

However, most of these and similar studies have considered the impacts of new construction or facilities and human activities in areas where none or few of these facilities or human activities previously existed. This is not the case in the East Link study area, where roads, numerous transit corridors, residential and commercial development, and regular human activity are common features of most of the landscape. Wildlife that use habitats adjacent to the project alternatives are more or less accustomed to some level of human activity and noise. Impacts would be related to changes in noise levels and the types of human activities.

Measured constant day-time noise levels along I-90 and I-405 average about 70 to 72 A-weighted decibels (dBA) Leq ("equivalent" continuous sound level) at a distance of 100 feet from the roads. Noise levels along the I-90 bridge are projected to be 72 dBA Leq at 50 feet from the roadway, with maximum noise levels between 80 and 87 dBA Lmax (maximum noise level) when heavy trucks pass by, such as dump trucks and long-haul tractor trailers. This is typical for major interstate highways. Measured average noise levels along Bellevue Way SE are between 65 and 69 dBA Leq for front-line residences (less than 50 feet from the road) and between 60 and 64 dBA Leq for second-line homes (about 100 feet from the road). Some wildlife species undoubtedly already avoid noisier areas such as along I-90 and I-405. The potential temporary impacts on wildlife from increased noise and human activity during construction would be less than what would occur if the East Link Project were located in a rural area. However, some displacement of wildlife from otherwise useable habitat could occur. The degree of displacement would generally be proportional to the change in noise levels over background conditions; the distance of the construction activity from occupied habitats; the frequency, duration, and types of noise and human activity; and changes in the types of human activity during construction.

#### 4.2.1.2 Specific Impacts of Alternatives by Segment

##### Vegetation and Wildlife

Project construction would require clearing and removal of vegetation from within the construction limits (approximately 35-foot-wide corridors along both sides of the 30-foot-wide operational right-of-way). The temporary construction disturbance would include the area beyond what would be required to accommodate the permanent facility. The estimated extent of the potential temporary construction impacts on vegetation is listed in Table 4-6, as most of the impact would occur to high-value habitats. Alternatives that are not listed would not affect these vegetation types.

Within the construction limits, animals of all types occupying areas that would be cleared would lose breeding, foraging, and roosting habitat. Less mobile species and those that retreat to burrows would likely be killed during this initial site work. More mobile species would likely flee to adjacent areas where they may not survive, depending on the availability of nearby suitable and unoccupied habitat. Suitable habitat for these species may be re-established within the construction limits over time, but increased noise and human presence combined with increased soil compaction may render some areas unsuitable for future re-occupancy by the affected species.

## Affected Habitats and Species with Special Status

### Affected Habitats

Table 4-6 includes an estimate of potential temporary construction impacts on vegetation and habitat types. The loss of these habitats would persist for varying lengths of time. It was assumed that areas supporting native upland or wetland vegetation and streambanks would be restored to their former condition following construction. These temporary, long-term impacts on shrub and forest habitats would persist for many years because of the time required for woody vegetation to grow enough to restore preconstruction functions.

TABLE 4-6
Potential Temporary Construction Impacts on Vegetation and Habitat Types in the Study Area

| Alternative | Area of Affected Vegetation (acres)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat [b] | | | | | Marginal Habitat | | | |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | Grand Total [c] |
| **Segment B** | | | | | | | | | |
| *Preferred 112th SE Modified Alternative (B2M)* | | | | | | | | | |
| *to C11A* | 0 | 0 | 1.1 | 0 | **1.1** | 0.1 | 1.3 | 0.3 | **2.8** |
| *to C9T*[d] | 0 | 0 | 1.0 | 0 | **1.0** | 0.1 | 1.2 | 0.3 | **2.6** |
| Bellevue Way Alternative (B1) | 0 | 0.8 | 1.2 | <0.1 | **2.1** | 0.6 | <0.1 | 0 | **2.7** |
| 112th SE At-Grade Alternative (B2A) | 0 | 0.9 | 0.9 | 0.1 | **1.9** | 0.3 | 0.5 | 0.1 | **2.8** |
| 112th SE Elevated Alternative (B2E) | 0 | 0.6 | 0.7 | 0 | **1.3** | 0.2 | 0.8 | 0.1 | **2.4** |
| 112th SE Bypass Alternative (B3) | 0 | 0.9 | 0.9 | 0.1 | **1.9** | 0.3 | 0.6 | 0.1 | **2.9** |
| B3 - 114th Extension Design Option | 0 | 1.2 | 1.0 | 0.2 | **2.4** | 0.3 | 1.3 | 0.1 | **4.1** |
| BNSF Alternative (B7) | 0.9 | 1.2 | 2.1 | 0.4 | **4.6** | 0 | 0.2 | 0.2 | **4.9** |
| **Segment C** | | | | | | | | | |
| *Preferred 108th NE At-Grade Alternative (C11A)* – from B2M | 0 | <0.1 | 0 | 0 | **<0.1** | 0 | 0 | <0.1 | **0.1** |
| *Preferred Alternative C11A* – from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.4 | **0.4** |
| *Preferred Alternative C11A* – from B3 Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| *Preferred 110th NE Tunnel Alternative (C9T) – from B2M*[d] | 0 | 0.2 | 0 | 0 | **0.2** | 0 | 0 | <0.1 | **0.2** |
| *Preferred Alternative C9T* – from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.4 | **0.4** |
| *Preferred Alternative C9T* – from B3 Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| 106th NE Tunnel Alternative (C2T) – from B3 or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |

TABLE 4-6 CONTINUED
Potential Temporary Construction Impacts on Vegetation and Habitat Types in the Study Area

| Alternative | Area of Affected Vegetation (acres)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat [b] | | | | | Marginal Habitat | | | |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | Grand Total [c] |
| 108th NE Tunnel Alternative (C3T) – from B3 or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **4.2.2 0 .5** |
| At-Grade Couplet Alternative (C4A) – from B3 or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| 112th NE Elevated Alternative (C7E) – from B3 or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| 110th NE Elevated Alternative (C8E) – from B3 or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| 110th NE At-Grade Alternative (C9A) – from B2A | 0 | 0.2 | 0 | 0 | **0.2** | 0 | 0 | 0.1 | **0.3** |
| Alternative (C9A) – from B3, B3 Design Option, or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| 114th NE Elevated Alternative (C14E) – from B3, B3 Design Option, or B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.5 | **0.5** |
| **Segment D** | | | | | | | | | |
| *Preferred Alternative NE 16th At-Grade (D2A)* | 0.4 | 0.1 | 1.4 | 0 | **1.9** | 0.2 | 0 | 1.2 | **3.3** |
| D2A - 120th Station Design Option | 0.4 | 0.1 | 1.4 | 0 | **1.9** | 0.2 | 0 | 1.2 | **3.3** |
| D2A - NE 24th Design Option | 0.4 | 0 | 1.6 | 0 | **2.0** | 0.1 | 0 | 1.3 | **3.5** |
| NE 16th Elevated Alternative (D2E) via 12th (C3T, C4A, C7E, C14E) | 0.3 | 0.1 | 0.4 | 0 | **0.8** | 0.1 | 0 | 1.4 | **2.2** |
| Alternative D2E via BNSF (C1T and C2T) | 0.3 | 0.1 | 0.3 | 0 | **0.7** | 0.1 | 0 | 1.3 | **2.1** |
| NE 20th Alternative (D3) via 12th (C3T, C4A, C7E, C8E) | 0 | 0.1 | 0.2 | 0 | **0.3** | 0.2 | 0 | 0.4 | **1.0** |
| Alternative D3 via BNSF (C1T and C2T) | 0 | 0.1 | 0.1 | 0 | **0.2** | 0.2 | 0 | 0.4 | **0.8** |
| SR 520 Alternative (D5) via 12th (C3T, C4A, C7E, C8E) | 0.6 | 0.2 | 0.5 | 0 | **1.3** | 1.0 | 0.2 | 1.4 | **3.8** |
| Alternative D5 via BNSF (C1T and C2T) | 0.6 | 0.2 | 0.4 | 0 | **1.2** | 1.0 | 0.2 | 1.3 | **3.7** |
| **Segment E** | | | | | | | | | |
| *Preferred Marymoor Alternative (E2)* | 0.1 | 0.9 | 0.5 | 0 | **1.5** | 1.2 | 0 | 0.3 | **2.9** |
| E2 - Redmond Transit Center Design Option | 0.1 | 0.9 | 0.6 | 0 | **1.6** | 1.2 | 0 | 0.3 | **3.1** |
| Redmond Way Alternative (E1) | 0 | 1.7 | 0.4 | 0 | **2.1** | 0.8 | 0 | 0.2 | **3.6** |
| Leary Way Alternative (E4) | 0 | 0.5 | 0.6 | 0 | **1.1** | 1.1 | <0.1 | 0.5 | **2.7** |

TABLE 4-6 CONTINUED
Potential Temporary Construction Impacts on Vegetation and Habitat Types in the Study Area

| Alternative | Area of Affected Vegetation (acres)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat [b] | | | | | Marginal Habitat | | | |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | Grand Total [c] |

Alternatives that are not listed would not affect these vegetation types.

[a] Vegetation polygons were classified and mapped regardless of size or upland/wetland designation. As a result, the vegetation polygons may include upland and/or wetland vegetation. Vegetation polygons may overlap with wetland polygons; therefore, affected acreage numbers for wetlands and vegetation/wildlife habitat cannot be added together. This overlap is depicted on Exhibits 3-23 to 3-26.
[b] Impacts on high-value habitats would require compliance with the Bellevue and Redmond CAOs.
Subtotals were added before rounding and therefore reflect true impacted area.
[c] Grand totals were added before rounding and therefore reflect the true impacted area.
[d] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.

High-value habitats that would be temporarily affected within the construction limits and their locations include the following:

- Wetland and open water including Mercer Slough (Alternative B7) (see Section 4.3 for wetland impacts discussion)
- Riparian forest associated with Mercer Slough (Alternative B7)
- Urban Natural Open Space including Urban Mostly Vegetated - deciduous forest (all Segment B alternatives).

Segment B

The estimated area of high-value habitat that would be directly affected during clearing for construction in Segment B varies from approximately 1 acre (*Preferred Alterative B2M from C9T*) to approximately 4.6 acres (Alternative B7). Alternative B7 would affect more area of each high-value habitat than the other Segment B alternatives. Riparian forest is the highest value wildlife habitat type in the study area, followed by the deciduous and coniferous forest types. Wetlands, along with riparian forest, are the highest value wildlife habitat type in the project vicinity. While wetland impacts are addressed in Section 4.3 of this report, Alternative B7 would also temporarily affect more wetland area than the other Segment B alternatives.

All the Bellevue Way alternative routes would have a similar total impact on high-value habitat.

*Preferred Alternative B2M* would temporarily affect approximately 1 acre of high-value deciduous forest habitat, which includes the removal of some mature deciduous trees near the Bellevue Way SE and 112th Avenue SE intersection. Impacts on this area would be minimized to the maximum extent possible by limiting the temporary clearing of mature vegetation to the 35-foot-wide construction area on each side of the guideway. Due to the amount of similar available habitat in the Mercer Slough vicinity, impacts on wildlife would not be significant. This impact would be mitigated as required by the CAO.

