

4.9 Water Resources

4.9.1 Introduction to Resources and Regulatory Requirements

This section describes the affected water resources and potential hydrologic, flooding, and water quality impacts associated with the East Link Project alternatives. The following laws, statutes, local ordinances, and guidelines address hydrology, water quality, and/or flooding issues:

- National Pollutant Discharge Elimination System (NPDES) Permit Regulations
- Presidential Executive Orders 11988 and 11990
- Washington State Water Quality Standards
- Washington State Department of Ecology (Ecology) *Stormwater Management Manual for Western Washington* (Ecology, 2005)
- WSDOT *Highway Runoff Manual* (WSDOT, 2008)
- Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) requirements
- The National Flood Insurance Protection Act
- The Flood Disaster Protection Act
- Sections 401, 402, and 404 of the Clean Water Act (CWA)
- Section 10 of the Rivers and Harbors Act
- City and County floodplain and drainage regulations
- City and County critical area ordinances
- City Shoreline Master Programs
- King County industrial rules and regulations
- King County Waste Discharge Permit for discharge of construction water to the sanitary sewer

A detailed discussion of wetlands, stream habitat, and stream/wetland buffers is in Section 4.8, Ecosystem Resources.

4.9.2 Affected Environment

The study area for water resources consists of the stream basins within which the project would be constructed (see Exhibit 4.9-1). The study area is located in Water Resources Inventory Area (WRIA) 8. Topography in the study area ranges from a high elevation of roughly 500 feet to Lake Washington at an

elevation of 21 feet (King County, 2007a; City of Bellevue, 2007a; Horizon Systems Corporation [Horizon], 2007). Most of the basin areas crossed by the alternatives are urbanized, with impervious surface cover ranging from approximately 30 percent to a high of nearly 70 percent around Downtown Bellevue (City of Bellevue, 2002). Notable features in the study area include the heavily developed corridors of Interstate (I) 90, I-405, and State Route (SR 520); Seattle; Downtown Bellevue; Downtown Redmond; and surrounding suburban development. The affected environment is described in the following subsections that address surface waters, stormwater management, floodplains, wellhead protection zones (WPZs), and maintenance-facility surroundings. Project segments are addressed separately as applicable.

4.9.2.1 Surface Waters

Each of the water bodies in the study area is designated by Ecology for the following uses: core summer salmonid habitat; extraordinary primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values (WAC 173-201A-602). These uses are used to define the Ecology water quality standards that must be met for each water body.

Table 4.9-1 summarizes the parameters for Ecology's 303(d) water quality standards that have been exceeded within the water bodies in the study area. See the insert on this page for an explanation of 303(d) section of the Clean Water Act.

Segment A

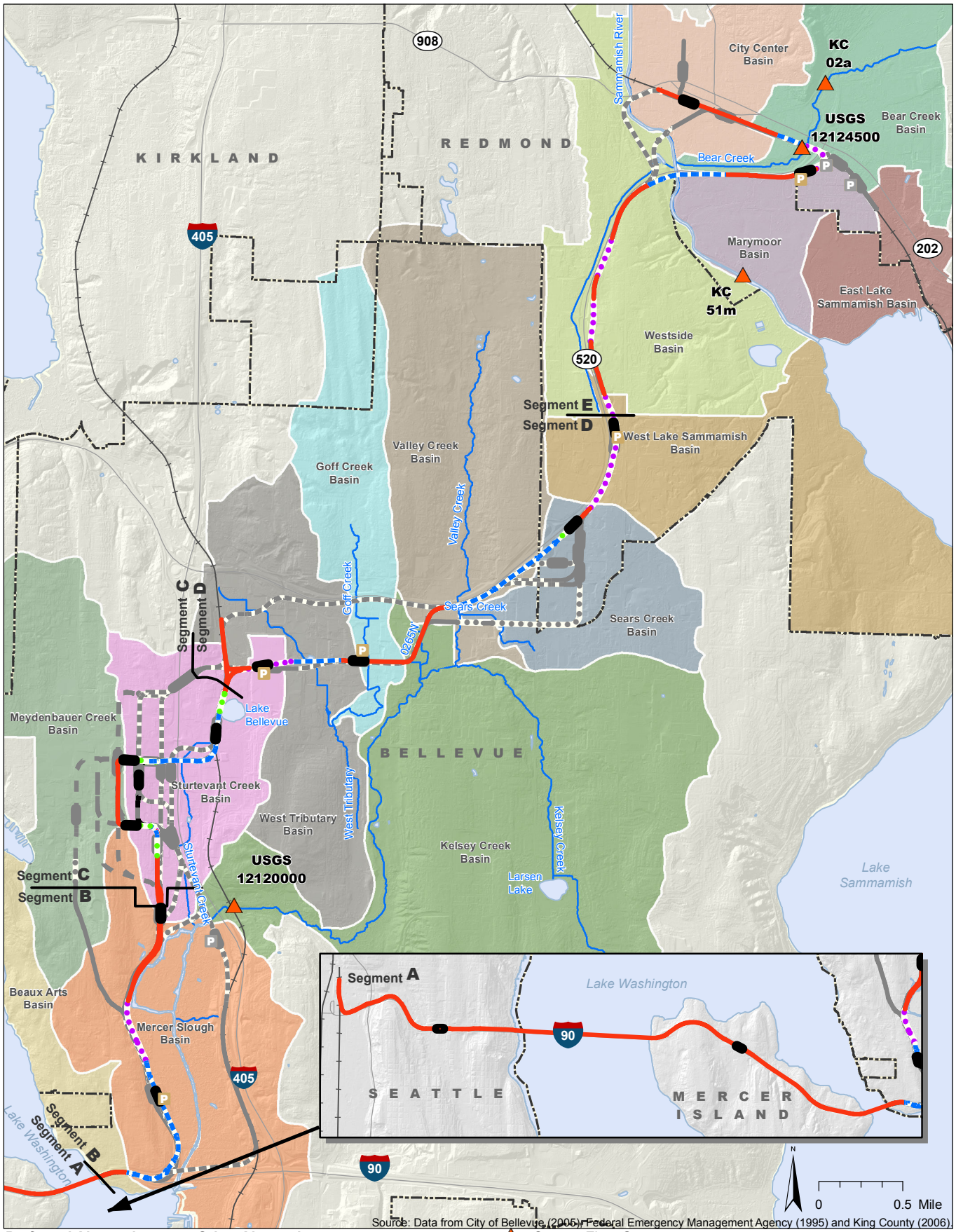
Lake Washington is the dominant water resource in Segment A. It is the second largest natural lake in Washington and lies between Seattle and Bellevue, where it would be crossed by Segment A.

What is the Ecology 303(d) List?

The federal Clean Water Act (CWA), adopted in 1972, requires states to restore their waters to be "fishable and swimmable." The CWA established a process to identify and clean up polluted waters. Every 2 years, all states are required to prepare a list of water bodies that do not meet water quality standards.

Ecology has prepared a preliminary assessment of water quality in Washington. The assessed waters are listed in categories that describe the status of water quality. For those waters that are in the polluted category, beneficial uses—such as drinking, recreation, aquatic habitat, and industrial use—are impaired by pollution.

For 303(d)-listed water bodies, total maximum daily loads (TMDLs) are developed by Ecology for the pollutants that exceed water quality standards as a means for ultimately attaining the standards.



Source: Data from City of Bellevue (2006), Federal Emergency Management Agency (1995) and King County (2006).

- | | | |
|------------------------------|---------------------------------------|---|
| Preferred Alternative | Other Alternatives | Stream Flow Gage |
| — At-Grade Route | — At-Grade Route | ▲ Stream |
| — Elevated Route | — Elevated Route | ● Proposed Station |
| — Retained-Cut Route | — Retained-Cut or Retained-Fill Route | ■ New and/or Expanded Park-and-Ride Lot |
| — Retained-Fill Route | — Tunnel Route | |
| — Tunnel Route | | |

Exhibit 4.9-1
Water Resources Overview
Segments A, B, C, D, and E
East Link Project

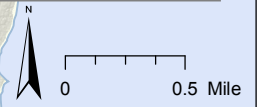


TABLE 4.9-1
303(d) Designated Use Violations (2008)

Water Body Basin	Fecal Coliform	Dissolved Oxygen	Temperature	Total Phosphorus
Lake Washington	✓			✓
Mercer Slough	✓		✓	
Sturtevant Creek				
Kelsey Creek	✓	✓	✓	
West Tributary				
Goff Creek				
Valley Creek				
Sears Creek				
Sammamish River	✓	✓	✓	
Bear Creek	✓ ^a	✓ ^a	✓ ^a	

^a A total maximum daily load (TMDL) has been prepared for this parameter on this water body.

Source: Ecology, 2008

Washington State Department of Ecology (Ecology), 2008. 2008 Water Quality Assessment (303d List) available at: <http://www.ecy.wa.gov/programs/wq/303d/2008/index.html>

Most of the surface water in this segment drains to this lake, which is 1 to 3 miles wide and extends 18 miles from Renton to Kenmore. Its two largest tributaries are the Cedar and Sammamish Rivers; the Sammamish River lies within the study area and is discussed below. Lake Washington is a major recreational feature in the region, with heavy use for swimming, fishing, and boating. Although algae blooms can occur, the lake generally has good water clarity. Various locations throughout the lake have been placed on the 2008 Ecology 303(d) list of impaired water bodies for violations of standards for nitrogen, fecal coliforms, and total phosphorus (Table 4.9-1).

