Appendix F4.9

Impervious Areas and Stormwater Facilities

Table F4.9-1
Existing and Proposed Impervious Area, Excluding Maintenance Facilities

Major Downstream Waterbody	Drainage Basin	Existing and Proposed Impervious Area (IA) by Indicated Segment and Project Alternative (acres)																			
		A		B																	
		A1*		B2M-C11A*		B2M-C9T*		B1		B2-A		B2-E		B3		B3-114th		B7			
		Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.		
Lake Washington	Seattle CSO	7.2	7.2																		
	Lake Washington	17.6	17.6																		
	Mercer Island	17.6	18.1																		
	Beaux Arts	0.1	0.1	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.9	0.7	0.7		
Mercer Slough	Mercer Slough			13.6	22.0	9.3	17.4	17.1	22.5	16.1	21.3	10.0	13.5	14.0	17.8	13.8	18.0	12.1	15.7		
	Maydenbauer Creek							3.7	4.5												
	Sturtevant Creek			0.9	1.0	0.6	0.9			0.3	0.5	0.0	0.2	0.3	1.5	0.3	1.5	0.1	0.1		
Kelsey Creek	Kelsey Creek																	0.5	0.7		
	West Tributary																				
	Goff Creek																				
	Valley Creek																				
	Sears Creek																				
Sammamish River	W. Lake Sammamish																				
	E. Lake Sammamish																				
	Westside																				
	Marymoor																				
	City Center																				
	Bear Creek																				
Total		42.4	43.1	15.3	23.9	10.8	19.2	21.5	27.7	17.1	22.6	10.8	14.5	15.0	20.0	15.0	20.4	13.4	17.3		
Total Increase in IA (acres)		0.6		8.6		8.4		*6.2*		5.5		3.7		5.0		5.4		3.9			
Total % Increase in IA		2%		56%		77%		29%		32%		35%		33%		36%		29%			

Major Downstream Waterbody	Drainage Basin	C																			
		C11A*		C9T*		C1-T		C2-T		C3-T		C4-A		C7-E		C8-E		C9A		C14E	
		Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.
Lake Washington	Seattle CSO																				
	Lake Washington																				
	Mercer Island																				
	Beaux Arts																				
Mercer Slough	Mercer Slough	0.6	1.0									0.1	0.1								
	Maydenbauer Creek	2.6	6.9			5.9	6.3	2.3	2.4	0.7	0.7	2.8	2.8								
	Sturtevant Creek	20.2	20.4	15.0	19.9	3.8	4.0	4.1	4.6	1.7	2.5	9.0	11.7	4.2	5.7	4.9	6.8	24.1	28.8	15.7	18.5
Kelsey Creek	Kelsey Creek																				
	West Tributary																				
	Goff Creek																				
	Valley Creek																				
	Sears Creek																				
Sammamish River	W. Lake Sammamish																				
	E. Lake Sammamish																				
	Westside																				
	Marymoor																				
	City Center																				
	Bear Creek																				
Total		23.4	28.2	15.0	19.9	9.7	10.2	6.5	7.0	2.4	3.2	11.9	14.6	4.2	5.7	4.9	6.8	24.1	28.8	15.7	18.5
Total Increase in IA (acres)		4.9		4.9		0.5		0.5		0.7		*2.7*		1.5		1.9		4.7		2.8	
Total % Increase in IA		21%		33%		6%		8%		31%		23%		35%		38%		19%		18%	

Major Downstream Waterbody	Drainage Basin	D												E							
		D2-A*		D2A-120th		D2A-24th		D2-E		D3		D5		E2*		E1		E2-RedTC		E4	
		Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.
Lake Washington	Seattle CSO																				
	Lake Washington																				
	Mercer Island																				
	Beaux Arts																				
Mercer Slough	Mercer Slough																				
	Maydenbauer Creek																				
	Sturtevant Creek	3.8	4.3	3.8	4.3	3.8	4.3	1.9	2.4	2.1	2.6	0.5	0.9								
Kelsey Creek	Kelsey Creek	0.1	0.8	0.1	0.8	0.1	0.8	0.7	0.9	2.1	2.4	0.0	0.2								
	West Tributary	4.8	5.9	4.8	5.9	4.8	5.9	2.5	2.6	2.2	2.4	2.0	3.3								
	Goff Creek	9.3	9.0	9.3	9.0	9.3	9.0	3.7	4.2	4.7	5.2	0.1	0.9								
	Valley Creek	0.9	3.2	0.9	3.2	1.1	3.6	0.7	2.3	4.3	4.7	0.3	3.3								
	Sears Creek	0.8	2.1	0.8	2.1	3.0	3.7	2.9	3.6	12.0	14.4	3.5	4.8								
Sammamish River	W. Lake Sammamish	6.1	11.2	6.1	11.2	6.1	11.2	2.1	7.5	2.1	7.7	2.1	7.6	0.5	0.7	0.5	0.7	0.5	0.7	0.5	0.7
	E. Lake Sammamish													0.0	0.0	0.3	0.5	0.0	0.0	0.1	0.4
	Westside													2.6	7.6	3.3	9.0	2.6	7.6	3.2	8.2
	Marymoor													8.8	7.9	8.2	4.6	8.8	7.9	7.0	4.2
	City Center													2.4	1.5	2.3	3.4	3.7	4.2	1.4	2.4
	Bear Creek													2.6	3.5	2.4	3.0	2.6	3.5	3.4	4.8
Total		25.8	36.4	25.8	36.4	28.2	38.4	14.5	23.4	29.6	39.4	8.5	21.0	16.8	21.2	16.9	21.1	18.1	23.9	15.5	20.8
Total Increase in IA (acres)		10.7		10.7		10.3		8.9		9.8		*12.5*		4.4		4.2		*5.8*		5.3	
Total % Increase in IA		41%		41%		36%		62%		33%		148%		26%		25%		32%		34%	

Notes:
* = preferred alternative.