Segment C

There would be relatively few temporary impacts on high-value habitat along Segment C.

Segment D

The estimated area of high-value habitat that would be directly affected during clearing for construction along Segment D varies from approximately 0.3 acre (Alterative D3) to approximately 2.0 acres (D2A - NE 24th Design Option).

Segment E

The estimated area of high-value habitat that would be directly affected during clearing for construction in Segment E varies from approximately 1.1 acres (Alterative E4) to approximately 2.1 acres (Alternative E1).

**Federal and State Threatened and Endangered, and Candidate Species, and Species of Concern**

Marbled Murrelet

During the nonbreeding season, marbled murrelets are rare and infrequent visitors to Lake Washington. They have been observed on the lake in the past but have not been documented to use the lake since the early 1990s. No impacts are expected because only one sighting has been observed in the last 50 years. As such, impacts are considered discountable.

Bald Eagle

None of the five bald eagle nests are located closer than 0.3 mile (about 1,580 feet) from any of the alternatives (see Table 3-9), and the shortest line-of-sight distance from a nest to a construction area would be 0.4 mile (about 2,110 feet). These distances are substantially greater than the recommended minimum of 660 feet. Therefore, according to the USFWS (2007b) bald eagle management guidance, potential impacts on nesting bald eagles during project construction would be minimized because disturbance levels would be lower than those specified in the guidelines.

Depending on screening vegetation, prevailing winds, topography, and the sensitivity of the nesting eagles to human activities, WDFW (2001) recommends possible expansion of the conditioned zone, or secondary zone, up to 2,640 feet from the edge of the protected zone, for a total distance of 3,640 feet. The shortest line-of sight distance from a nest to a construction area would be 2,112 feet under *Preferred Alternative A1* (see Table 3-9). The line-of sight distances from the other nests to the nearest construction area would be about 2,650 feet, 3,080 feet, and greater than 1 mile (two nests), respectively. Given the general location of these bald eagle nests in an urban area with relatively high levels of human activity, it is very unlikely that construction activities would directly or indirectly affect any of the existing bald eagle nest sites.

There are no known communal roosts within a half mile of any of the alternatives.

The change and increase in human activity from passing construction vehicles and people on foot outside of vehicles could displace eagles farther from the I-90 construction area. A study of bald eagles found that 50 percent of wintering eagles in open areas flushed at 500 feet from the source of human activity but that 98 percent will tolerate human activities at 1,000 feet (Stalmaster and Newman, 1979). Therefore, any increase in displacement in the vicinity of *Preferred Alternative A1* along I-90 would likely occur within 1,000 feet of the construction area. Given the large areas available for foraging, it is unlikely that this would result in impacts on bald eagle foraging and perching.

Bald eagles are suspected of foraging for salmon along Bear Creek during the fall and winter. Although specific foraging locations are not known, construction of *Preferred Alternative E2* or Alternatives E1or E4 across Bear Creek could temporarily displace bald eagles from the construction area.

Peregrine Falcon

Peregrine falcons still using the nest on the I-90 East Channel bridge might abandon the nest during construction. There is no way to estimate whether these birds would nest elsewhere during construction or whether they would reoccupy this nest after construction is complete.

Olive-Sided Flycatcher

The olive-sided flycatcher breeds in coniferous forests and might be present along the study area in Segments B and E, although none were recorded before or during surveys. There would be no temporary construction impacts on this species because only narrow strips of conifer forest would be affected by construction.

Willow Flycatcher

These birds typically breed in deciduous thickets, especially in willow thickets. Willow flycatcher nest sites are often close to water. There could be impacts on willow flycatcher habitat due to minor loss of scrub-shrub riparian habitat that could occur at Mercer Slough Wetland and Sturtevant Creek Wetland from any of the Segment B alternatives except Alternative B1.

**State Candidate Species**

Several other priority species are known to occur in the project vicinity. Aquatic species were addressed in Section 4.1 of this report. Table 4-7 lists these species and potential construction impacts on the species or their habitat. Stream crossings are specifically called out as an impact due to the loss of riparian habitat to occur as well as changes in other stream characteristics (see Section 4.1, Aquatic Resources).

TABLE 4-7
Potential Temporary Construction Impacts on State Candidate Species Likely or Known to Occur in the Study Area

| Species[a] | Preferred Habitat | Potential Project Impacts |
|---|---|---|
| Pileated woodpecker | Requires wooded forests with a component of dead and dying trees and snags for foraging and nesting. Prefers deciduous forests but would use conifer forests with some deciduous tree component. Found at Marymoor Park. One bird observed in WR-5. | Signs of pileated woodpecker activity were observed in some larger forest stands. Some loss of forest habitat might occur. Any loss would persist for many years (*Preferred B2M*, B3, B3 - Design Option, B1, B2A, B2E, and B7). |
| Western grebe | Nests in colonies numbering up to several hundred birds on large inland lakes or in coastal marshes of the western United States. | This species could be displaced from some foraging area near I-90 during construction (*Preferred A1*). |
| Merlin | Seen during the nesting season at Marymoor Park. Unlikely to nest in the study area. | Impacts on this species would be very unlikely. Foraging areas would not be affected. |
| Purple martin | Nests in structures over water bodies. Forages for insects over open water or wet areas. Nesting observed at Marymoor Park in 2003. | There are no purple martin nests close enough to any of the alternatives to be affected by construction. |

[a] Includes only those species not discussed in text.

Alternative Designations:
*Preferred A1 = I-90*
*Preferred B2M = 112th SE Modified*
B1 = Bellevue Way
B2A = 112th SE At-Grade
B2E = 112th SE Elevated
B3 = 112th SE Bypass
B3 - Design Option = 114th Extension
B7 = BNSF

## 4.2.3 Permanent Operational Impacts

Operational impacts are those that cause permanent displacement by the project alternatives, stations, maintenance facilities, traction power substations, and road widening. These impacts would occur during the early stages of construction within each segment and would be permanent.

### 4.2.3.1 Impacts Common to Most or All Action Alternatives

Many amphibian annual life cycles require seasonal migration between habitats with different ecological properties. These species' populations depend on dispersal connections and landscape links (Gibbs, 1998). Simple linear structures such as roads and at-grade tracks can act as physical and psychological barriers for amphibian movement (Mader, 1984; Gibbs, 1998). Areas where such movements may occur are between Mercer Slough Nature Park and forest remnants to the east and west of the park and between Bear Creek and Marymoor Park. However, the project vicinity already includes many roads that function as partial or complete physical barriers to seasonal amphibian movements between areas of suitable habitat. Few, if any, amphibians are likely to successfully cross the former BNSF Railway tracks and I-405 to the east of Mercer Slough Nature Park, or Bellevue Way to reach the coniferous patch west of the nature park.

Permanent indirect and qualitative impacts might also occur as a result of construction and operation activities. Potential permanent indirect impacts for each of the project alternatives may include the following:

- Conversion of existing high-quality, forest-dominated vegetation and wildlife habitat under and within 20 feet of each side of the elevated guideways to shrub and short-tree habitat, which may become high-quality habitat for some species, to prevent trees and branches from interfering with operation of the light rail
- Conversion of existing low-quality, weed-dominated, and disturbed vegetation and wildlife habitat under and within 20 feet of each side of the elevated guideways to shrub and short-tree habitat, which would be a substantial environmental improvement
- Light and habitat fragmentation

### Impacts of Noise and Human Activity on Wildlife

The East Link project vicinity is predominantly urbanized, and the open spaces and open waters include high volumes of human activity with noise from adjacent roadways. East Link operations along elevated track sections adjacent to Mercer Slough (i.e., *Preferred Alternative B2M* and Alternatives B3, B3 - 114th Design Option, B2E, and B7) might result in noise impacts on wildlife above existing noise impacts from adjacent roadways. Noise from at-grade sections would not be expected to cause additional wildlife disturbance or displacement.

## 4.2.3.2 Specific Impacts of Alternatives by Segment

### Vegetation and Wildlife

Table 4-8 provides estimates of the potential permanent operational impacts of the project on vegetation types in each of the segments.

**Segment B**

The potential area of high-value habitat that could be permanently affected in Segment B varies from approximately 0.8 acre (Alterative B2E) to approximately 3.2 acres (Alternative B7). Alternative B7 would affect the most area of riparian forest (0.6 acre). Alternatives B1 and B7 would affect the most high-value coniferous forest (1.2 acres each). Alternative B7 would affect the largest area of high-value deciduous forest (0.8 acre).

*Preferred Alternative B2M to C11A* and *B2M to C9T* would permanently affect 0.6 to 0.7 acre of high-value deciduous forest habitat, respectively, which includes the removal of some mature deciduous trees near the Bellevue Way SE/112th Avenue SE intersection. Due to the amount of similar available habitat in the Mercer Slough vicinity, impacts on wildlife would not be significant and would be mitigated as required by local Critical Area regulations.

**Segment C**

There would be relatively few permanent impacts on high-value habitat in Segment C.

TABLE 4-8
Potential Permanent Operational Impacts on Vegetation and Habitat Types within the Study Area

| Alternative and Connection | Area of Affected Vegetation (acres)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat[b] | | | | | Marginal Habitat | | | Grand Total |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | |
| **Segment A** | | | | | | | | | |
| *Preferred Interstate 90 Alternative (A1)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **Segment B** | | | | | | | | | |
| *Preferred 112th SE Modified Alternative (B2M)* | | | | | | | | | |
| *to C11A* | 0 | 0 | 0.6 | 0 | **0.6** | 0.3 | 0.7 | 0.1 | **1.7** |
| *to C9T*[c] | 0 | 0 | 0.7 | 0 | **0.7** | 0.3 | 1.3 | 0.1 | **2.4** |
| Bellevue Way Alternative (B1) | 0 | 1.2 | 0.5 | 0 | **1.7** | 0.7 | 0 | 0 | **2.4** |
| 112th SE At-Grade Alternative (B2A) | 0 | 0.2 | 0.5 | 0 | **0.7** | 0.3 | 0.1 | 0.1 | **1.2** |
| 112th SE Elevated Alternative (B2E) | 0 | 0.2 | 0.2 | 0 | **0.4** | 0.1 | 0.2 | 0.1 | **0.8** |
| 112th SE Bypass Alternative (B3) | 0 | 0.2 | 0.5 | 0 | **0.7** | 0.3 | 0.1 | 0.1 | **1.2** |
| B3 - 114th Extension Design Option | 0 | 0.2 | 0.5 | 0 | **0.7** | 0.3 | 0.2 | 0.1 | **1.2** |
| BNSF Alternative (B7) | 0.5 | 1.2 | 0.8 | 0.4 | **3.0** | 0 | 0.1 | 0.1 | **3.2** |
| **Segment C** | | | | | | | | | |
| *Preferred 108th NE At-Grade Alternative (C11A) from B2M* | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | **0** |
| *Preferred Alternative C11A* from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.4 | **0.4** |