Segment B

In Segment B, Mercer Slough covers 1,330 acres and receives inflow from Kelsey Creek and Sturtevant Creek. The southern portion of the slough flows through the protected Mercer Slough Nature Park, underneath I-90, and into Lake Washington. In the northern part of the slough, Mercer Slough has an east and a west branch. Sturtevant and Kelsey Creeks flow into the northern portion of the slough, supplying flow to both branches. Both Mercer Slough and Kelsey Creek are within Bellevue's Shoreline Master Program. The gradient is gradual, which creates sluggish flow in

these branches. Mercer Slough is at the same elevation as Lake Washington and has no perceptible flow. Approximately 35 percent of the basin area is covered by impervious surface, indicating a moderate level of basin development (City of Bellevue, 2002). The primary functions of Mercer Slough are to provide a migration corridor for salmon and trout and to support one of the largest wetlands within the area. The slough is used extensively for recreation, including nonmotorized boating. The water body is listed on the 2008 Ecology 303(d) list of impaired water bodies with violations of standards for temperature and fecal coliform (Table 4.9-1).

Segments C and D

Sturtevant Creek originates at Lake Bellevue near the Segment C and D boundary and drains southward from an area of just over 770 acres into Mercer Slough (City of Bellevue, 2002). Interstate 405 runs parallel to the creek, crossing it midway between Lake Bellevue and Mercer Slough. The creek is surrounded on both sides by heavy commercial and high traffic use, making the basin approximately 65 percent impervious. The entire basin falls within the City of Bellevue. Lake Bellevue, located in the upper portion of the basin, is completely surrounded by residential and commercial development.

Kelsey Creek drains an area of over 9,200 acres into Mercer Slough (Horizon, 2007). Smaller upstream tributaries include (from east to west) Sears Creek, Valley Creek, Goff Creek, and West Tributary Kelsey Creek. Kelsey Creek flows north through Larson Lake and loops around to the west and south, receiving the flows of the above-mentioned tributaries along the way.

Land use within the associated basins is primarily light to medium residential. An exception is the medium- to high- density commercial development along the southern portion of SR 520, which crosses Goff and Valley creeks. Directly to the west of the West Tributary Kelsey Creek headwaters is the SR 520 and I-405 interchange. These uses contribute to an overall impervious surface coverage of approximately 40 percent of the basin (City of Bellevue, 2002). The U.S. Geological Survey (USGS, 2007) has recorded flows within Kelsey Creek ranging from 2.4 to 412 cubic feet per second (cfs) near its confluence with Mercer Slough. The water body is also listed on the 2008 Ecology 303(d) list of impaired water bodies with violations of standards for temperature, fecal coliform, and dissolved oxygen (Table 4.9-1).

Segment E

In Segment E, the Sammamish River is the largest tributary flowing to Lake Washington, draining over

150,000 acres (Horizon, 2007). The river begins at the outlet from Lake Sammamish, then flows north and west for 15 miles through Redmond, Woodinville, Bothell, and Kenmore. Decades ago the river channel was dredged and straightened. Along its route, it collects flow from Bear Creek, Little Bear Creek, North Creek, and Swamp Creek. Land use within the Sammamish basin varies from urban commercial and residential to recreational, agricultural, and open space. Sammamish River and Bear Creek are within the City of Redmond's Shoreline Master Program.

Multiple subbasins of the Sammamish River watershed lie within the Segment E study area. The study area includes the first 2 miles of the Sammamish River as it flows through Marymoor Park, a large regional park, and past Downtown Redmond. Study area basins draining to the river include East and West Lake Sammamish, Westside, Marymoor, Bear Creek, and City Center (Exhibit 4.9-1). Flow records at a gage midway down the river measured flows ranging from 25 to 2,830 cfs. The Sammamish River has been added to Ecology's 2008 303(d) list of impaired water bodies in Washington because water quality in the river exceeds standards for temperature, fecal coliform, and dissolved oxygen (Table 4.9-1).

The headwaters of Bear Creek are located in southern Snohomish County. The creek drains a total of 31,000 acres and flows into the Sammamish River, just south of Downtown Redmond (Horizon, 2007). Major tributaries include tributary flows from Evans Creek, Cottage Lake Creek, and Seidel Creek. The lower portion of Bear Creek lies within the study area. Recorded flows along the lower portion of Bear Creek have ranged from 16 to 1,040 cfs (King County, 2007b). Bear Creek is on Ecology's 303(d) because it exceeds the allowable water quality standards for dissolved oxygen, fecal coliform, and temperature (Table 4.9-1). The Bear-Evans creek system is recognized as one of the top six natural resource basins in King County in the Waterways 2000 Program (King County, 2010).

4.9.2.2 Stormwater Management

Segment A lies entirely within the I-90 right-of-way. For much of the length of Segment A in Seattle, runoff flows to a combined pipe system that receives both stormwater runoff and sanitary sewage. This combined flow is conveyed to the West Point Treatment Plant, where the water is treated and discharged to Puget Sound. For the portion of I-90 crossing Mercer Island, the highway runoff is conveyed within the WSDOT-owned pipe system and discharged to Lake Washington. Some stormwater treatment is provided within vaults.

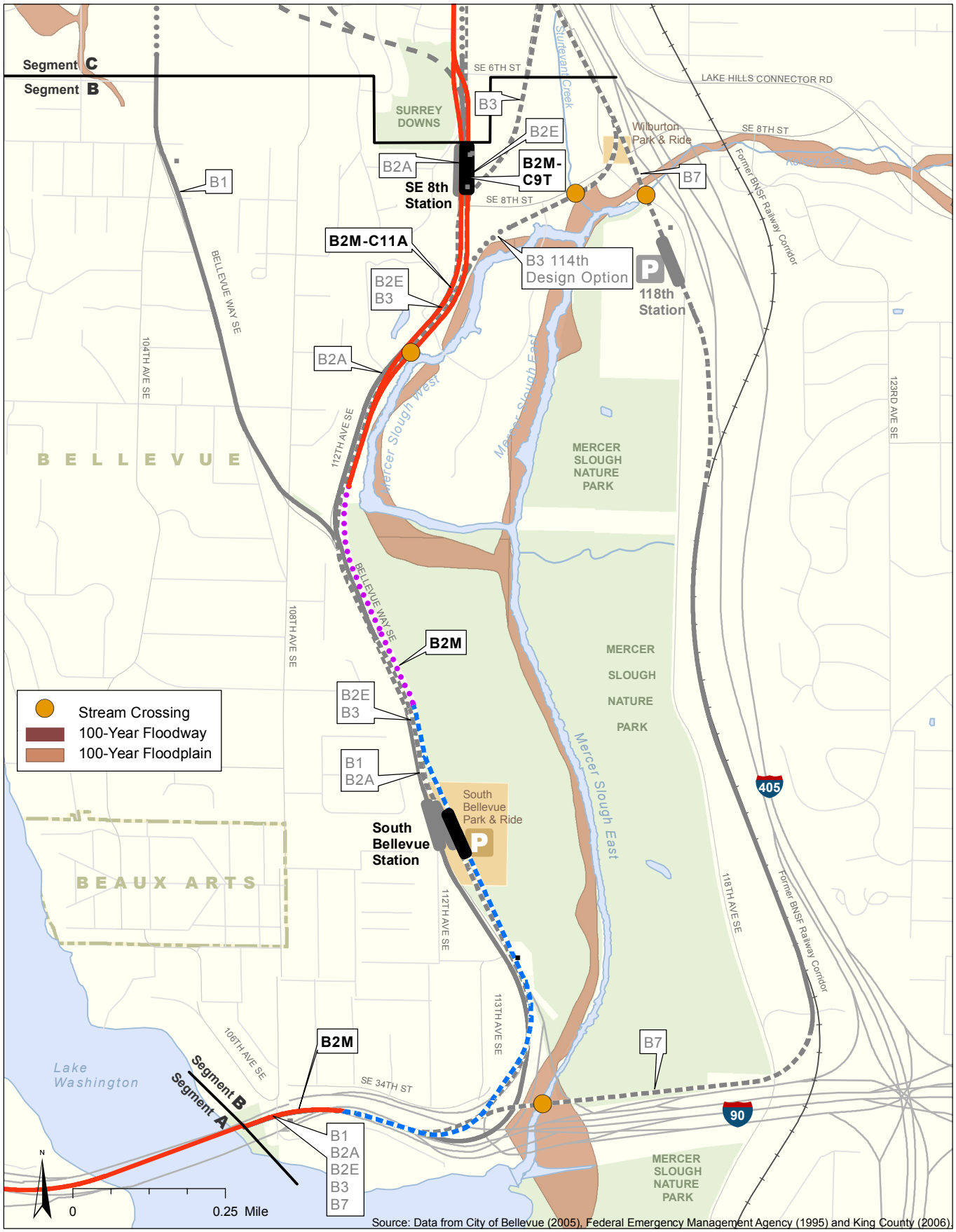
The remaining project segments lie within Bellevue and Redmond. These cities operate separated stormwater systems. These systems only collect and convey stormwater, not sanitary sewage. These systems typically discharge to the local streams. Urbanization within these cities has changed many of the land uses, from forested areas to urban development. Higher peak flows that are caused by impervious surface prevent infiltration from occurring and result in channel scour and degradation of stream habitat. To reduce the high flows that would otherwise occur within the streams, both cities operate a system of regional detention ponds. Runoff from developments constructed less than 15 to 20 years ago generally receives treatment and detention prior to discharging into the city stormwater systems. Each city operates a regional stormwater system within its downtown area. The regional system has the advantage of allowing new development to discharge stormwater to them without having to provide stormwater facilities for each new development. For convenience, these are referred to as the Bellevue or Redmond Stormwater Service Area in this EIS.

The cities in the study area have active stormwater management regulations and programs. Ecology provides guidelines for stormwater management in its *Stormwater Management Manual for Western Washington* (Ecology, 2005), also known as the Ecology Manual. Stormwater management design guidelines for Bellevue and Redmond are generally consistent with the Ecology manual. The City of Seattle updated its stormwater code to more closely comply with the Ecology Manual in 2009.

4.9.2.3 Floodplains

Federal Emergency Management Agency (FEMA) 100-year floodplains, as mapped by FEMA, are shown in Exhibits 4.9-2 through 4.9-5. In general, 100-year floodplains that are crossed by the project are less than 200 feet wide; however, wider floodplains lie along the lower reaches of Bear Creek and along the Sammamish River. The Sammamish River valley is broad and gently sloping, with a 100-year floodplain that is nearly 1 mile wide in places.