TABLE 4-8 CONTINUED
Potential Permanent Operational Impacts on Vegetation and Habitat Types within the Study Area

| Alternative and Connection | Area of Affected Vegetation (acres)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat[b] | | | | | Marginal Habitat | | | |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | Grand Total |
| *Preferred Alternative C11A* from B3 - Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| *Preferred 110th NE Tunnel Alternative (C9T) from B2M*[c] | 0 | 0.3 | 0 | 0 | **0.3** | 0 | 0 | 0 | **0.3** |
| *Preferred Alternative C9T* from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.4 | **0.4** |
| *Preferred Alternative C9T* from B3 - Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| 106th NE Tunnel Alternative (C2T) from B2A | 0 | 0.1 | 0 | 0 | **0.1** | 0 | 0 | 0 | **0.1** |
| Alternative C2T from B2E | 0 | 0.2 | 0 | 0 | **0.2** | 0 | 0 | 0 | **0.2** |
| Alternative C2T from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.4 | **0.4** |
| Alternative C2T from B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| 108th NE Tunnel Alternative (C3T) from B2A | 0 | 0.1 | 0 | 0 | **0.1** | 0.1 | 0 | 0 | **0.2** |
| Alternative C3T from B2E | 0 | 0.2 | 0 | 0 | **0.2** | 0.1 | 0 | 0 | **0.4** |
| Alternative C3Tfrom B3 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.4 | **0.5** |
| Alternative C3T from B7 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.6 | **0.8** |
| At-Grade Couplet Alternative (C4A) from B2A | 0 | 0.2 | 0 | 0 | **0.2** | 0.1 | 0 | 0 | **0.3** |
| Alternative C4A from B2E | 0 | 0.2 | 0 | 0 | **0.2** | 0.1 | 0 | 0 | **0.3** |
| Alternative C4A from B3 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.4 | **0.4** |
| Alternative C4A from B7 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.6 | **0.6** |
| 112th NE Elevated Alternative (C7E) from B2A | 0 | 0.2 | 0 | 0 | **0.2** | 0.1 | 0 | 0.1 | **0.3** |
| Alternative C7E from B2E | 0 | 0.2 | 0 | 0 | **0.2** | 0.1 | 0 | 0.1 | **0.3** |
| Alternative C7E from B3 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.4 | **0.5** |
| Alternative C7E from B7 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.6 | **0.7** |
| 110th NE Elevated Alternative (C8E) from B3 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.3 | **0.4** |
| Alternative C8E from B7 | 0 | 0 | 0 | 0 | **0** | 0.1 | 0 | 0.5 | **0.6** |
| 110th NE At-Grade Alternative (C9A) from B2A | 0 | <0.1 | 0 | 0 | **0** | 0 | 0 | <0.1 | **<0.1** |
| Alternative C9A from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.3 | **0.3** |
| Alternative C9A from B3 - Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| 114th NE Elevated Alternative (C14E) from B3 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.3 | **0.3** |
| Alternative C14E from B3 - Design Option and B7 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0.6 | **0.6** |
| **Segment D** | | | | | | | | | |
| *Preferred NE 16th At-Grade Alternative (D2A)*[d] | 0.5 | 0.1 | 0.4 | 0 | **0.9** | 0.4 | 0 | 2.1 | **3.4** |
| D2A - NE 24th Design Option | 0.5 | 0 | 0.3 | 0 | **0.8** | <0.1 | 0 | 2.1 | **2.9** |
| NE 16th Elevated Alternative (D2E) via 12th (C3T, C4A, C7E, C14E) | 0.2 | 0 | 0.3 | 0 | **0.5** | <0.1 | 0 | 2.5 | **3.0** |
| Alternative D2E via BNSF (C1T, C2T) | 0.2 | 0 | 0.2 | 0 | **0.5** | <0.1 | 0 | 2.4 | **2.9** |
| NE 20th Alternative (D3) via 12th (C3T, C4A, C7E, C8E) | 0 | 0 | 0.1 | 0 | **0.1** | 0.5 | 0 | 1.7 | **2.2** |
| Alternative D3 via BNSF | 0 | 0 | <0.1 | | **<0.1** | 0.5 | 0 | 1.6 | **2.1** |

TABLE 4-8 CONTINUED
Potential Permanent Operational Impacts on Vegetation and Habitat Types within the Study Area

| Alternative and Connection | Area of Affected Vegetation (acres) [a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | High-Value Habitat [b] | | | | | Marginal Habitat | | | |
| | Riparian Forest | Urban Mostly Vegetated – Coniferous Forest | Urban Mostly Vegetated – Deciduous Forest | Urban Mostly Vegetated – Mixed Forest | Subtotal | Urban Moderately Vegetated | Blackberry | Urban Sparsely Vegetated | Grand Total |
| SR 520 Alternative (D5) via 12th (C3T, C4A, C7E, C8E) | 0.6 | 0.3 | 0.6 | 0 | **1.4** | 2.3 | 0.1 | 2.4 | **6.2** |
| Alternative D5 via BNSF (C1T, C2T) | 0.6 | 0.3 | 0.5 | | **1.3** | 2.2 | 0.1 | 2.3 | **5.9** |
| **Segment E** | | | | | | | | | |
| *Preferred Marymoor Alternative (E2)* | 0 | 0.6 | 0.5 | 0 | **1.1** | 1.1 | 0 | 0.5 | **2.7** |
| E2 - Redmond Transit Center Design Option | 0 | 0.6 | 0.5 | 0 | **1.2** | 1.1 | 0 | 0.5 | **2.8** |
| Redmond Way Alternative (E1) | 0 | 1.5 | 0.6 | 0 | **2.1** | 1.0 | 0 | 0.5 | **3.6** |
| Leary Way Alternative (E4) | 0 | 0.5 | 0.7 | 0 | **1.2** | 1.1 | 0.1 | 0.9 | **3.2** |
| **Maintenance Facilities** | | | | | | | | | |
| MF1, 116th (*D2A*, D2E, D3) | 0 | 0 | 0.1 | 0 | **0.1** | 0 | 0 | 0 | **0.1** |
| MF1, 116th (D5) | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | **0** |
| MF2, BNSF (*D2A*, D2E, D3) | 0 | 0 | 0.1 | 0 | **0.1** | 0 | 0 | 0 | **0.2** |
| MF2, BNSF (D5) | 0 | 0 | 0.2 | 0 | **0.2** | 0 | 0 | 0 | **0.2** |
| MF3, SR 520 (all Segment D Alternatives) | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | **0** |
| MF5, SE Redmond (E1, *E2*, E4) | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | **0** |

Alternatives that are not listed would not affect these vegetation types.

[a] Vegetation polygons were classified and mapped regardless of size or upland/wetland designation. As a result, the vegetation polygons may include upland and/or wetland vegetation. Vegetation polygons may overlap with wetland polygons; therefore, impact acreage numbers for wetlands and vegetation/wildlife habitat cannot be added together. This overlap is depicted on Exhibits 3-23 to 3-26.
[b] These are high-value habitats and therefore effects on these areas would require adherence to the Bellevue and Redmond Critical Area ordinances.
[c] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.
[d] Impacts for D2A - 120th Station Design Option would not vary from those of *Preferred Alternative D2A*.

### Segment D

The estimated area of high-value habitat that would be directly affected during project operation in Segment D varies from approximately <0.1 acre (Alterative D3 via BNSF [C1T or C2T]) to approximately 1.3 acres (Alternative D5 via BNSF).

*Preferred Alternative D2A* would permanently affect approximately 0.9 acre of high-value habitat, including mostly riparian forest and deciduous forest. Alternative D5 would affect the most area of riparian forest, coniferous forest, and deciduous forest, with a total of up to 1.4 acres of high-value habitat permanently affected.

### Segment E

The estimated area of high-value habitat that would be directly affected during permanent operation in Segment E varies from approximately 1.1 acres (*Preferred Alternative E2*) to approximately 2.1 acres (Alternative E1). Alternative E1 would affect the most area of high-value coniferous forest.

### Maintenance Facilities

Potential permanent operational impacts on vegetation and habitat types from the maintenance facilities would be minor. Impacts would range from 0.1 acre with MF1 to 0.2 acre with MF2 from Alternative D5. MF3 and MF5 would result in no impacts.

### Affected Habitats and Species

**High-Value Habitats**

Animals of all types that lose breeding, foraging, and roosting habitat within the project vicinity would be permanently lost unless they were able to occupy suitable unoccupied habitat nearby.

The loss of high-value habitats within the project vicinity would persist because lands would be occupied by project facilities. High-value habitats that would be permanently affected by the project, and their locations, include the following:

- In-stream habitats (see Section 4.1, Aquatic Resources)
- Wetlands (see Section 4.3) (all Segment B, D, and E alternatives)
- Riparian forest associated with Mercer Slough (Alternative B7) and along several streams in Segment D (*Preferred Alternative D2A* and Alternatives D2E and D5)
- Urban natural open space, including urban mostly vegetated—coniferous forest (all Segment B alternatives, small areas along several alternatives in Segments C and D, and all Segment E alternatives) and urban mostly vegetated – deciduous forest (all Segment B alternatives, areas along several alternatives in Segment D, and all Segment E alternatives).

**Federal and State Threatened and Endangered, and Candidate Species, and Species of Concern**

Marbled Murrelet

Project operations are not expected to permanently affect marbled murrelets because of the project's location along the existing I-90 bridge and because marbled murrelets are extremely rare in the study area (one sighting in the past 50 years on Lake Washington). Furthermore, the maximum operating noise levels are projected to be far below the injury and disturbance thresholds for murrelets established by the USFWS. Therefore, no operational impacts are expected.

Bald Eagle

Because of local bald eagle acclimation and distances to eagle nests, no impacts on bald eagles would be expected from operation of this project.

Peregrine Falcon

Because there is an existing active nest on I-90 that experiences vehicular noise, no permanent operational impacts on the peregrine pair or nest would be expected from operation of this project.

Olive-Sided Flycatcher

Because the potential habitat areas suitable for the olive-sided flycatcher are already adjacent to noisy arterial roadways habitats, no permanent impacts on the olive-sided flycatcher are expected from project operation.

Willow Flycatcher

Because the potential habitat areas suitable for the willow flycatcher are already near or being crossed by noisy arterial roadways and the project would not introduce more human activities near these habitats, no operational impacts on the willow flycatcher are expected.

**Other State Species**

Loss of high-value habitat and foraging as a result of project operation might affect some priority species.

## 4.3 Wetland Resources

Construction of the East Link Project could have permanent operational and temporary construction impacts on wetlands in the project vicinity. These include mostly direct and some potential indirect impacts. The following sections outline the range of potential impacts that could occur for each segment and alternative. Actual impacts would depend on the final alternative selection and design, construction footprint and methods, BMPs implemented during construction, and performance of post-construction wetland and buffer restoration.

No wetland resources were identified in Segment A, so this segment is not discussed in the text or shown on exhibits. The potential temporary construction and permanent operational impacts by alternative are summarized below. More detailed maps and tables listing the potential temporary construction and permanent operational impacts by alternative for individual wetlands and wetland buffers affected are included in Appendix F.

Vegetation polygons were classified and mapped regardless of size or upland/wetland designation. As a result, the vegetation polygons might include upland and/or wetland vegetation. Vegetation polygons might overlap with wetland polygons; therefore, affected acreage numbers for wetlands and vegetation/wildlife habitat cannot be added together. This overlap is depicted on Exhibits 3-23 to 3-26.

## 4.3.1 Temporary Construction Impacts

### 4.3.1.1 Types of Impacts Common to All Project Alternatives

It is assumed that construction areas would be only temporarily affected and that they would be restored to pre-project conditions after construction.

All vegetation within the construction limits (which varies by project alternative to a maximum of 100-foot-wide corridor) would be cleared. A temporary access road would be constructed using BMPs to avoid impacts on the remaining portions of the wetland. After construction the access road would be removed to restore the original wetland contours, and native shrubs and emergent vegetation would be planted, maintained, and monitored to achieve performance standards. Trees would not be planted under or within 20 feet on either side of the elevated guideway to prevent development of tall vegetation that could interfere with operation and safety of the light rail.

Short-term and long-term temporary impacts were previously defined in Section 1.4.1.1 of this report. The duration of temporary impacts can vary depending on the type of vegetation that is affected. For instance, temporary impacts on emergent wetlands are generally short-term, lasting for a limited time, with functions returning to pre-impact performance fairly soon (about 1 year or within one growing season of the impact).

Temporary impacts on woody vegetation (shrubs and trees) are generally long-term because functions can be restored over time, but not within a year or so due to the time required for shrubs and/or trees to grow enough to regain preconstruction functions.

Determining the boundaries of wetland vegetation types (such as emergent, scrub-shrub, forest) in order to calculate short-term and long term temporary direct impacts is beyond the scope of the analysis performed for all the alternatives evaluated in the Final EIS. This information would be developed during preparation of the permit application for the selected alternatives of the East Link Project.

According to Ecology et al. (2006), impacts on sites containing existing compensatory wetland mitigation projects should be avoided if possible. Unavoidable impacts on active mitigation sites (i.e., still under construction or being monitored) may require a greater amount of mitigation to address additional temporal loss of the original wetland's functions and area. Unavoidable impacts on a completed mitigation site (monitoring is completed and the permit requirements have been fulfilled) would be viewed similar to an impact on any other natural wetland.

Temporary impacts from construction activities can be either direct and quantifiable, or indirect and qualitative. Potential temporary direct impacts include the following:

- Vegetation clearing and temporary site grading and filling for access. After construction, contours in these areas would be restored to pre-project conditions and typically planted with native vegetation. In those areas of the study area where existing vegetation is dominated by weeds (such as blackberry, Japanese knotweed, and/or reed canarygrass), vegetation clearing would be an essential first step for restoration, such as what Bellevue Parks Department has been planning for the disturbed weedy area between 112th Avenue SE and Mercer Slough West (Bradley, 2009).

Temporary indirect impacts on the qualitative function of wetlands that could potentially occur with and/or adjacent to the construction limits include the following:

- Soil compaction during construction activities that contributes to a decrease in soil permeability, infiltration, water-storage capacity, and vegetation regrowth
- Accidental spills of fuel oils, chemicals, and/or concrete leachate used during construction that impact aquatic species
- Noise and human activity associated with construction activities that temporarily displace wildlife
- Some increase in sediment loading and turbidity from grading and filling activities that could allow runoff into wetlands and affect water quality

- Temporary changes in wetland hydrology due to soil compaction or access road construction
- Introduction of invasive species as a result of disturbance
- Management of existing invasive species as a result of disturbance and revegetation

#### 4.3.1.2 Specific Impacts of the Alternatives in Each Segment

Table 4-9 shows potential temporary direct impacts on wetlands and wetland buffers for each segment and project alternative. These impacts are also shown graphically in Appendix F. There would be no temporary direct or indirect impacts on wetlands in Segment A. These temporary impacts would be in addition to the permanent operational impacts resulting from the project as described in Section 4.3.2.

TABLE 4-9
Potential Temporary Construction Direct Impacts on Wetlands and Wetland Buffers by Project Alternative[a]

| Project Alternative | Wetland Category | Wetland Area Affected (acres) | Wetland Buffer Area Affected (acres)[b] |
|---|---|---|---|
| **Segment B** | | | |
| *Preferred 112th SE Modified Alternative (B2M)* | | | |
| *to C11A* | 2 | 0.5<br>(Mitigation site: <0.1) | 4.0<br>(Mitigation site: 0.2) |
| *to C9T*[c] | 2 | 0.5<br>(Mitigation site: <0.1) | 3.7<br>(Mitigation site: 0.2) |
| Bellevue Way Alternative (B1) | 2 | 0.9 | 3.0<br>(Mitigation site: 0.3) |
| 112th SE At-Grade Alternative (B2A) | 2 | 0.7 | 3.7<br>(Mitigation site: 0.3) |
| 112th SE Elevated Alternative (B2E) | 2 | 0.6 | 3.5<br>(Mitigation site: 0.3) |
| 112th SE Bypass Alternative (B3) | 2 | 1.2 | 3.9<br>(Mitigation site: 0.3) |
| B3 - 114th Extension Design Option | 2 | 0.6 | 4.8<br>(Mitigation site: 0.3) |
| BNSF Alternative (B7) | 2, 4 | 2.9<br>(Mitigation site: 0.7) | 0.6<br>(Mitigation site: <0.1) |
| **Segment C**<br>**(Alternatives with connections to Alternatives B3, B3 - Design Option, or B7 only)** | | | |
| *Preferred 108th NE At-Grade Alternative (C11A)* | 3 | 0 | 0.1 |
| *Preferred 110th NE Tunnel Alternative (C9T)*[c] | 3 | 0 | 0.1 |
| 106th NE Tunnel Alternative (C2T) | 3 | 0 | 0.1 |
| 108th NE Tunnel Alternative (C3T) | 3 | 0 | 0.1 |
| At-Grade Couplet Alternative (C4A) | 3 | 0 | 0.1 |
| 112th NE Elevated Alternative (C7E) | 3 | 0 | 0.1 |
| 110th NE Elevated Alternative (C8E) | 3 | 0 | 0.1 |
| 110th NE At-Grade Alternative (C9A) | 3 | 0.1<br>(for B3 connection only) | 0.1 |
| 114th NE Elevated Alternative (C14E) | 3 | 0.1<br>(for B3 connection only) | 0.1 |
| **Segment C**<br>**(Alternatives with connections to *Preferred B2M* only)** | | | |
| *Preferred 110th NE Tunnel Alternative (C9T)*[c] | 2 | 0 | <0.1 |

TABLE 4-9 CONTINUED
Potential Temporary Construction Direct Impacts on Wetlands and Wetland Buffers by Project Alternative[a]

| Project Alternative | Wetland Category | Wetland Area Affected (acres) | Wetland Buffer Area Affected (acres)[b] |
|---|---|---|---|
| **Segment D** | | | |
| *Preferred NE 16th At-Grade Alternative (D2A)*[d] | 2, 3, 4 | 0.5 | 1.7 |
| NE 16th Elevated Alternative (D2E)– connecting from NE 6th (C1T, C2T) | 2, 3, 4 | 0.2 | 0.6 |
| Alternative D2E, NE 16th Elevated – connecting from NE 12th (C3T, C4A, C7E, C14E) | 2, 3, 4 | 0.3 | 0.7 |
| NE 20th Alternative (D3) – connecting from NE 6th (C1T, C2T) | 3, 4 | 0.1 | 0.1 |
| Alternative D3, NE 20th – connecting from NE 12th (C3T, C4A, C7E, C8E) | 3, 4 | 0.1 | 0.1 |
| SR 520 Alternative (D5) – connecting from NE 6th (C1T, C2T) | 2, 3 | 0.4 | 0.8 |
| Alternative D5, SR 520 – connecting from NE 12th (C3T, C4A, C7E, C8E) | 2, 3 | 0.4 | 0.8 |
| **Segment E** | | | |
| *Preferred Marymoor Alternative (E2)* | 2, 3 | 0.1 (Mitigation site: <0.1) | 0.9 (Mitigation site: 0.4) |
| E2 - Redmond Transit Center Design Option | 2, 3 | 0.1 (Mitigation site: <0.1) | 0.9 (Mitigation site: 0.3) |
| Redmond Way Alternative (E1) | 2 | 0.1 | 0.3 (Mitigation site: 0.1) |
| Leary Way Alternative (E4) | 2 | <0.1 | 0.2 (Mitigation site: 0.1) |

Values in parentheses are the portion of the total impact for each alternative that affect existing mitigation sites.
[a] Alternatives not listed would not have temporary construction impacts on wetlands or wetland buffers.
[b] Some of the impacts on stream buffers would overlap with impacts on some wetland buffers. Refer to Table 4-2 and Appendix F.
[c] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.
[d] Impacts for D2A - 120th Station and NE 24th Design Options would not vary from those of *Preferred Alternative D2A*.

## Segment B Direct Temporary Construction Impacts

Segment B Alternatives would have the greatest potential for unavoidable temporary impacts on wetlands and wetland buffers due to the proximity of existing transportation corridors to Mercer Slough wetlands and buffers (see Table 4-9). An existing stormwater pond located near the northeastern corner of the South Bellevue Park-and-Ride Lot was delineated and included as part of the Mercer Slough Wetlands (WR-1/2). All the alternatives that are routed along Bellevue Way SE have the potential for temporary construction impacts on this pond. During permitting, the regulatory agencies would be asked whether they would regulate this stormwater pond as a wetland. This pond provides necessary stormwater storage and treatment functions that would need to be replaced during construction if impacts could not be avoided.

### *Preferred 112th SE Modified Alternative (B2M)*

*Preferred Alternative B2M* could temporarily impact 0.5 acre of Category 2 wetland located next to Bellevue Way SE and 112th Avenue SE (WR-1/2). Several existing wetland mitigation sites are located within Mercer Slough Nature Park. Of the area affected, a small portion (<0.1 acre) could be temporarily affected by *Preferred Alternative B2M* (see Table 4-9 and Appendix F).

The potential temporary impacts on wetlands would be primarily related to the following:

- Construction staging and access within the 35-foot-wide construction corridor east of the permanent Sound Transit right-of-way along Bellevue Way SE and 112th Avenue SE.
- Construction staging near the South Bellevue Park-and-Ride Lot, which would affect a portion of the Mercer Slough Wetland (WR-1/2), including the existing stormwater pond.