Some of the smaller creeks and tributaries, including Goff Creek, Sears Creek, and Sturtevant Creek, do not have formally delineated floodplains. Occasional flooding has been reported on Sturtevant Creek south of Lake Bellevue and on Valley Creek north of the intersection of NE 20th Street and 140th Avenue NE (Watson, 2007).



Preferred Alternative

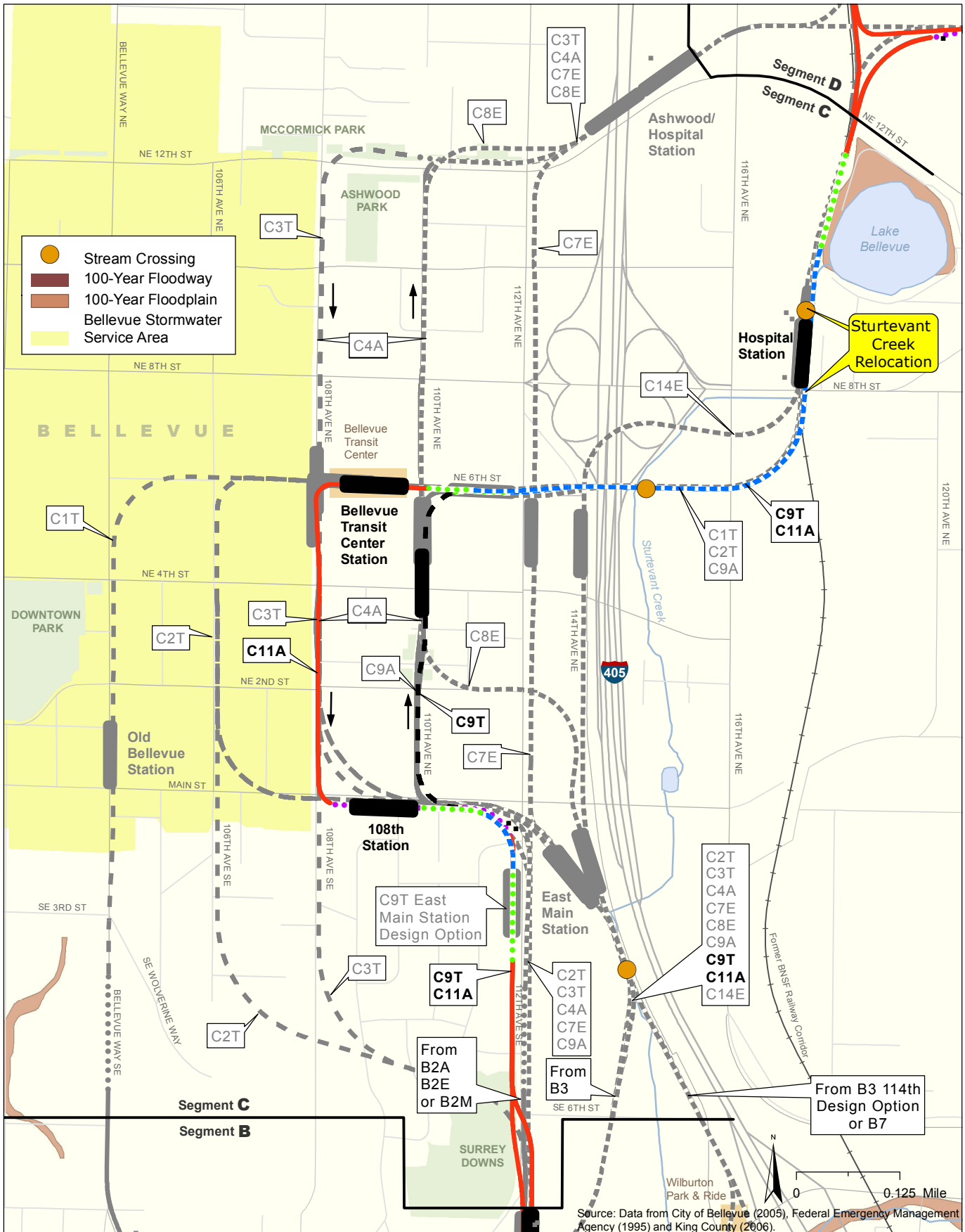
- At-Grade Route
- - - Elevated Route
- · · Retained-Cut Route
- · · Retained-Fill Route
- - - Tunnel Route

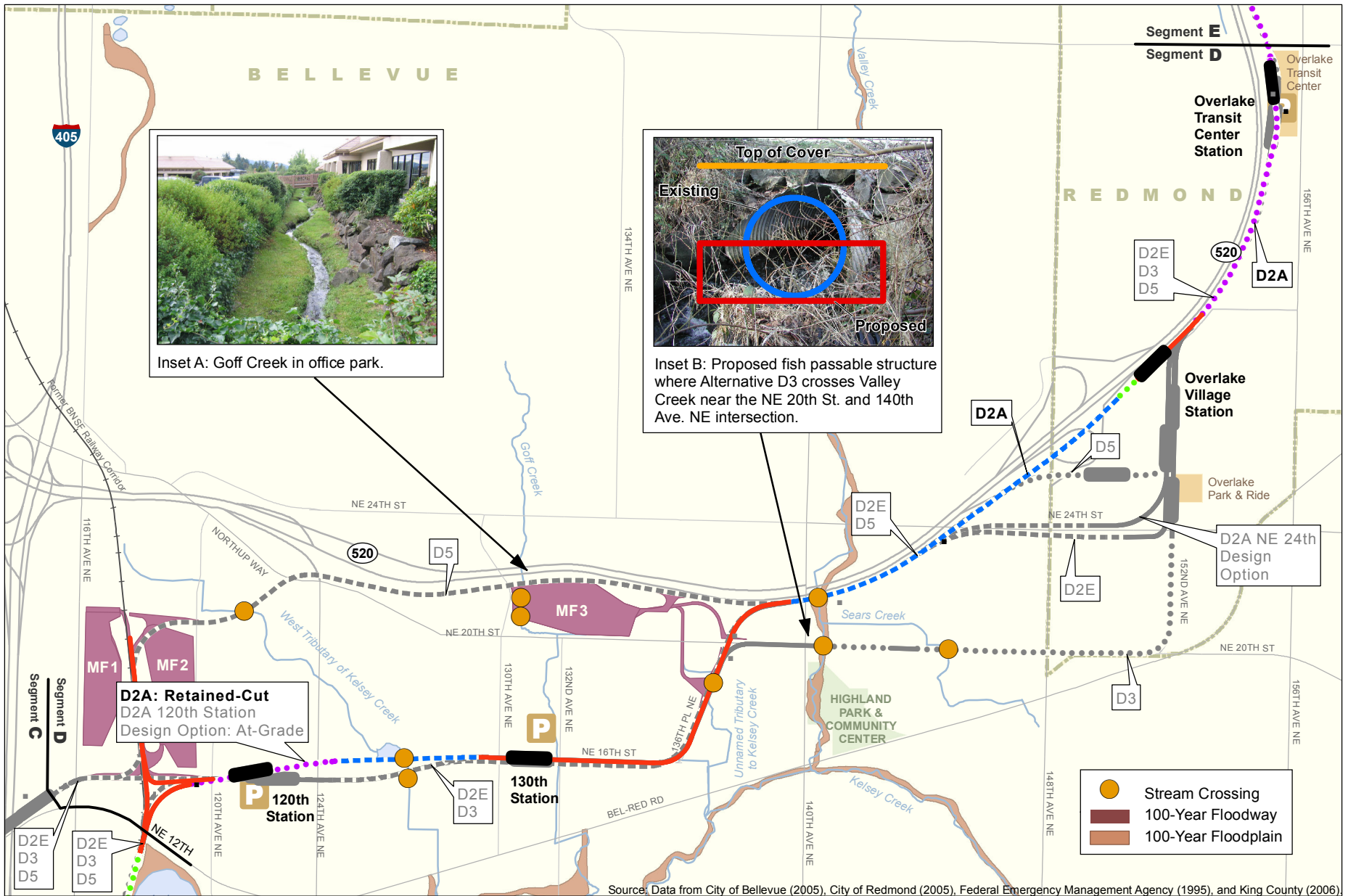
Other Alternatives

- At-Grade Route
- - - Elevated Route
- · · Retained-Cut or Retained-Fill Route
- - - Tunnel Route

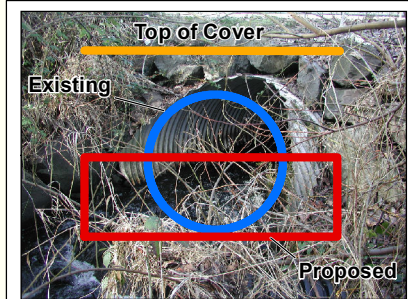
- Traction Power Substation
- P Proposed Station
- P New and/or Expanded Park-and-Ride Lot

Exhibit 4.9-2
Water Resources
Segment B
 East Link Project





Inset A: Goff Creek in office park.



Inset B: Proposed fish passable structure where Alternative D3 crosses Valley Creek near the NE 20th St. and 140th Ave. NE intersection.