- Because *Preferred Alternative B2M* would be located immediately east of Bellevue Way SE and 112th Avenue SE, the potential temporary impacts on wetland buffers would be greatest compared to the other alternative routes along Bellevue Way SE. The potential temporary impacts on wetland buffers would be 4.0 and 3.7 acres for options connecting to *Preferred Alternatives C11A* or *C9T*, respectively (see Table 4-9).
- The condition of the wetland buffers that would be affected by construction includes unvegetated areas, areas of blackberry, lawn, and some deciduous forest (often with an understory of weeds such as Himalayan blackberry and patches of Japanese knotweed). The potential temporary impacts on wetland buffers would be primarily related to the following:
- Construction staging near the South Bellevue Park-and-Ride Lot
- Construction of the elevated guideway near the intersection of Bellevue Way SE and 112th Avenue SE, which would affect an area of deciduous forest with high-quality habitat
- Construction staging and access within the 35-foot-wide corridor located east of the operational right-of-way
- Construction impacts would occur on an existing mitigation site located immediately south of the South Bellevue Park-and-Ride Lot.
- Restoration of these affected buffers following construction could improve buffer function by replacing existing areas that are dominated by noxious and invasive weeds or lawn. This could improve the functions of the existing wetland and stream buffers and result in beneficial environmental impacts.

BNSF Alternative (B7)

Of all the alternatives evaluated, Alternative B7 has the potential for the largest temporary impact on wetlands (2.9 acres, see Table 4-9). The majority of this impact would result from crossing the Mercer Slough Wetland (WR-1/2), which would also include the largest impacts (1.1 acres) on several existing wetland mitigation sites. Alternative B7 would also affect a portion of the I-90 Mercer Slough Wetland (WR-4) and would bisect the WSDOT 118th Avenue SE Wetland (WR-5). In order to construct the guideway across Mercer Slough, a temporary work trestle might need to be built. The option of constructing the guideway with an overhead gantry could reduce temporary impacts and would be explored during final design. Alternative B7 would have the lowest potential temporary impact on wetland buffers of all the Segment B alternatives (0.6 acre).

Bellevue Way (B1), 112th SE At-Grade (B2A), 112th SE Elevated (B2E), and 112th SE Bypass (B3) Alternatives

All the other Segment B alternatives along Bellevue Way SE would have considerably lower temporary impacts on wetlands than Alternative B7. The other Bellevue Way alternatives would have higher temporary impacts on wetlands compared to *Preferred Alternative B2M*. Other than Alternative B7, Alternative B3 would have the highest temporary wetland impacts of the Segment B alternative because it bisects the Sturtevant Creek Wetland (WR-3). The other alternatives traveling along Bellevue Way SE would avoid wetland impacts on existing mitigation sites.

Alternatives B1, B2A, and B2E would have relatively low and similar potential impacts on wetlands and similar potential impacts on wetland buffers. Alternatives B2A, B2E, and B3 would have relatively similar potential buffers impacts that would primarily affect wetland buffers along 112th Avenue SE, which consist of disturbed vegetation dominated by Himalayan blackberry. Alternative B1 would have the lowest impact on wetland buffers of all the Bellevue Way alternatives.

The B3 - 114th Extension Design Option would avoid the temporary impact (approximately 0.6 acre) that Alternative B3 would have on the Sturtevant Creek wetland. This design option also would tie with Alternative B2E for the lowest wetland area affected (0.6 acre). However, this design option would include several additional small impacts on wetlands near the shoreline of Mercer Slough West, and involve an additional elevated crossing of Sturtevant Creek along the south side of SE 8th Street that might temporarily affect streamside wetlands and buffers. The B3 - 114th Extension Design Option would have the greatest impact on wetland buffers (4.8 acres).

### Segment B Indirect Temporary Construction Impacts

Construction of Alternative B3 could have indirect temporary impacts on the Sturtevant Creek Wetland (WR-3) if construction activities hydrologically disconnect the northwest portion of this wetland from the remainder of the Sturtevant Creek wetland. Similarly, hydrologically disconnected portions of the Mercer Slough Wetland

(WR-1/2) and 118th Avenue SE Wetland (WR-5) could be indirectly affected during construction of Alternative B7, which would bisect these wetlands.

### Segment C Direct Temporary Construction Impacts

The only potential wetland identified within Segment C is the Hilton Stormwater Pond (WR-16). The current design for alternatives proposed along 114th Avenue SE only with connections to Alternative B3 and B7 shows potential temporary construction impacts on this pond. The regulatory agencies would be asked during permitting whether they would regulate this stormwater pond as a wetland. This pond, which provides necessary stormwater storage and treatment functions, would need to be replaced during construction if impacts could not be avoided.

***Preferred 108th NE At-Grade Alternative (C11A) and Preferred 110th NE Tunnel Alternative (C9T)***

*Preferred Alternative C11A* connecting to *Preferred Alternative B2M* would avoid impacts on wetlands and wetland buffers. *Preferred Alternative C9T* connecting to *Preferred Alternative B2M* would have no impacts on wetlands but would have a small, temporary construction impact (less than 0.1 acre) on the Sturtevant Creek wetland buffer (WR-3) during construction.

*Preferred Alternatives C11A* or *C9T* connecting to Alternative B3, B3 - 114th Design Option, or B7 might have potential temporary construction impacts on the Hilton Stormwater Pond (WR-16) wetland buffer. Impacts on the pond buffer would overlap with the impacts on the stream buffer and are therefore not further described here to avoid double counting this buffer impact. The potential temporary impacts on wetland buffer would be primarily related to construction of the elevated guideway over Sturtevant Creek.

**Other Segment C Alternatives**

Other Segment C alternatives proposed along 114th Avenue SE connecting to Alternative B3 or B7 (Alternatives C2T, C3T, C4A, C7E, C8E, C9A, and C14 E) would have similar potential temporary impacts on the Hilton Stormwater Pond (WR-16) wetland buffer as described for *Preferred Alternatives C11A* and *C9T* connecting to Alternative B3. Alternatives C9A and C14E might also have a potential temporary construction impact on the WR-16wetland itself. The current design for Alternatives C9A and C14E shows a temporary impact on the portion of the pond at its outlet. For purposes of the East Link Project EIS, it was assumed that the function of the entire 0.1-acre pond would be temporarily disturbed (see Table 4.8-7 in Chapter 4, Section 4.8 of the Final EIS). Segment C alternatives that connect from Alternatives B2A or B2E would not affect WR-16.

### Segment C Indirect Temporary Construction Impacts

No indirect temporary construction impacts on wetlands are expected in Segment C.

### Segment D Direct Temporary Construction Impacts

In Segment D, the potential temporary construction impacts on wetlands and wetland buffers would vary by alternative but in general would be relatively small (see Table 4-9).

***Preferred NE 16th At-Grade Alternative (D2A)***

To construct *Preferred Alternative D2A*, elevated crossings over five wetlands (WR-7, WR-8SE, WR-11, WR-10W, and WR-15) and road construction related to the retained cut across 120th Avenue NE (WR-17) would result in potential temporary impacts on 0.5 acre of wetland and 1.7 acres of wetland buffer. This alternative would have the largest temporary impact on wetlands and wetland buffers compared to the other Segment D alternatives; however, the total impact would be relatively low. The potential temporary impacts on wetlands and wetland buffers would be primarily related to staging and access necessary to construct the elevated guideway and would affect mostly Category 3 wetlands, a very small amount of one Category 2 forested wetland, and buffers that are currently disturbed by surrounding development, noxious weeds, stormwater from parking lots and buildings, and litter.

No existing mitigation sites are located within the Segment D study area.

Direct temporary construction impacts on wetland resources would be the same with either the D2A - 120th Station Design Option or NE 24th Design Option, and would be the same as described for *Preferred Alternative D2A*.

**NE 20th Alternative (D3)**

Alternative D3 would result in the smallest temporary impacts on wetlands (0.1 acre) and wetland buffers (0.1 acre, for either connection from NE 6th or NE 12th) compared to all the Segment D alternatives (see Table 4-9). This alternative would completely avoid all impacts on the wetlands east and west of 140th Avenue NE (WR-10E, WR-10W, and WR-11). This alternative would have minor temporary impacts on wetlands WR-6,

WR-8, and WR-15. In addition, connecting from Segment C via Alternative B7 (rather than via NE 12th Street) would further avoid a small impact on the BNSF Matrix Wetland (WR-6).

**NE 16th Elevated (D2E) and SR 520 (D5) Alternatives**
The amount of temporary impact on wetlands and wetland buffers from Alternatives D2E and D5 would be less than *Preferred Alternative D2A* but more than Alternative D3 (see Table 4-9).

Alternative D5, which is also completely elevated, would have temporary impacts primarily on the West Tributary to Kelsey Creek Riparian Wetland Northwest (WR-8NW) and the wetland west of 140th Avenue NE (WR-11).

#### Segment D Indirect Temporary Construction Impacts
Construction of *Preferred Alternative D2A* with either design option and Alternatives D2E and D5 could indirectly affect wetland WR-11 if construction activities hydrologically disconnect the southeastern portion of this wetland from the remainder of the wetland.

#### Segment E Direct Temporary Construction Impacts
***Preferred Marymoor Alternative (E2)***
Construction of *Preferred Alternative E2* would result in potential temporary impacts on 0.1 acre of wetland and 0.9 acre of wetland buffer. An unavoidable temporary impact on Marymoor Park Wetland (WR-13) would result from the at-grade route along SR 520 and elevated crossing over Bear Creek Wetland (WR-12). These impacts include a potential minor (< 0.1 acre) temporary disturbance to existing mitigation wetlands at the Marymoor Park Wetland (WR-13) and a potential minor (0.4 acre) temporary disturbance to buffers at the Marymoor Park Wetland and at SR 520 Bear Creek 1 and 2 mitigation sites at NE 76th Street.

Construction of the E2 - Redmond Transit Center Design Option would result in potential temporary impacts similar to *Preferred Alternative E2*. Potential temporary impacts on wetlands would be 0.1 acre, and 0.9 acre on wetland buffer.

**Other Segment E Alternatives**
Potential impacts on wetlands and wetland buffers from Alternative E1 would be the same for wetlands and slightly less for wetland buffers than those described for *Preferred Alternative E2*, as shown in Table 4-9. Potential impacts on wetlands and wetland buffers from Alternative E4 would be slightly less than those described for *Preferred Alternative E2.*

#### Segment E Indirect Temporary Construction Impacts
No indirect temporary construction impacts on wetlands are expected in Segment E.

## 4.3.2 Permanent Operational Impacts

### 4.3.2.1 Types of Impacts Common to All Alternatives
Permanent direct impacts are those that occur inside the project limits where the permanent alternatives (i.e., at-grade alternatives, columns for elevated structures), stations, maintenance facilities, park-and-ride lots, traction power substations, permanent access roads, stormwater facilities, and road widening would occur. It is assumed that these areas would be permanently affected and all wetlands or buffers within these areas would be lost. For purposes of the Final EIS, this also includes wetlands and wetland buffers under the elevated guideway. During future design and permitting, impacts on wetlands under elevated structures would be evaluated more closely to determine whether the expected vertical clearance over wetlands would allow sufficient sunlight and precipitation to restore some of these wetlands and buffers.

Wetlands typically receive water from groundwater or surface water sources. Vegetation within buffer areas receives water directly from precipitation. Therefore, the elevated guideway might create a rainshadow effect and in some cases might also have a low clearance that could also limit sunlight. Situations were observed at several locations along Sound Transit's Central Link route where vegetation replanted within buffers under the elevated guideway was having difficulty re-establishing due to limited summer water and/or light. Estimating this impact is complicated and depends on multiple variables, such as slope, aspect, soil conditions, and stormwater dispersion from the elevated guideway. All these variables make for a complicated buffer impact analysis that exceeds the site and design information available during the Final EIS. It is expected, therefore, that permanent impacts on wetlands associated with elevated sections of the alternatives can be avoided or further minimized during final design and during construction.

Permanent indirect and qualitative impacts might also occur as a result of construction and operation activities. Potential permanent indirect impacts for each of the project alternatives include the following:

- Conversion of forest-dominated wetlands to shrub-dominated wetlands and buffers under and within 20 feet of each side of the elevated guideways to prevent trees and branches from interfering with operation of the light rail
- Partial shading of areas of wetlands and buffers from shadows cast beyond the elevated structure footprint
- Trackway and paved area runoff to surface waters or wetlands that degrade water quality
- Hydrologic disconnection

#### 4.3.2.2 Specific Impacts of the Alternatives in Each Segment

Table 4-10 shows potential direct, permanent operational impacts on wetlands and wetland buffers for each segment and project alternative. These impacts are also shown graphically in the figures in Appendix F. There would be no direct or indirect permanent wetland impacts from Segments A or C. Attachment 2 in Appendix F contains tables of the quantitative impact information by alternative.

#### Segment B Direct Permanent Impacts

Compared to other segments, Segment B alternatives would have a slightly greater potential for unavoidable permanent impacts on wetlands and wetland buffers due to the constraints from and proximity of existing transportation corridors to Mercer Slough wetlands and buffers (see Table 4-10).

***Preferred 112th SE Modified Alternative (B2M)***

*Preferred Alternative B2M* would be located along the east side of Bellevue Way SE and 112th Avenue SE, but its route almost entirely avoids permanent impacts on wetlands (0.1 acre) (see Table 4-10). The impacts would be to Category 2 wetlands.

TABLE 4-10
Permanent Operational Direct Impacts on Wetlands and Wetland Buffers by Project Alternative[a]

| Alternative and Connection | Category | Wetland Area Affected (acres) | Wetland Buffer Area Affected[b] (acres) |
|---|---|---|---|
| **Segment B** | | | |
| *Preferred 112th SE Modified Alternative (B2M) to C11A, 112th SE Modified* | 2 | 0.1 | 3.3<br>(Mitigation site: 0.2) |
| *Preferred Alternative B2M to C9T* [c] | 2 | 0.1 | 4.5<br>(Mitigation site: 0.2) |
| Bellevue Way Alternative (B1) | 2 | 0.2 | 1.8 |
| 112th SE At-Grade Alternative (B2A) | 2 | 0.2 | 3.4<br>(Mitigation site: <0.1) |
| 112th SE Elevated Alternative (B2E) | 2 | 0.2 | 2.8<br>(Mitigation site: <0.1) |
| 112th SE Bypass Alternative (B3) | 2 | 0.7 | 3.4<br>(Mitigation site: <0.1) |
| B3 - 114th Extension Design Option | 2 | 0.2 | 3.6<br>(Mitigation site: <0.1) |
| BNSF Alternative (B7) | 2, 4 | 1.9<br>(Mitigation site: 0.4) | 0.4<br>(Mitigation site: <0.1) |
| **Segment C<br>(Alternatives with connections to Alternatives B3, B3 – 114th Design Option, or B7 only)** | | | |
| *Preferred 108th NE At-Grade Alternative (C11A)* | 3 | 0 | 0.1 |
| *Preferred 110th NE Tunnel Alternative (C9T)*[c] | 3 | 0 | 0.1 |
| 106th NE Tunnel Alternative (C2T) | 3 | 0 | 0.1 |
| 108th NE Tunnel Alternative (C3T) | 3 | 0 | 0.1 |
| At-Grade Couplet Alternative (C4A) | 3 | 0 | 0.1 |

TABLE 4-10 CONTINUED
Permanent Operational Direct Impacts on Wetlands and Wetland Buffers by Project Alternative[a]

| Alternative and Connection | Category | Wetland Area Affected (acres) | Wetland Buffer Area Affected[b] (acres) |
|---|---|---|---|
| 112th NE Elevated Alternative (C7E) | 3 | 0 | 0.1 |
| 110th NE Elevated Alternative (C8E) | 3 | 0 | 0.1 |
| 110th NE At-Grade Alternative (C9A) | 3 | 0 (<0.1 for B3 connection only) | 0.1 |
| 114th NE Elevated Alternative (C14E) | 3 | 0 (<0.1 for B3 connection only) | 0 |
| **Segment D** | | | |
| *Preferred NE 16th At-Grade Alternative (D2A)*[d] | *2, 3, 4* | *0.5* | *0.6* |
| NE 16th Elevated Alternative (D2E) from NE 6th (C1T, C2T) | 2, 3, 4 | 0.2 | 0.5 |
| Alternative D2E, NE 16th Elevated from NE 12th (C3T, C4A, C7E, C14E) | 2, 3, 4 | 0.3 | 0.5 |
| NE 20th Alternative (D3) from NE 6th (C1T, C2T) | 3, 4 | 0.2 | 0.1 |
| Alternative D3, NE 20th from NE 12th (C3T, C4A, C7E, C8E) | 3, 4 | 0.2 | 0.1 |
| SR 520 Alternative (D5) from NE 6th (C1T, C2T) | 2, 3, 4 | 0.2 | 0.6 |
| Alternative D5, SR 520 from NE 12th (C3T, C4A, C7E, C8E) | 2, 3, 4 | 0.3 | 0.7 |
| **Segment E** | | | |
| *Preferred Marymoor Alternative (E2)* | 2, 3 | 0.1 (Mitigation site: 0.1) | 0.4 (Mitigation site: <0.1) |
| E2 - Redmond Transit Center Design Option | 2, 3 | 0.1 (Mitigation site: 0.1) | 0.5 (Mitigation site: <0.1) |
| Redmond Way Alternative (E1) | 2 | 0.1 | 0.2 (Mitigation site: 0.1) |
| Leary Way Alternative (E4) | 2 | < 0.1 | 0.2 (Mitigation site: 0.1) |

Values in parentheses are the portion of the total impact for each alternative that affect existing mitigation sites.
[a] Alternatives not listed do not have direct short-term wetland or wetland buffer impacts.
[b] Some of the impacts on stream buffers overlap with impacts to some wetland buffers. Refer to Table 4-2 and Appendix F.
[c] Impacts for C9T - East Main Station Design Option would not vary from those of *Preferred Alternative C9T*.
[d] Impacts for D2A - 120th Station and NE 24th Design Options would not vary from those of *Preferred Alternative D2A*.

The potential permanent impacts on wetlands would be primarily related to the following:

- Sections of elevated guideway (this situation will be evaluated further during future design phases to evaluate potential to restore buffer under the elevated guideway).
- Retained cut immediately north of the blueberry farm. During future design, Sound Transit will continue to evaluate the potential for impacts on wetlands from this retained cut.

Unlike the other alternatives routes along Bellevue Way SE, *Preferred Alternative B2M* would not involve permanent impacts on wetlands from a new stormwater pond near the South Bellevue Station.

The potential impacts on wetland buffers range from 3.3 acres for *Preferred Alternative B2M to C11A* to 4.5 acres for *Preferred Alternative B2M to C9T*. The impact on wetland buffers from *Preferred Alternative B2M to C9T* would be the largest of all the Segment B alternatives. The condition of the wetland buffers that would be permanently affected by light rail operation includes existing unvegetated areas, disturbed areas with blackberry, maintained lawn, and some deciduous forest (often with an understory of weeds such as Himalayan blackberry and Japanese knotweed). The potential permanent impacts on wetland buffers would be primarily related to the following:

- Sections of at-grade guideway along 112th Avenue SE.

- Sections of elevated guideway. (This situation will be evaluated further during future design phases to evaluate the potential to restore buffer under the elevated guideway.)
- Section of retained cut immediately north of the Winters House. This would affect a forested area with high-quality habitat.

**Other Segment B Alternatives**
All the other Segment B alternatives would have some permanent operational impact on wetlands.

Alternative B7 has the potential for the greatest permanent impacts on wetlands (1.9 acres, see Table 4-10). Nearly one-quarter of this impact would be on existing mitigation sites. Alternative B7 would have the smallest permanent impact on wetland buffers.

The other Segment B alternative routes along Bellevue Way SE (Alternatives B1, B2A, and B2E) would all permanently affect approximately 0.2 acre of wetland, which would largely result from the new stormwater pond proposed immediately east of the South Bellevue Station. All of these Segment B alternatives would avoid permanent wetland impacts on existing mitigation sites within the Mercer Slough Nature Park.

Alternative B3 could potentially impact 0.7 acre of wetlands. It would have similar impacts on wetlands along Bellevue Way SE as the other alternative routes that travel along Bellevue Way. However, construction of the elevated guideway through the Sturtevant Creek Wetland (WR-3) would also disturb 0.5 acre of shrub and emergent Category 2 wetlands dominated by reed canarygrass (a state-listed noxious weed).

Implementing the B3 - 114th Extension Design Option would reduce the potential permanent operational impacts on wetlands by avoiding the Sturtevant Creek Wetland (WR-3). Therefore, this design option would have similar permanent impacts on wetlands as the other alternatives along Bellevue Way SE.

These other Segment B alternatives would have varying degrees of potential permanent impacts on wetland buffers. Among the other Segment B alternatives along Bellevue Way SE, Alternative B7 would have the least permanent impacts on wetland buffers (0.4 acres). Alternatives B2A, B2E, and B3 would have relatively similar potential permanent impacts on buffers that would partially affect the disturbed area immediately east of the existing South Bellevue Park-and-Ride Lot, a portion of which is maintained as access to the existing stormwater pond, and a portion of which is existing forest. All of these Segment B alternatives (except Alternative B1) would permanently affect wetland buffers of existing mitigation sites within the Mercer Slough Nature Park.

### Segment B Indirect Permanent Impacts
Indirect permanent impacts may include the potential for shading impacts from Alternative B7 along the north side of I-90 due to the effect that the existing I-90 roadway already has on southerly sun exposure. Also, Alternative B7 would further increase the effective width of the combined transportation footprint (I-90 elevated roadway plus East Link elevated guideway) that bisects the Mercer Slough wetlands. Also, Alternative B7 would permanently bisect the 118th Ave SE Wetland (WR-5), which could reduce the functions of this wetland and increase the overall impact on this wetland.

Portions of *Preferred Alternative B2M* would be constructed in retained cuts along Mercer Way SE. The concrete-lined retain cuts could intercept and redirect local groundwater flow with resulting adverse impacts to down-gradient wetlands. However, mitigation would be designed to alleviate such impacts (see Section 5.3.1). Similarly, track foundations in many places along this section of *Preferred Alternative B2M* would be improved with subsurface stone columns; however, these columns would not affect groundwater flow because they are pervious to groundwater movement.