Source: Data from City of Bellevue (2005), City of Redmond (2005), Federal Emergency Management Agency (1995), and King County (2006)

- Preferred Alternative** **D2A**
- At-Grade Route
 - Elevated Route
 - Retained-Cut Route
 - Retained-Fill Route
 - Tunnel Route

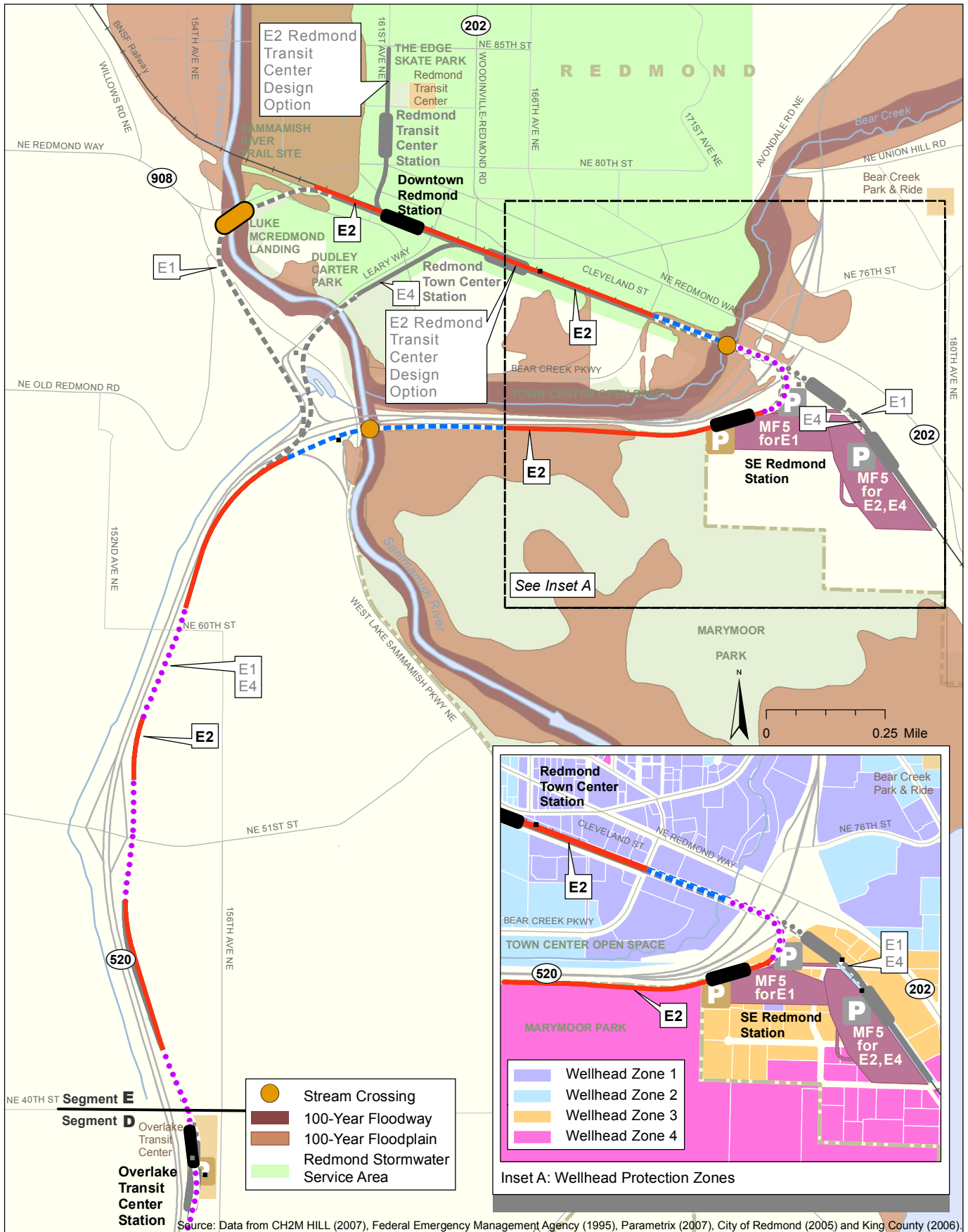
- Other Alternatives** **D3**
- At-Grade Route
 - Elevated Route
 - Retained-Cut or Retained-Fill Route
 - Tunnel Route

- Traction Power Substation
- Proposed Station
- Maintenance Facility and Access Track
- New and/or Expanded Park-and-Ride Lot



0 0.25 Mile

Exhibit 4.9-4
Water Resources
Segment D
 East Link Project



Preferred Alternative
 — At-Grade Route
 - - - Elevated Route
 ··· Retained-Cut Route
 ··· Retained-Fill Route
 - - - Tunnel Route

Other Alternatives
 — At-Grade Route
 - - - Elevated Route
 ··· Retained-Cut or Retained-Fill Route
 - - - Tunnel Route

■ Traction Power Substation
 ■ Proposed Station
 ■ Maintenance Facility and Access Track
 P New and/or Expanded Park-and-Ride Lot

Exhibit 4.9-5
Water Resources
Segment E
 East Link Project

4.9.2.4 Groundwater

With the exception of Beaux Arts Village and the City of Redmond, which are the only cities in the study area that get their municipal water primarily from groundwater, there is limited use of groundwater in the study area. Groundwater levels vary considerably throughout the project vicinity. Glacial till underlies much of the area at shallow depth. Water infiltrates slowly through this material. It is not uncommon during the rainy season for perched groundwater to pond at the surface. During the drier summer months, groundwater plays a critical role in providing base flow to the streams in the area and recharging aquifers.

The Sammamish Valley supports a productive aquifer that is used by the City of Redmond as a source of drinking water from several municipal wells. The closest municipal well is less than a quarter mile away in Anderson Park, on the north side of SR 202. Thus, the area south of Downtown Redmond is designated as a WPZ (see Exhibit 4.9-5). Such areas serve as recharge areas surrounding domestic wells. The City of Redmond has a Wellhead Protection Ordinance (Chapter 13.07) that specifies measures to minimize the threat of groundwater contamination. Four zones are defined that require increasingly stringent controls and reporting of industrial and related activities that handle or store hazardous materials. This issue is discussed further in Section 4.9.3.2, Impacts During Operation, under the heading Groundwater.

4.9.2.5 Maintenance Facility Surroundings

Each of the maintenance facilities identified in the alternatives would be located in an area that is mostly impervious surface comprising office, commercial, warehouse, and light industrial facilities. Each area is generally well-served with stormwater infrastructure. There are no surface water bodies close to the 116th Maintenance Facility (MF1) or the SE Redmond Maintenance Facility (MF5). A wetland lies along the northern edge of the BNSF Maintenance Facility (MF2). Goff Creek flows through the western portion of the SR 520 Maintenance Facility (MF3). A portion of MF5 lies within the City of Redmond's WPZ 3. Redmond's WPZs are discussed in Section 4.9.2.4 above.

4.9.3 Environmental Impacts

As part of the conceptual engineering prepared for the East Link Project, a preliminary design was developed for the major stormwater detention and treatment facilities required for the proposed alternatives. In general, a conservative approach was taken when

developing drainage concepts. Sound Transit applied the Western Washington Hydrology Model, developed by Ecology, to develop project hydrology and to determine facility sizing. Detention facilities were designed to achieve post-project stormwater flows equivalent to forested conditions, as required by Ecology. Further information on project stormwater can be found in Section 4.9.3.2, Impacts During Operation, under the heading Stormwater Treatment and Detention.

4.9.3.1 No Build Alternative

Under the No Build Alternative, some redevelopment and new development in the study area would still occur, with the potential to increase impervious surface and affect surface waters or groundwater flows, duration, and volumes.

Stormwater detention and treatment improvements would likely be delayed until future redevelopment occurs. Higher vehicle miles traveled is also expected under the No Build Alternative. This could result in more traffic, which can increase the amount of pollutants such as oils and heavy metals that, in turn, can degrade water quality.

As documented in Section 4.2, Land Use, a consequence of the No Build Alternative would be that a lower density of residential and commercial development would occur at key points along the proposed light rail corridor because the higher-density, transit-oriented development planned around light rail might not occur, or occur in less dense development patterns. By not building the East Link Project, some portion of this development would likely occur on the urban fringe rather than in the existing urban centers that would be served by the project. This type of development in less developed areas would result in an increase in impervious area and an associated increase in stormwater runoff in the urban fringe. Stormwater facilities associated with new development in the urban fringe area would reduce potential impacts on local streams; however, during the summer they could reduce stream flows, which could degrade water quality.

4.9.3.2 Impacts during Operation

Impacts of the build alternatives are presented by segment and address the following impacts on water resources: impervious area, stormwater treatment and detention, streams and floodplains, and groundwater.

Impervious Area Impacts Common to All Build Alternatives

Overall, the project would increase the amount of existing impervious surface area by approximately 16

to 35 acres, approximately 14 to 24 percent (including a maintenance facility), depending on the alternatives selected. The route with the lowest increase in impervious surface area would result from the combination of *Preferred Interstate 90 Alternative (A1)*, *112th SE Elevated Alternative (B2E)*, *106th NE Tunnel Alternative (C2T)*, *NE 16th Elevated Alternative (D2E)*, and *Redmond Way Alternative (E1)*, and MF3. The route with the greatest increase in impervious surface area would be *Preferred Alternative A1*, *Preferred 112th SE Modified Alternative (B2M)*, *Preferred 108th NE At-Grade Alternative (C11A)*, *SR 520 Alternative (D5)*, and *Preferred*

Marymoor Alternative (E2) (without the design option), and MF1.

Impervious surfaces can increase stormwater runoff rates, volumes, and

pollutant loads. These, in turn, can cause higher flows and degraded water quality in storm sewers and streams. Impervious surfaces can also result in decreased infiltration and aquifer recharge. New impervious areas from the project would include tracks and guideways, stations, park-and-ride lots, maintenance facilities, and roads. Ballasted (i.e., gravel) track sections were considered as impervious areas because of the high compaction and low permeability of the subsoils underlying the tracks.

Relocated roads to accommodate the project were also considered as project-associated impervious area because the new and replaced pavement would require stormwater treatment and detention. This includes surface roadways replaced after cut-and-cover tunnel construction. For those cases where elevated track would overlay a relocated road, the underlying impervious area of the road was not considered in the impervious area numbers (to avoid double-counting). Existing impervious area was obtained from a geographic information system (GIS) map of impervious areas developed in 2000 by King County (King County, 2004). This information was supplemented with aerial mapping conducted for the project. This represents the best impervious area data available for the study area.

Table 4.9-2 summarizes total existing and proposed impervious area within the project limits for each project alternative. The project limits include the right-

of-way for the rail corridor, relocated streets, the maintenance facility, and new project park-and-ride lots. Appendix F4.9 provides a further breakdown by both project alternative and basin. In general, elevated alternatives would result in less new impervious area than at-grade alternatives because they would be typically narrower and relocate fewer roads.

Alternatives with bored tunnels would also add smaller amounts of impervious area. However, tunnel alternatives with cut and cover construction, such as *Preferred 110th NE Tunnel Alternative (C9T)*, would result in more impervious surfaces.

Project pollutant-generating impervious surface (PGIS) comprises primarily roads parallel to the project route that would need to be reconstructed to accommodate the light rail tracks and road intersections with the at-grade rails. PGIS is also composed of access roads and parking areas at the project park-and-ride lots and the access roads, parking surfaces, and equipment maintenance and fuel and chemical transfer areas at the maintenance facilities. Project trackways, guideways, and stations are considered non-PGIS. Project trackways are only considered PGIS when combined with roadways, which carry pollutants from vehicular use. Since the portion *Preferred Alternative A1* east of the Mount Baker Tunnel (more than 5 miles) would be converted from high-capacity vehicle use to exclusive use by light rail, there would be a substantial decrease (about 35 acres) of PGIS for this segment. Other alternatives also convert portions of roadways that are now PGIS to exclusive light rail use. However, since these alternatives are near or comingled with automobile roadways, they are assumed to be PGIS for purposes of stormwater treatment. Some proposed project parking surfaces would contribute between 4 and 5 acres of PGIS unless the area is already PGIS, such as South Bellevue Park-and-Ride Lot or Overlake Transit Center. Elevated alternatives have little to no need for road reconstruction and, thus, would have relatively low PGIS values. For instance, the *112th NE Elevated (C7E)* and the *110th NE Elevated (C8E)* Alternatives have zero PGIS. In contrast, at-grade alternatives within urban settings (such as the *Bellevue Way Alternative [B1]*, *112th SE At-Grade Alternative [B2A]*, *Preferred Alternative C11A*, *110th NE At-Grade Alternative [C9A]*, and *NE 20th Alternative [D3]*) frequently require relocating multiple lanes of roadway parallel to the alternative, which would result in a relatively large PGIS. Stormwater runoff from project-related PGIS would receive water quality treatment as discussed in the section below titled *Stormwater Treatment and Detention*.

Pollutant-Generating Impervious Surface

Impervious surfaces are considered a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to vehicular use; industrial activities (as defined in the Ecology Manual); and storage of erodible or leachable materials, wastes, or chemicals; and which receive direct rainfall or the run-on or blow-in of rainfall.

TABLE 4.9-2
Existing and Proposed Impervious Areas by Project Build Alternative

Segment/Alternative	Total Existing Impervious Area (acres) ^a	Total Proposed Impervious Area (acres) ^{a, b}	Total Change in Impervious Area (acres) ^{a, c}	Total Impervious Area Increase (percent) ^a
<i>Preferred Interstate 90 Alternative (A1)</i>	42.4	43.1	0.6	2
<i>Preferred 112th SE Modified Alternative (B2M) to C11A</i>	15.2	23.9	8.6	57
<i>Preferred 112th SE Modified Alternative (B2M) to C9T</i>	10.8	19.2	8.4	77
Bellevue Way Alternative (B1)	21.5	27.7	6.2	29
112th SE At-Grade Alternative (B2A)	17.1	22.6	5.5	32
112th SE Elevated Alternative (B2E)	10.8	14.5	3.7	35
112th SE Bypass Alternative (B3)	15.0	20.0	5.0	33
B3 - 114th Extension Design Option	15.0	20.4	5.4	36
BNSF Alternative (B7)	13.4	17.3	3.9	29
<i>Preferred 108th NE At-Grade Alternative (C11A)</i>	23.4	28.2	4.9	21
<i>Preferred 110th NE Tunnel Alternative (C9T)^d</i>	15.0	19.9	4.9	33
Bellevue Way Tunnel Alternative (C1T)	9.7	10.2	0.5	6
106th NE Tunnel Alternative (C2T)	6.5	7.0	0.5	8
108th NE Tunnel Alternative (C3T)	2.4	3.2	0.7	31
Couplet Alternative (C4A)	11.9	14.6	2.7	23
112th NE Elevated Alternative (C7E)	4.2	5.7	1.5	35
110th NE Elevated Alternative (C8E)	4.9	6.8	1.9	38
110th NE At-Grade Alternative (C9A)	24.1	28.8	4.7	19
114th NE Elevated Alternative (C14E)	15.7	18.5	2.8	18
<i>Preferred NE 16th At-Grade Alternative (D2A)^e</i>	25.8	36.4	10.7	41
D2A - NE 24th Design Option	28.2	38.4	10.3	36
NE 16th Elevated Alternative (D2E)	14.5	23.4	8.9	61
NE 20th Alternative (D3)	29.6	39.4	9.8	33
SR 520 Alternative (D5)	8.5	21.0	12.5	147
<i>Preferred Marymoor Alternative (E2)</i>	18.1	23.9	5.8	32
E2 - Redmond Transit Center Station Design Option	16.8	21.2	4.4	26
Redmond Way Alternative (E1)	16.9	21.1	4.2	25
Leary Way Alternative (E4)	15.5	20.8	5.3	34
MF1, 116th	8.0 to 9.2	11.7	2.5 to 3.7	27 to 46
MF2, BNSF	11.5 to 16.4	11.1 to 12.7	-0.4 to -3.7	-3 to -23
MF3, SR 520	13.8 to 14.5	12.8	-1.0 to -1.7	-7 to -12
MF5, SE Redmond	11.2 to 13.6	13.5 to 15.5	1.8 to 2.3	14 to 21
Project Totals^f	88.8 to 142.8	114.3 to 174	16.2 to 34.9	15 to 31

^a Range includes the variation in connections evaluated for the maintenance facilities.

^b Includes reconstruction of existing roads.

^c Approximate due to rounding.

^d The C9T - East Main Station Design Option connecting from *Preferred Alternative B2M* would not result in a change to impacts for either *Preferred Alternative C9T* or *B2M*.

^e Impacts for D2A - 120th Station Design Option would not vary from those of *Preferred Alternative D2A*.

^f Numbers in this row are derived from different combinations of segments in each column.

Segment A

Preferred Alternative A1 and the portion of Segment B within the Beaux Arts basin (see Exhibit 4.9-1) would be constructed completely within the existing I-90 corridor. There would be a limited amount of additional impervious area (0.6 acre, less than a 2 percent increase).

Segment B

Both variations of *Preferred Alternative B2M* add about 8.5 acres of new impervious area, the largest increase of the Segment B alternatives. *Preferred Alternative B2M* would increase impervious areas by 77 percent with the C9T connector and by 57 percent with the C11A connector.

The remaining Segment B alternatives would add between 3.7 and 6.2 acres of impervious area (a 29 percent to 36 percent increase in impervious area). Alternative B2E would add the least amount of impervious area.

Segment C

Preferred Alternatives C11A and *C9T* would add the most impervious area (4.9 acres, a 21 percent and 33 percent increase, respectively) of the Segment C alternatives, primarily along 112th Avenue NE.

Other Segment C alternatives would result in a 6 percent to 38 percent increase in impervious area. New impervious area added by these alternatives would range from a low of 0.5 acre with Bellevue Way Tunnel Alternative (C1T) and Alternative C2T, to a high of 4.7 acres with Alternative C9A.

Segment D

Preferred NE 16th At-Grade Alternative (D2A) would add between 10.3 and 10.7 acres of impervious area, depending upon the design option selected, which would increase impervious area by approximately 36 percent to 41 percent.

Alternative D5 would result in the largest increase in new impervious area (12.5 acres, a 147 percent increase) of all the Segment D alternatives because it would be routed through the largely less developed portion of the corridor immediately south of SR 520. Alternatives D2E and D3 would result in 8.9 acres and 9.8 acres of new impervious area. Alternatives D2E and D3 would result in a 61 percent and 33 percent increase in impervious area, respectively.

Segment E

Preferred Alternative E2 and *E2 - Redmond Transit Center Station Design Option* would add 4.4 to 5.8 acres of impervious area (a 26 percent to 32 percent increase), which is the largest increase in impervious area of the Segment E alternatives.

Alternative E1 would have the smallest impervious area increase in Segment E (4.2 acres, a 25 percent increase).

Maintenance Facilities

The MF1 and MF5 would result in a local increase in impervious area. Because of the highly developed nature of the areas proposed for the MF2 and MF3, selecting either facility would result in a net local decrease in impervious area. This is because these two maintenance facilities would result in more landscaped, pervious area than currently exists in the respective areas. Impervious surfaces at maintenance facilities would be PGIS except for sidewalks, roofs, and tracks that are not crossed by motor vehicles.

Stormwater Treatment and Detention

In general, stormwater management would meet the requirements of the Ecology Manual. Within WSDOT right-of-way, the requirements of the *Highway Runoff Manual* (WSDOT, 2008) would be met, which is equivalent to Ecology's manual. In addition, local jurisdiction requirements for stormwater management would be met.

Runoff from PGIS areas would require basic water quality treatment. In accordance with the Ecology Manual, Sound Transit would provide enhanced stormwater treatment for all roadways where the average daily traffic volume exceeds 7,500 vehicles per day. Enhanced stormwater treatment would be provided for runoff from any new and replaced pavement on these high traffic volume streets.

The guideways and stations have no motor vehicle traffic or other sources of pollution-generating activities and are therefore classified as non-PGIS, except where at-grade track crosses intersections. No stormwater treatment facilities would be required in these areas.

Certain water bodies have been designated by Ecology as exempt from requiring detention, including Lake Washington, Mercer Slough, Lake Sammamish, and the Sammamish River. Prior to discharge from the

Stormwater Detention

The temporary storage of stormwater runoff and subsequent release at a slower rate.

Stormwater Treatment

Stormwater ponds and underground vaults are used to remove sediments and pollutants from stormwater. They collect sediments on the bottom of the pond or vault, where maintenance workers can clean them out on a regular basis.