Also, unavoidable indirect permanent impacts on wetlands would result after restoration of the temporary impacts on wetlands (described in Section 4.3.1). These wetlands would be restored after construction and would continue to function as wetlands. However, an associated permanent impact would result from converting existing forest-dominated wetlands to future shrub-dominated wetlands under and within 20 feet of each side of the elevated guideways to prevent trees and branches from interfering with operation of the light rail. This change in vegetation type (forest to shrub) is considered a vegetation conversion impact.

Forested wetland vegetation that cannot be restored with trees because of safety concerns would generally be planted with woody shrub vegetation to minimize any loss of function related to vegetation conversion. A vegetation conversion from trees to shrubs would result in a smaller loss of function than a vegetation conversion

from trees to emergent plants. During future design and permitting, Sound Transit will evaluate the potential impact of vegetation conversion and maximize the wetland functions at the restored construction sites. Sound Transit might propose other habitat improvements (such as adding downed logs and managing noxious weeds) as mitigation for the loss of function from converting the vegetation in some wetlands from trees to shrubs.

See Section 4.1, Aquatic Resources, for potential indirect permanent impacts on Mercer Slough, Kelsey Creek, and Sturtevant Creek.

### Segment C Permanent Impacts

The only direct or indirect permanent impacts on wetlands or wetland buffers from Segment C alternatives would occur at the Hilton Hotel stormwater pond (WR-16). Alternatives C9A and C14E connecting to Alternative B3 would impact less than 0.1 acre of wetlands at the Hilton Hotel stormwater pond. A 0.1 acre impact on wetland buffers at the Hilton Hotel stormwater pond (WR-16 would occur with Alternatives C2T, C3T, C4A, C7E, C8E, C9A, and C14E with connections to either Alternative B3, B3 – 114th Extension Design Option, or B7.

### Segment D Direct Permanent Impacts

***Preferred NE 16th At-Grade Alternative (D2A)***

*Preferred Alternative D2A* would avoid permanent operational impacts on wetlands except for WR-11 and WR-15 (resulting from fill for the at-grade trackway) and WR-7 and WR-8 SE where the elevated guideway would cross over. Potential permanent operational impacts on wetlands and buffers would be 0.5 and 0.6 acre, respectively. This would be a small, permanent operational impact on these Category 3 and 4 wetlands. The primary impact would be on WR-7.

Impacts on wetlands and wetland buffers from both D2A design options (120th Station and NE 24th) would essentially be the same as with *Preferred Alternative D2A*.

The storage track along the former BNSF Railway corridor north of Lake Bellevue would result in impacts of approximately 0.1 acre on wetlands and 0.1 acre on wetland buffers to accommodate an access path adjacent to the storage tracks.

**Other Segment D Alternatives**

The other Segment D alternatives and connection options would have approximately half of the permanent operational impacts on wetlands compared to *Preferred Alternative D2A*, primarily because they would avoid impacts on Wetland WR-7. Alternative D2E would permanently affect 0.2 to 0.3 acre of wetland (depending on connection option) because of the elevated guideway over Wetlands WR-6, WR-8SE, WR-11, and WR-15. Alternative D3 would permanently affect 0.2 acre of wetland from the fill used to widen 136th Place NE for the at-grade trackway at Wetland WR-15 and the elevated guideway over Wetlands WR-6 and WR-8SE. Alternative D5 would permanently affect 0.2 to 0.3 acre of wetland (depending on connection option) due to elevated guideway over Wetlands WR-6, WR-8NW, and WR-11.

Potential permanent impacts on wetland buffers would be lowest (0.1 acre) for Alternative D3 and would be slightly greater for Alternatives D2E and D5.

Table 4-11 shows the potential direct permanent wetland and wetland buffer impacts associated with the four maintenance facility locations in Segment D. MF1, MF2, and MF2 (D5) would have minor impacts on the Category 3 WR-6 wetland and its buffers. MF3 (*Preferred Alternative D2A* and Alternatives D2E and D3) would have minor permanent impacts on the Category 4 WR-15 wetland.

### Segment D Indirect Permanent Impacts

Fill from the at-grade portion of *Preferred Alternative D2A* and both D2A design options, or from the elevated section of Alternative D2E, could result in indirect permanent impacts on Wetland WR-11 by disconnecting hydrology in the remaining western portions of the wetland.

TABLE 4-11
Permanent Operational Impacts on Wetlands and Wetland Buffers by Maintenance Facility Placement

| Maintenance Facility | Wetland Locator – Wetland Name | Category | Wetland Affected Area (acres) | Wetland Buffer Affected Area (acres) |
|---|---|---|---|---|
| MF1, 116th (*Preferred D2A*, D2E, D3) | WR-6—BNSF Matrix Wetland | 3 | 0.1 | 0.1 |
| MF2, BNSF (*Preferred D2A*, D2E, D3) | WR-6—BNSF Matrix Wetland | 3 | 0.1 | 0.1 |
| MF2, BNSF (D5) | WR-6—BNSF Matrix Wetland | 3 | 0.1 | 0.2 |
| MF3, SR520 (*Preferred D2A*, D2E, D3) | WR-15—Unnamed Tributary to Kelsey Creek Wetland | 4 | <0.1 | 0 |

Also, unavoidable indirect permanent impacts on wetlands would result following restoration of the temporary wetlands impacts (described in Section 4.3.1). These wetlands would be restored after construction and would continue to function as wetlands. However, an associated permanent impact would result from converting existing forest-dominated wetlands to future shrub-dominated wetlands under and within 20 feet of each side of the elevated guideways to prevent trees and branches from interfering with operation of the light rail. This change in vegetation type (forest to shrub) would be a vegetation conversion impact.

See Section 4.1, Aquatic Resources, for potential indirect permanent impacts on the West Tributary to Kelsey Creek, Unnamed Tributary to Kelsey Creek, and Valley Creek.

### Segment E Direct Permanent Impacts

***Preferred Marymoor Alternative (E2)***

*Preferred Alternative E2* has the potential to permanently affect up to 0.1 acre of wetland and 0.4 acre of wetland buffer. *Preferred Alternative E2* would affect the existing mitigation wetland and buffers at the Marymoor Park Wetland (WR-13) and the wetland and stream buffer at the railroad crossing at the Bear Creek Wetland (WR-12). Approximately 0.1 acre of wetland and less than 0.1 acre of buffer in the northern portion of the mitigation wetland (WR-13) would be lost due to the construction of the at-grade section of *Preferred Alternative E2* through the mitigation site.

Impacts on wetlands with the E2 - Redmond Transit Center Design Option would be the same as described above for *Preferred Alternative E2*. Impacts on wetland buffers with this design option would be slightly more than with *Preferred Alternative E2*.

**Other Segment E Alternatives**

Alternatives E1 and E4 would have comparable direct, permanent impacts on wetlands and wetland buffers.

### Segment E Indirect Permanent Impacts

Unavoidable indirect permanent impacts on wetlands would result following restoration of the temporary wetlands impacts (described in Section 4.3.1). These wetlands would be restored after construction and continue to function as wetlands. However, an associated permanent impact would result from converting existing forest-dominated wetlands to future shrub-dominated wetlands under and within 20 feet of each side of the elevated guideways to prevent trees and branches from interfering with light rail operations. This change in vegetation type (forest to shrub) is considered a vegetation conversion impact.

See Section 4.1, Aquatic Resources, for potential indirect permanent impacts on Sammamish River and Bear Creek.

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*Chapter 5*

# Potential Mitigation Measures

Appendix A (Best Management Practices for Sensitive Ecosystem Resources) identifies the typical regulatory requirements for avoidance and minimization of impacts on ecosystem resources during design and construction. Sound Transit might also take additional measures to avoid and minimize impacts on sensitive natural resources as needed. The Biological Assessment (Sound Transit, 2010) prepared for ESA consultation also outlines conservation measures and proposed aquatic habitat improvements that would become conditions of federal approvals for the project. Based on this analysis, and the mitigation measures proposed herein, the NMFS and the USFWS concurred that the determination for ESA-listed species is "**May Affect, Not Likely to Adversely Affect"** and the determination for Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act would be "**No Adverse Effect**."It is important to note that the Biological Assessment only covers the *Preferred Alternative*.

To the extent that impacts cannot be avoided or minimized through BMPs, Sound Transit would implement the compensatory mitigation measures described in Sections 5.1 through 5.3.

## 5.1 Aquatic Resources Mitigation Measures

- On Sturtevant Creek at the Hospital Station where realignment of the stream channel would be required (with *Preferred Alternatives C11A* and *C9T* and Alternatives C1T, C2T, C9A, or C14E), Sound Transit would reconstruct the new channel with natural stream habitat features. Riparian habitat functions would be improved with native riparian plantings. This reach is currently lacking shade. The newly shaded reach would help lower stream temperatures in the downstream reaches that support salmonids. Specific requirements and details of these measures would be established during final design and project permitting.
- For Alternatives D3 or D5, which have culvert lengthening or shortening (Goff Creek [D5] and Valley Creek [D3]), habitat might be improved by placing LWD. For maximum benefit to fisheries, habitat improvements could be done in either Goff Creek, Valley Creek, or West Tributary to Kelsey Creek below the anadromous fish barriers, wherever the best improvements and access exist. Along the West Tributary to Kelsey Creek, enhancement could include creating wider buffers for habitat and open space, environmental education, and stormwater management.
- As mitigation for the increased culvert length on the Unnamed Tributary to Kelsey Creek (with *Preferred Alternative D2A* and Alternatives D3 and D2E), Sound Transit proposes to coordinate with the City of Bellevue to find and develop instream habitat improvements on Goff Creek in coordination with the City of Bellevue's larger plans to restore and daylight the creek.
- Riparian plantings to mitigate impacts in riparian areas from shading by elevated tracks or bridges would be possible in a number of locations, such as in Mercer Slough, West Tributary to Kelsey Creek, Valley Creek, Bear Creek, and Sammamish River. The Sammamish River would receive the most benefit from this mitigation.
- Sound Transit would consult with the Tribes to avoid impacts on Tribal fisheries from construction work in Lake Washington, barge/boat transit through the Lake Washington ship canal, or barge/boat approaches to the Ballard Locks.
- In-water work would be conducted during approved in-water construction windows. Where ESA-listed species might be present, stream crossings would not require in-water work and the project would not install infrastructure below the OHWM. If over-water construction is conducted over Mercer Slough (with Alternative B7) or the Sammamish River (all Segment E alternatives) during the migratory period of ESA-protected species, nighttime lighting would be shielded from the waters below.

## 5.2 Vegetation and Wildlife Resources Mitigation Measures

- Areas disturbed in the construction staging areas would be revegetated with native vegetation within one year of construction completion.
- Sound Transit would update its survey of bird nests during final design. If a bald eagle nest is found within a half mile of the proposed construction limits, a bald eagle management plan would be prepared. Under the MBTA, nesting migratory bird nests cannot be destroyed during the breeding season. Sound Transit would consult with the USFWS on methods to implement during construction to avoid impacts on migratory birds consistent with the MBTA and the Bald and Golden Eagle Protection Act. Such methods would include clearing in the Mercer Slough buffer outside the nesting season for migratory birds.
- High-value habitat regulated by local agency regulations that are affected by the project would be mitigated with habitat replacement or enhancement. The type of habitat to be established would depend on the affected species. The type of habitat to be replaced and mitigation ratios would be determined through discussions with local permitting agencies during final design and project permitting.
- Sound Transit would adhere to local ordinances regarding tree replacement ratios.