Total Suspended Solids

Organic and inorganic particles that are entrained within and carried by water. The particles are typically sand, silt, and clay, but may include pebbles and larger rocks in fast-flowing water.

project site, stormwater detention to predevelopment (i.e., forested) levels would be provided for project runoff flowing to the remaining (nonexempt) water bodies, which includes the other study area water bodies except for Sturtevant Creek. Sturtevant Creek lies within a basin designated an urban basin by the City of Bellevue. As a result, project runoff within this basin need only be detained so as to maintain existing peak flows. Non-PGIS runoff would be conveyed separately from PGIS runoff because it does not require water quality treatment. Where practical, runoff would be dispersed over pervious areas from elevated guideways where infiltration could occur. The East Link Project conceptual design for major stormwater facilities, including stormwater ponds and underground vaults, can be found in Appendix G1. As shown in Appendices F4.9 and G1, stormwater detention and treatment facilities (on-site systems such as vaults or ponds) have been sized for the project alternatives. However, in some basins, an alternative approach is to contribute to regional detention or treatment facilities where allowed by the local jurisdiction.

Most of the East Link Project lies within highly urbanized areas, with limited undeveloped area available for surface detention. As a result, most of the stormwater facilities would be within underground vaults. Project runoff in the Downtown Redmond Stormwater Service Area would require neither project-related detention nor treatment facilities because it would be within the Redmond Stormwater Service Area. Project runoff in the Downtown Bellevue Stormwater Service Area in Segments C would only require project-related treatment facilities for the PGIS areas. The stormwater facilities provided by the project would meet the requirements of the local jurisdictions. As a result, stormwater impacts from the project would not be significant. (Appendix F4.9 presents a tabular summary of the project stormwater facilities and compares the alternatives.)

For *Preferred Alternative D2A*, a storage track is planned in the former BNSF Railway corridor, with office space, storage, and parking for vehicle operators. The only anticipated work would be light cleaning of the interiors of the trains. No wastewater would be discharged into the surrounding storm facilities.

With *Preferred Alternative E2*, WSDOT is proposing to reconfigure an Ecology embankment (also referred to as a media filter drain) that borders Marymoor Park and treats runoff from SR 520. Sound Transit proposes reconstructing the highway shoulder and moving the Ecology embankment from the shoulder to the

highway median. Stormwater treatment would be provided using a dual filter drain (BMP RT.07.2 of the *Highway Runoff Manual*, WSDOT, 2008). This approach would meet the highway requirements while also providing the required treatment of highway runoff using less land area.

Sound Transit's Environmental and Sustainability Management System encourages innovative measures to reduce stormwater runoff, such as low-impact development or other on-site measures, to be incorporated into the project where feasible. Some opportunities exist for runoff to be dispersed to adjacent natural areas. Other measures could include, but are not limited to, the following and will be considered during detailed design:

- Flow dispersal of runoff from at-grade trackways where they lie adjacent to Mercer Slough in Segment B
- Permanent landscaping of areas above tunnel segments in Segment C following construction
- Drip-dispersion of runoff from elevated guideway along portions of SR 520 that remain landscaped in Segment D

The proposed maintenance facility is categorized as an industrial facility. In addition to motor vehicle traffic, petroleum products and other chemicals would be stored and used at the site, and there would be other maintenance activities as well. Therefore, to meet the requirements of the Ecology Manual, a strategy of enhanced stormwater treatment would be implemented at the maintenance facility. A constructed stormwater wetland would provide the enhanced stormwater treatment for the maintenance facility. On-site stormwater detention would also be provided.

Surface Water and Floodplain Impacts Impacts Common to All Alternatives

As discussed in Section 4.8, Ecosystem Resources, considerable effort was made during development of the alternatives to avoid critical areas, including streams and lakes, because changes to water bodies can have substantial adverse impacts on aquatic ecosystems, floodplains, and real estate property. This section discusses water features that would be unavoidably impacted by the project.

Floodplains and floodways are subject to federal and local regulations. A floodplain is defined as the area adjacent to a stream or river that is inundated during the 100-year flood event. The floodway is the stream channel and adjacent portions of the floodplain that must be reserved in order to discharge the base flood

elevation (100-year flood) without increasing the water surface elevation more than 1 foot. The City of Redmond generally prohibits floodway encroachment unless mitigating measures achieve zero rise in the floodway, or base flood elevations increase less than 1 foot and significant environmental impacts are mitigated (Ordinance 2259). The City of Bellevue prohibits construction that results in any rise of the base flood; an exception is construction using post-and-piling techniques, which is presumed without modeling to cause no rise in the base flood (Ordinance 5680). Fill within the 100-year floodplain must be mitigated by excavating an equal volume of material from within a proximate portion of the FEMA floodplain and at a comparable elevation to create “compensatory storage.”

The East Link Project would generally employ elevated guideways to cross water bodies at a number of locations (Exhibits 4.9-1 through 4.9-5). The exact location of columns to support the elevated guideway would be determined during design, but columns would be located outside the stream channel floodway or floodplain when it is possible to span these areas. In general, an elevated guideway crossing of a stream, floodplain, or floodway would cause little or no impact. Impacts on specific streams are discussed below.

Segment A

No impacts on streams, floodplains, or floodways would occur within Segment A.

Segment B

Preferred Alternative B2M is located outside of the Mercer Slough floodplain and, therefore, would result in no adverse impact.

Alternative B7 would cross approximately 415 feet of the Mercer Slough floodplain just north of I-90. A minimum of two columns would be located in the floodplain but not within a waterway channel. Compensatory storage requirements would be minor with no adverse impact. Alternative B3 - 114th Extension Design Option and BNSF Alternative (B7) would cross Sturtevant Creek north of SE 2nd Street on an elevated structure and would not impact the creek. There would be no impacts with the other Segment B alternatives.

Segment C

With *Preferred Alternatives C11A* or *C9T*, Sturtevant Creek would be relocated from the east to the west side of the former BNSF Railway corridor to route the channel around the proposed Hospital Station. This would require installing a new culvert under the NE 8th Street right-of-way and the abandonment of the

existing culvert. The new stream would convey the 100-year flow as defined by the City of Bellevue. These two alternatives also cross Sturtevant Creek just south of the NE 8th Street/ I-405 interchange. The creek is in a pipe at this location. A bridge column would be placed in the location where the creek pipe makes a sharp turn. The pipe would be relocated to avoid the bridge column and to allow for future interchange improvements by WSDOT.

Preferred Alternatives C11A or *C9T* connecting to Alternative B3 or Alternative B7 follow Sturtevant Creek for approximately 500 feet and 700 feet, respectively, where Sturtevant Creek first parallels 114th Avenue NE (see Exhibit 4.9-3). The alternatives are elevated through this reach on supporting columns, and supporting columns would be located in the creek’s riparian buffer zone, thus avoiding the creek channel. In addition, because a FEMA flood insurance rate map has not been developed for this section of creek, the 100-year floodplain would need to be determined through modeling during final design. The upstream area draining to the creek is of modest size, approximately 400 acres. High flows in the creek would be limited, and the 100-year floodplain would likely be narrow. As stated above, the project design would avoid placing support columns for the elevated guideway in the channel or its streambanks, thereby avoiding disturbance of the creek and minimizing impacts on the floodplain.

The Sturtevant Creek impact near Lake Bellevue for *Preferred Alternatives C11A* or *C9T* would also occur under Alternatives C1T, C2T, C9A, or C14E.

The Sturtevant Creek riparian impact described above for *Preferred Alternatives C11A* and *C9T* would also occur for the other Segment C alternatives that connect from Alternatives B3 and B7, i.e., all Segment C alternatives except C1T.

Segment D

With the exception of *Preferred Alternative D2A* (discussed below), the Segment D alternatives and design options would have no permanent impact on the floodplains or floodways. However, there would be project crossings at several tributaries of Kelsey Creek – West Tributary, Goff, Valley, and Sears Creeks. These are shown in Figure 4.9-4 and Table 4.9-3 and are discussed in this section.

Preferred Alternative D2A crosses four streams in Segment D. It is routed along a portion of the West Tributary of Kelsey Creek. Four columns are proposed within a large impoundment of the stream that serves as a regional detention pond. The pond is greater than 100 feet wide at this point; therefore, the impact of the

TABLE 4.9-3
Segment D Stream Crossings by Alternative

Stream	Preferred Alternative D2A	Alternative D2E	Alternative D3	Alternative D5
West Tributary of Kelsey Creek	Elevated crossing with 4 columns placed within a stream impoundment	Elevated crossing	Elevated crossing	Elevated crossing
Goff Creek	Crosses at an existing piped stream that would not be disturbed ^a	Elevated crossing at an existing stream culvert	Crosses at an existing piped stream that would not be disturbed ^a	Elevated crossing
Unnamed Tributary to Kelsey Creek	Portion of stream would be enclosed in a longer pipe	Portion of stream would be enclosed in a longer pipe	Portion of stream would be enclosed in a longer pipe	None
Valley Creek	Elevated crossing	Elevated crossing	Existing culvert would be replaced with a bridge	Elevated crossing
Sears Creek	None	None	Crosses at an existing stream culvert that would not be disturbed	None

^aA box culvert would be constructed under the alternative to support future city plans to daylight Goff Creek.

columns on the flood storage and conveyance capacity of the creek would be negligible.

Preferred Alternative D2A crosses Goff Creek at NE 16th Street where the stream is currently conveyed in a pipe. It is not anticipated that this pipe would be disturbed during project construction. However, a box culvert would be constructed allowing for the eventual daylighting of Goff Creek as planned by the City of Bellevue. *Preferred Alternative D2A* crosses Valley Creek on an elevated structure over the SR 520 culvert, and it would not affect Sears Creek.

Preferred Alternative D2A would affect a 130-foot-long open channel and a 0.2-mile piped segment of the Unnamed Tributary to Kelsey Creek (see Exhibit 4.9-4). This stream reach carries local runoff and is conveyed through a series of culverts and ditches along 136th Place NE. Most, if not all, of the flow of the creek is routed through a 24-inch-diameter storm drain pipe at 136th Avenue NE and NE 16th Street. *Preferred Alternative D2A* would require widening 136th Place NE. The road passes through a highly commercialized area, and widening the road would eliminate the ditches, thereby enclosing the entire stream in a pipe through this section. The long-term water quality and flow impacts would not be affected by this change. As indicated in Table 4.9-3, Alternative D2E would have elevated crossings at three streams. There would be no stream impacts at three of these crossings. Due to column placement, a portion of the Unnamed Tributary to Kelsey Creek would need to be piped. Alternatives D2E and D3 would impact the same 130 feet of open channel and 0.2-mile piped segment of the Unnamed Tributary to

Kelsey Creek along 136th Place NE, as described for *Preferred Alternative D2A*.

Alternative D3 would cross five streams. Alternative D3 would be in a retained cut where it crosses Valley and Sears Creeks. The Sears Creek culvert is approximately 12 feet below the retained cut and would not be affected. The Valley Creek culvert at NE 20th Street is a 6-foot-diameter metal culvert with between about 1 and 1.5 feet of cover. If Alternative D3 is selected, then the existing culvert would need to be replaced with a fish-passable bridge extending 30 feet downstream of the existing culvert outlet, as shown in Exhibit 4.9-4, Inset B. Like D2E, Alternative D3 would result in the piping of a portion of an unnamed tributary to Kelsey Creek.

Alternative D5 would have elevated crossings at three streams and would therefore have no stream impacts.

Segment E

Preferred Alternative E2 would cross the Sammamish River north of Marymoor Park. This alternative would be elevated at the crossing location (see Exhibit 4.9-5), where the floodway is about 235 feet wide and the floodplain is about 3,050 feet wide. At least one column would be located in the floodway, but flooding impacts would be negligible.

Compared to the other Segment E alternatives, the largest amount of fill placed within a floodplain would be required for *Preferred Alternative E2*, where a 1,000-foot-long, at-grade segment in the floodplain adjacent to SR 520 would displace approximately 650 cubic yards of soil below the 100-year water surface elevation. The average depth of fill below the 100-year

water elevation would be less than 0.5 foot. *Preferred Alternative E2* would include compensatory storage as required to offset the impacts of any fill placed within floodplains.

Compensatory storage could consider enhancing Marymoor Park through grading, or areas along the Sammamish River north of SR 520.

Preferred Alternative E2 would cross Bear Creek along the route of the former BNSF Railway corridor, located about 250 feet downstream from NE Redmond Way. The existing former BNSF Railway bridge opening creates a channel constriction. Flood modeling performed for the creek (Parametrix, 2007) indicates that the 100-year flood elevation upstream from the bridge is 39.6 feet, approximately 1.5 feet higher than downstream from the bridge. *Preferred Alternative E2* would span Bear Creek on a bridge extending for a distance of about 100 feet on either side of the center of the 30-foot bridge opening. The existing embankment for the former BNSF railroad would be widened to about 50 feet to accommodate both retained fill for the track and a 15-foot-wide parallel strip for a bicycle path (to be constructed by others). The old railroad bridge structure would remain in place, and the geometry of the stream channel would not be changed. The lowest portion of the proposed light rail bridge would be at least 3 feet above the 100-year flood elevation of Bear Creek. The potential future shift in the *Preferred Alternative E2* alignment to accommodate the City of Redmond's utility project and the regional trail could change the position of the crossing over Bear Creek but is unlikely to change the relation to the flood elevation.

The fill placed along the railroad embankment would displace approximately 150 cubic yards of floodplain storage. Compensatory storage would be provided near the edge of the floodplain near the rail crossing. The existing stream opening would remain unaltered. Two culverts about 60 feet south of the bridge would remain as they are. If disturbed during guideway construction, these culverts would be replaced at their existing locations and elevations. In summary, the new project bridge would not permanently impact Bear Creek. The existing stream opening would remain unaltered. Although the height of the existing railroad embankment would be raised by the retained fill, this would not affect the flow conditions through the bridge because the embankment lies above the 100-year water surface elevation and is not overtopped during flood conditions. The flow conditions and flood water surface elevations near the bridge would remain unchanged.

Alternative E1 and the Leary Way Alternative (E4) would also cross Sammamish River and Bear Creek at similar locations as *Preferred Alternative E2* and would therefore have the similar impacts.

Similar to *Preferred Alternative E2*, Alternatives E1 and E4 would cross the Sammamish River north of Marymoor Park. Both alternatives would be elevated at their crossing locations (see Exhibit 4.9-5). Where the two alternatives cross the Sammamish River, the floodway width is about 600 feet (for Alternative E1) and 200 feet (for Alternative E4). Similar to *Preferred Alternative E2*, under either Alternatives E1 or E4, at least one column would be located in the floodway, but flooding impacts would be negligible.

Alternative E1 would have an elevated crossing over Bear Creek along the route of the inactive, former BNSF Railway bridge. Constructing columns on this embankment would minimally impact the floodplain and would not change the existing Bear Creek channel. Similar to *Preferred Alternative E2*, Alternative E4 would span Bear Creek on a bridge. Impacts on Bear Creek from Alternatives E1 and E4 would be similar to those described above for *Preferred Alternative E2*.

Maintenance Facilities

MF3 would be constructed at an existing business park through which Goff Creek flows, as shown in Exhibit 4.9-4 (see Inset A). The west side of MF3 would extend over the creek. Sound Transit would consider two approaches in final design to accommodate the creek that could potentially improve Goff Creek. In the first approach, the creek would remain in its present location, and two short, fish-passable bridges would be constructed under the rail loop on the western end of MF3 to accommodate the creek. A 50-foot-wide riparian buffer would be established on each side of the creek. In the second approach, the stream would be relocated around the west side of MF3, which would increase the length of the stream by about 220 feet.

The Bel-Red Corridor Study identifies redevelopment opportunities for this area (City of Bellevue, 2007b). The riparian buffer mentioned above would be compatible with redevelopment plans identified in the Bel-Red Corridor.

MF2- borders a wetland. The wetland buffers discussed in Section 4.8.3 (Ecosystem Resources) would provide adequate protection against water quality impacts. No other water bodies would be impacted by the other maintenance facilities.

Groundwater

The project could impact groundwater in a number of ways. Adding impervious surface could reduce the amount of infiltration into the soil and reduce groundwater recharge. Reduced groundwater recharge could also result in reductions in the base flows of streams in the project area. Overall, the project would increase the amount of existing impervious surface area by approximately 16 to 35 acres, depending on the alternatives selected. Because of the highly linear nature of the project, this impact would occur across many miles of project path, the groundwater level would not likely substantially decline, and other serious groundwater impacts are not anticipated.

Additionally, interrupting groundwater flows may result in adverse impacts by changing the amount of water that eventually reaches the surface and the location where groundwater surfaces. There are three areas where this project may affect groundwater: (1) in retained-cut areas along *Preferred Alternative B2M*, (2) at the tunnels under Downtown Bellevue in Segment C and (3) in Redmond. These potential impacts are discussed below.

Retained Cut

Portions of *Preferred Alternative B2M* would be constructed in retained cuts along Bellevue Way SE. Without mitigation, the concrete-lined retain cuts could intercept and re-direct local groundwater flow, with potential impacts on down-gradient wetlands and surface water features. Mitigation for this potential impact is discussed in Section 4.9.4.2 below.

Tunnel Seepage

Several alternatives in Segment C involve constructing tunnels under Downtown Bellevue. When constructing tunnels, a drainpipe would be installed to convey groundwater that might seep into the tunnel. The tunnel design criteria for the Central Link Project (the previously constructed Pine Street Stub tunnel) stipulated no greater than 0.2 gallon per minute per 250 feet of tunnel. When similar criteria are applied to the four Bellevue tunnel alternatives (*C9T*, *C1T*, *C2T*, or *C3T*), they are estimated to collect between 6 to 7 gallons per minute (gpm) of tunnel seepage. The seepage rate for the tunnel would be tightly controlled using the same techniques as used for the Central Link Project. These small flows would flow into a storm drain system and be discharged outside of the tunnel to the local stormwater system. This would not be expected to substantially affect the groundwater level in the central Bellevue area.

Redmond Wellhead Protection Zone

As stated in Section 4.9.2.4, the City of Redmond identifies four WPZs. Zones 3, 2, and 1, respectively, lie in increasing proximity to the City's municipal wells and, therefore, have increasingly stringent requirements to protect the underlying aquifer from contaminants that might be introduced as a result of land use activities, Zone 1 being the most stringent. All Segment E alternatives would cross through all four WPZs. As shown in Exhibit 4.9-5, the proposed route and station alternatives in Downtown Redmond would lie within Zones 1 and 2. There would be no vehicle maintenance nor storage or use of hazardous materials associated with the light rail tracks and the stations. Project runoff would be directed to the existing regional stormwater management system for treatment and discharge to the Sammamish River. The project would, therefore, result in no additional impact on the area's groundwater.

South of Bear Creek, the SE Redmond Park-and-Ride Lot and the MF5 would lie within Zone 3. There would be vehicle maintenance work, and some fuels and hazardous materials would be stored at the maintenance facility. The soils in this area are permeable. Runoff from these project facilities would be collected, treated, and infiltrated on site, as is the current practice within this area. The Redmond City Code (WPZ Performance Standards) lists the requirements for stormwater management for developments within Zone 3. Applicable provisions that would be incorporated into project design to protect groundwater quality include the following:

- Containment and treatment of runoff from vehicle fueling, maintenance, and storage areas
- Secondary containment for hazardous materials unloading and storage areas
- Stormwater best management practices (BMPs) approved by the City's Technical Committee

These measures would protect groundwater quality. Standard stormwater BMPs would be required for WPZ4 and would be implemented as discussed below in Section 4.9.3.3.