## 5.3 Wetland Resources Compensatory Mitigation Measures

Sound Transit is committed to achieving no net loss of wetland function and area on a project-wide basis. Sound Transit would apply appropriate current available agency guidance developed jointly by the Washington Department of Ecology, U.S. Army Corps of Engineers Seattle District, and the U.S. Environmental Protection Agency Region 10 (Ecology et al., 2006a and 2006b) and applicable Critical Areas Ordinances for the Cities of Bellevue and Redmond. To the extent possible, compensatory mitigation sites would be identified and compensate for lost values in-kind. Sound Transit determined there are several opportunities for wetland mitigation in the study area that are expected to meet required mitigation ratios. The specific compensatory mitigation for the selected alternative would be determined during final design and project permitting.

The *Preferred Alternatives* for the proposed East Link Project would permanently affect approximately 0.7 acre of various wetlands (see Table 5-1). This relatively small amount of impact for an 18-mile-long project reflects Sound Transit's commitment to avoid and minimize environmental impacts. To compensate for these unavoidable permanent impacts, several mitigation strategies are available. Agency guidance developed jointly by Ecology, USACE Seattle District, and U.S. Environmental Protection Agency Region 10 (referred to hereafter as the Joint Guidance) (Ecology et al., 2006a and 2006b) allows for strategies that include wetland re-establishment (combined with creation), rehabilitation, and enhancement.

TABLE 5-1
Summary of Permanent Direct Impacts from the Preferred Alternatives by Segment

| Segment (Preferred Alternative) | Permanent Wetland Impacts (acres) | Permanent Buffer Impacts (acres) |
|---|---|---|
| Segment A – *A1* | 0 | 0 |
| Segment B – *B2M* | 0.1 | 3.3 to 4.5 |
| Segment C – *C11A* or *C9T* | 0 to <0.1 | 0 |
| Segment D – *D2A* | 0.6 | 0.6 |
| Segment E – *E2* | 0.1 | 0.4 |
| **Total**[a] | **0.7** | **4.2 to 5.4** |

[a]The totals in this row might not add up because the impact acreage numbers are rounded up or down.

Mitigation ratios are guidelines from which case-by-case considerations start. To determine the appropriate mitigation ratios for this project, the project team may propose adjustments to these guidelines to take into consideration unique project circumstances.

The *Preferred Alternatives* for the proposed East Link Project would temporarily affect approximately 6.3 to 6.6 acres of various wetlands and 1.1 to 1.2 acres of wetland buffer (see Table 5-2). These wetlands would be restored after construction and continue to function as wetlands. However, an associated permanent impact would result from converting existing forest-dominated wetlands to future shrub-dominated wetlands under and within 20 feet of each side of the elevated guideways to prevent trees and branches from interfering with operation of the light rail. This change in vegetation type (forest to shrub) is considered a vegetation conversion impact.

To estimate the mitigation required, Sound Transit currently assumes that all the wetlands that are temporarily affected during construction would have a vegetation conversion impact. The actual vegetation conversion impact areas will be determined during future design when more detailed information along the selected alternative routes is available for the existing wetland vegetation types, railway design, and associated construction impacts. Sound Transit would conduct detailed site surveys to establish existing topography and would conduct hydrologic monitoring to reestablish the topography after project construction. Restoration would need to amend the soil and replace vegetation.

TABLE 5-2
Summary of Potential Temporary Construction Direct Impacts from the Preferred Alternatives by Segment

| Segment (Preferred Alternative) | Temporary Wetland Impacts (acres) | Temporary Buffer Impacts (acres) |
|---|---|---|
| Segment A – *A1* | 0 | 0 |
| Segment B – *B2M* | 0.5 | 3.7 to 4.0 |
| Segment C – *C11A or C9T* | 0 | 0 to <0.1 |
| Segment D – *D2A* | 0.5 | 1.7 |
| Segment E – *E2* | 0.1 | 0.9 |
| **Total**[a] | **1.1 to 1.2** | **6.3 to 6.6** |

[a]The totals in this row might not add up because the impact acreage numbers are rounded up or down.

Forested wetland vegetation that cannot be restored with trees due to safety concerns would generally be planted with woody shrub vegetation to minimize any loss of function related to vegetation conversion. A vegetation conversion from trees to shrubs would result in a smaller loss of function than a vegetation conversion from trees to emergent plants. During future design and permitting, Sound Transit would evaluate the potential impact of vegetation conversion and maximize the wetland functions at the restored construction sites. Sound Transit might propose other habitat improvements (such as adding downed logs and managing noxious weeds) as mitigation for the loss of function from converting the vegetation in some wetlands from trees to shrubs.

In addition, the City of Bellevue's critical areas ordinance requires that critical area buffers disturbed or affected shall be replaced at a ratio of one-to-one (1:1). Other mitigation requirements may also result from potential impacts on aquatic resources. It is environmentally and economically desirable to maximize the ecological functions at sites by consolidating as many mitigation requirements as possible at the least number of mitigation sites. Due to the size of the proposed East Link Project, the variety of impacts on critical areas, and the complexity of identifying mitigation opportunities and satisfying the mitigation requirements, it may be necessary to use several sites and approaches to mitigation.

The existing conditions of each potential mitigation site would be used to develop an estimate of proposed mitigation value. The estimated mitigation value would inform the process of mitigation site selection and the value received for conducting mitigation at that site.

### 5.3.1 Conceptual Mitigation Framework

The expected impacts from the East Link Project that would occur in Bellevue would be within the Kelsey Creek subbasin, and the affected areas that drain to Mercer Slough/Lake Washington. It is possible that one mitigation site could be used to compensate for all wetland impacts related to Segments B, C, and D. The expected impacts within Segment E in Redmond would be within the Lake Sammamish subbasin.

Permanent impacts on wetlands could be mitigated by one or more of the following approaches, which are described in the text that follows:

- King County In-Lieu Fee Program
- Approved Mitigation Bank
- Project-specific mitigation developed by Sound Transit
- Also, Sound Transit would consider opportunities to establish mitigation in advance of the impacts from future construction of East Link Project. Advance mitigation is a form of permittee-responsible compensatory mitigation performed in advance of a permitted impact (USACE et al., 2010)

#### 5.3.1.1 King County In-Lieu Fee Program (Mitigation Reserves Program)

King County is in the process of developing an in-lieu fee program called the Mitigation Reserves Program (King County, 2010). The program includes service areas for the Cedar River-Lake Washington and Lake Sammamish basins. This program should be available by the time the East Link Project is ready for permitting. However, many questions are unanswered at this time. Sound Transit would discuss this program with the Cities of Bellevue and Redmond to determine whether this could be applicable to the East Link Project or not.

#### 5.3.1.2 Approved Mitigation Bank

There are no existing approved mitigation banks in the Kelsey Creek subbasin. However, it is possible that a bank could become certified in the project study area in the future. However, mitigation banking projects take considerable lead time for planning and approval.

#### 5.3.1.3 Project-Specific Mitigation Developed by Sound Transit

Recent guidance developed by Ecology (Hruby et al., 2009) recommends the implementation of a watershed approach to selecting mitigation sites. This approach allows for a greater degree of flexibility in selecting mitigation sites and potentially greater value created for the watershed than the previous regulatory focus of on-site mitigation.

Current potential sites under consideration for project-specific mitigation are described below.

##### Wetland Hydrology along Bellevue Way SE

Regarding the interception of groundwater by the retained cut proposed for *Preferred Alternative B2M*, Sound Transit is addressing this issue by designing a sealed system for the trackway where it is below groundwater to eliminate the need for draining groundwater and thereby preserving the wetlands. The sealed system would allow the water to continue to flow around the retained cut to the wetland. The retained cut along Bellevue Way SE would intercept flows from groundwater flowing into Mercer Slough wetlands from the west, but the retained cut would be sealed and allow for groundwater to flow below and around it and would continue to reach the wetlands. The primary sources of hydrology for the Mercer Slough wetlands are the controlled water fluctuation of Lake Washington; input from Kelsey Creek and other small drainages; groundwater from the hill slopes to the west and east of Mercer Slough wetlands and culverts that enter these wetlands from the north, west, and east sides; and precipitation. As a result, no impact on hydrology of the Mercer Slough wetland is expected.

EXHIBIT 5-1
View of Existing Potential Wetland and Buffer Restoration Area at 112th Avenue SE and Mercer Slough West

##### Wetland and Buffer Restoration at 112th Avenue SE and Mercer Slough West

The Watershed Company (2008b) prepared design drawings for the Wetland and Buffer Restoration at 112th Avenue SE and Mercer Slough West (see Exhibit 5-1) for the City of Bellevue Department of Parks and Community Services. This site would potentially enhance

a narrow fringe of wetland along the west side of Mercer Slough West. The site would provide substantial stream (riparian), wetland, and shoreline buffer enhancement.

An advantage of this site is that a preliminary design and use agreement with the private landowner already exists. Bellevue Parks Department is interested in implementing this restoration project, but put it on hold when they learned that construction of the East Link route in Segment B could disturb this area.

Implementing this restoration project would be a logical consequence of restoring the temporary construction impacts in this area with direct benefits to wetlands and Mercer Slough West. Acquisition may not be needed to implement this restoration project. Wetland re-establishment would not likely result at this site, and therefore, would not contribute toward meeting Sound Transit's commitment of no-net-loss of wetland area.

## Bel-Red/Springs District

### West Tributary to Kelsey Creek

The West Tributary to Kelsey Creek site includes two parcels in the Springs District that the City of Bellevue acquired in Fall 2009 with funding from King County. This fits into Bellevue's planned Bel-Red vision for a restored West Tributary to Kelsey Creek with new community and neighborhood parks and public trail (City of Bellevue, 2010b) (see Exhibit 5-2).

Sound Transit would consider partnering with Bellevue to develop a restoration plan for these parcels that could occur concurrently with or in advance of the proposed light rail through this area. Unlike the 112th Avenue SE and Mercer Slough West site, this site could likely provide wetland re-establishment and therefore would contribute toward meeting Sound Transit's commitment of no-net-loss of wetland area. Acquisition may not be needed to implement this restoration project.

EXHIBIT 5-2
City of Bellevue's Conceptual Future Vision of West Tributary to Kelsey Creek in the Bel-Red area (City of Bellevue, 2010)

### Goff Creek

Sound Transit met with the City of Bellevue to discuss impacts and mitigation for various aspects of the East Link Project and discussed the culvert lengthening of the Unnamed Tributary to Kelsey Creek. Sound Transit will continue to coordinate with the City of Bellevue to find and develop instream habitat improvements on Goff Creek in coordination with the City of Bellevue's larger plans to restore and daylight the creek.

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*Chapter 6*

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