Best Management Practices

BMPs are activities, construction measures, maintenance procedures, and structural and/or managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to surface and groundwater.

4.9.3.3 Impacts during Construction

Impacts Common to All Build Alternatives

The potential water quality impacts resulting from construction activities would be increased turbidity and sedimentation in the receiving streams as a result of stormwater runoff from disturbed construction sites. Erosion and sedimentation typically occur when rainfall and stormwater runoff erode soil and deposit the eroded materials downslope or downstream from the construction area. Erosion and sedimentation can result from a variety of potential actions associated with construction, including the following:

- Removing vegetation that exposes soil to erosion
- Exposing soil by way of grading, filling, and excavation
- Tracking soils onto roads by vehicles
- Constructing in or near wetlands, lakes, streams, or drainage courses
- Constructing slopes that collect and concentrate stormwater, causing erosion
- Dewatering excavations such as pier foundations, trenches and tunnels

The runoff from newly poured concrete surfaces can have a high pH (parts hydrogen), often above pH 9, which can result in degraded water quality and is lethal to fish. In addition, total suspended solids from the concrete fines might result in a milky-white appearance of the runoff, exceeding turbidity requirements. Both of these issues were encountered during Central Link Project construction.

Because the total amount of ground disturbance during construction would be more than 1 acre, an NPDES general construction stormwater permit would be required for this project. One of the permit requirements is a project-specific stormwater pollution prevention plan (SWPPP). The SWPPP would be developed and implemented in accordance with the Sound Transit Environmental and Sustainability Management System. This plan would include a temporary erosion and sediment control plan (TESC), a hazardous materials management plan, and would employ BMPs during construction to minimize the potential for soil erosion and sedimentation and to protect water quality. Potential BMPs include the following:

- Minimizing the amount of cleared area at a construction site
- Stabilizing construction entrances and haul roads using quarry spalls

- Washing truck tires at construction entrances, as necessary
- Constructing silt fences downslope from exposed soil
- Protecting catch basins from sediment
- Containing and controlling concrete and hazardous materials on site.
- Installing temporary ditches to route runoff around or through construction sites, with periodic straw bales or rock check dams to slow and settle runoff
- Providing temporary plastic or mulch to cover soil stockpiles and exposed soil
- Using straw wattles to reduce the length of unbroken slopes and minimize runoff concentration
- Using temporary erosion control blankets or mulch on exposed steep slopes to minimize erosion before vegetation is established
- Constructing temporary sedimentation ponds to remove solids from concentrated runoff and dewatering before being discharged
- Conducting vehicle fueling and maintenance activities no closer than 100 feet from a water body or ditch

A TESC plan also would include a water quality monitoring plan and a schedule for inspecting the erosion control measures for effectiveness. Water from dewatering, such as from tunnels or guideway pier construction, would be treated as required to meet discharge requirements identified on the SWPPP or hauled off site for proper disposal. Pavement slurry and residue from road cutting and grinding would be collected and properly disposed of off site, and a concrete containment and disposal plan would also be prepared. An Ecology-certified erosion and sediment control lead (CESCL) would be employed to conduct the inspections, and deficiencies would be promptly corrected. These measures would minimize the likelihood for serious water quality problems occurring during construction.

The concrete used for the project would need several months to cure enough so that the pH decreases to acceptable levels. Stormwater runoff would be tested, and if excessive levels of pH or turbidity are found, then the water quality of the runoff would be treated before it is released to storm sewers or a receiving water body. If discharge of treated construction or process water to a sanitary sewer is proposed,

approval must be obtained from the King County Industrial Waste Division and the local jurisdiction.

For construction within and over streams or other water bodies, a Hydraulic Project Approval (HPA) would be required. The HPA would be obtained from WDFW before work begins. The project would comply with the HPA's stream protection measures, including diverting stream flow around the construction area and limiting the construction period to the required "work window," a period of the year identified in the HPA when fish would be minimally affected.

Segment A

Preferred Alternative A1 would be constructed within the I-90 corridor. Nearly all construction would occur within the existing roadbed of I-90 and would, therefore, not be expected to pose a substantial erosion risk.

Preferred Alternative A1 would cross over a large area that is designated as an erosion-hazard area in Mercer Island. Clearing, grading, and other construction-related activities in areas with steep slopes or unstable soils has the potential to cause severe erosion problems. No further construction impacts would be anticipated.

Segment B

Preferred Alternative B2M involves construction activity adjacent to Mercer Slough, including constructing a retained cut structure near the Winters House. This poses a sedimentation hazard to the slough. However, the BMPs listed in the previous subsection would provide adequate protection against water quality degradation.

Alternative B7 would be constructed over Mercer Slough. In addition to measures listed above, construction inside Mercer Slough Nature Park and over the slough waterway would include building a stilt and plank temporary roadway to reduce compressing the soils and limiting construction material into and adjacent to Mercer Slough. Dewatering water from pier excavations would be either treated prior to release to remove suspended solids or hauled off site for proper disposal.

Similar measures would also be used to minimize the impact of the elevated portion of the 112th SE Bypass Alternative (B3) that would traverse a large wetland south of SE 6th Street.

Alternative B7 would cross a steep area that is more than 1 mile long, located along the east side of Mercer Slough and west of I-405. However, this portion of the alternative would be constructed within a railroad bed

where only minor grading and minimal hillside disturbance would occur.

The other Segment B alternatives that follow Bellevue Way SE would have similar impacts as those described for *Preferred Alternative B2M*.

Segment C

Groundwater seepage from tunnel boring activities for *Preferred Alternative C9T* could be up to 250 gpm; this is typical of other projects with deep underground parking structures or foundations that have recently been constructed in Downtown Bellevue. The existing storm drainage system has adequate capacity to accept this quantity of pumped groundwater. Prior to discharge, the collected groundwater would be treated to meet city discharge requirements before it is discharged into the storm drainage system.

The other Segment C alternatives would have similar impacts as those described above for *Preferred Alternatives C11A* and *C9T*. Groundwater impacts due to seepage from tunnel boring activities for Alternative C2T or 108th NE Tunnel Alternative (C3T) would be similar to those discussed above for *Preferred Alternative C9T*.

Any of the Segment C alternatives that connect from Alternative B3, B3 - 114th Design Option, or Alternative B7 would involve constructing four guideway columns close to Sturtevant Creek channel, north of SE 6th Street. The stream could experience substantial siltation during construction. BMPs discussed earlier in this section would reduce the potential for this impact. An HPA would be required and obtained from the WDFW. Stream protection measures are further discussed in Section 4.8, Ecosystems Resources, and would provide adequate protection of water quality in Sturtevant Creek during construction.

Segment D

Preferred Alternative D2A would construct several columns within the impounded section of the West Tributary of Kelsey Creek. The stilt and plank temporary roadway and proper treatment/disposal of pier excavation water discussed in Segment B would also be carried out at this location. No further construction impacts would be anticipated with *Preferred Alternative D2A* or the D2A design options.

Alternative D3 would require the reconstruction and extension of the Valley Creek culvert under NE 20th Street. Temporary creek relocation and related stream protection measures specified in an HPA obtained for this crossing would ensure that creek water quality was adequately protected. There would be no impacts related to Alternatives D2E or D5.

Segment E

Preferred Alternative E2 includes construction activity along the SR 520 corridor as well as construction activity related to the Sammamish River and Bear Creek crossings. Construction stormwater BMPs and measures stipulated in the HPAs for these stream crossings would be implemented to reduce impacts on these two watercourses.

The other Segment E alternatives would have similar impacts as those described above for *Preferred Alternative E2*.

Maintenance Facilities

The BMPs presented previously under Impacts Common to All Build Alternatives would generally apply to the construction of the maintenance facility. A wetland lies on the north side of the MF2, and Goff Creek flows through the west side of the MF3. Construction could impact these water bodies. Potential impacts would be minimized by implementing BMPs, adhering to the HPA requirements for relocating Goff Creek, and adhering to the buffer recommendations in Section 4.8.3.

4.9.4 Potential Mitigation Measures

A number of regulatory requirements for addressing water resource impacts would be part of the project design, as discussed in Section 4.9.3. Where the project alternatives would result in adverse impacts after the application of minimization measures included in the project design, further mitigation would be necessary as described below.

During final design, opportunities for regional management of project stormwater and on-site control of stormwater runoff would be explored. The project design team would work with local jurisdictions to identify opportunities to incorporate low-impact development features into the project, including consideration of runoff dispersion, permeable pavement, green roofs, and other measures to retain rainfall on site and minimize project runoff. Stormwater management and treatment principles of Low-Impact Development (LID) will be favored over “traditional” stormwater treatment and applied wherever feasible.

For *Preferred Alternative B2M*, the sealed, concrete-lined retained cut constructed near Mercer Slough would prevent groundwater from entering the retained cut but allow groundwater to flow down-gradient beneath the cut. This would maintain the existing groundwater flow toward the Slough and sustain down-gradient wetlands and other surface water features.

If any of the Segment C alternatives that connect from Alternatives B3 or B7 were to be selected, then the elevated guideway columns would be placed outside of the Sturtevant Creek stream channel, avoiding direct impact on the creek. For *Preferred Alternative D2A*, the Unnamed Tributary to Kelsey Creek would be relocated into a new 24-inch-wide storm drain. The stream would remain in the existing storm drain until a new storm drain is constructed. Rerouting the tributary would occur within the permitted work window during the summer when flows in the stream do not typically exist or are extremely low. If Alternative D3 were to be selected, then the existing shallow culvert crossing of NE 20th Street by Valley Creek would be replaced with a bridge that is structurally capable of supporting the light rail crossing at this location. Bridge construction would meet applicable fish passage criteria.

If the MF3 were to be selected, then Goff Creek could be relocated several hundred feet to the west to avoid the facility. Alternatively, the stream could be restored in its present location and the culverts replaced by ones that allow fish passage and migration. The stream would be relocated and restored in a manner compatible with the Bel-Red Corridor redevelopment plans.