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

TABLE F4.9-2
Existing and Proposed Impervious Area for Maintenance Facilities

Drainage Basin	Area (acres)	Existing and Proposed Impervious Area (IA) by Indicated Segment and Project Alternative (acres)																							
		MF1						MF2						MF3						MF5					
		D2		D3		D5		D2		D3		D5		D2		D3		D5		E1		E2		E4	
		Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.	Exist	Prop.
Sturtevant Creek	773.0	2.4	3.5	2.4	3.5	2.4	3.3					0.7	1.1												
Kelsey Creek	2822.4													2.4	0.4	1.6	0.7	1.6	0.4						
West Tributary	1005.8	5.6	8.2	5.6	8.2	6.8	8.5	11.5	11.1	11.5	11.1	15.7	11.6												
Goff Creek	674.4													11.9	10.2	11.9	10.7	11.9	11.0						
Valley Creek	1390.9													0.2	2.2	0.7	1.4	0.4	1.4						
Marymoor	414.8																			11.2	13.5	13.6	15.5	13.1	14.9
Total	21535.8	8.0	11.7	8.0	11.7	9.2	11.7	11.5	11.1	11.5	11.1	16.4	12.7	14.5	12.8	14.1	12.8	13.8	12.8	11.2	13.5	13.6	15.5	13.1	14.9
Total Increase in IA		3.7		3.7		2.6		-0.3		-0.3		-3.7		-1.7		-1.3		-1.0		2.3		1.9		1.8	
Total % Increase in IA		46%		46%		28%		-3%		-3%		-23%		-12%		-9%		-7%		20%		14%		14%	

Appendix F4.9

Stormwater Management for East Link Project

The approach to stormwater management proposed within each segment of the East Link Project is summarized below. The numbers of water quality and detention vaults and the surface areas of detention ponds and constructed stormwater wetlands are shown in Table F4.9-3 for each segment. The size and locations of these facilities will change as more detailed engineering is performed in future project phases. There is the potential for contribution to regional detention and treatment facilities, where available or appropriate, as an alternative to onsite detention or treatment systems, via vaults or ponds.

F4.9.1 Segment A

Segment A (see Exhibit 4.9-1 in Section 4.9 of the Final Environmental Impact Statement [EIS]) passes through the Cities of Seattle and Mercer Island and stays within the Washington State Department of Transportation (WSDOT) right-of-way along Interstate 90 (I-90) for the entire length of the segment. An existing highway drainage system serves the entire segment. A small amount of the D2 Roadway in the western portion of this segment would be reconstructed; therefore, a single detention vault is proposed at this location. Because this area drains to Seattle's combined sewer, no stormwater treatment would be required. No detention or water quality treatment facilities would be required for the remainder of this segment because the project would create little or no new or reconstructed pavement areas.

F4.9.2 Segment B

Segment B (see Exhibit 4.9-2 in Section 4.9 of the Final EIS) falls within the City of Bellevue. The City of Bellevue has a fully separated stormwater system that drains to local streams, Mercer Slough, or Lake Washington. The runoff from large portions of Segment B alternatives could be routed directly to Mercer Slough, a detention-exempt water body, and would therefore require no detention. Detention would be required for the northern portion of Segment B, however. Note that the Bellevue Way Alternative (B1) is isolated from Mercer Slough, and this alternative would require seven vaults to provide the required detention. A small constructed wetland would provide treatment to runoff from the reconstructed South Bellevue Park-and-Ride.

F4.9.3 Segment C

Segment C (see Exhibit 4.9-3 in Section 4.9 of the Final EIS) also falls within the City of Bellevue. Most of this segment lies within the Sturtevant Creek Basin that drains much of Downtown Bellevue. Sturtevant Creek Basin is an urbanized basin with greater than 40 percent impervious area. Projects occurring within this basin are subject to a lower detention requirement. Project stormwater need only be detained to meet existing (rather than forested) conditions (Volume II, Section 2.5.7 of Ecology's 2005 *Stormwater Management Manual for Western Washington*). As a result, fewer project detention vaults are required in this basin, compared to much of the rest of the study area.

Portions of the western alternatives (Bellevue Way Tunnel [C1T], 106th NE Tunnel [C2T], 108th NE Tunnel [C3T], 114th NE Elevated [C14E] and the west leg of the Couplet [C4A]) Alternative lie within the Downtown Bellevue stormwater service area. Runoff collected in this service area is conveyed directly to Lake Washington (a water body exempt from detention requirements) and would therefore not require detention. However, treatment facilities would be required to treat runoff from pollution-generating impervious surfaces (PGISs).

This is the only segment with tunnel alternatives. The portions of the tunnel alternatives that would not disturb the overlying surface or that would be constructed with a landscaped surface cover would not require stormwater facilities. In general, the tunnel and the elevated alternatives would require fewer detention vaults than the at-grade alternative.

F4.9.4 Segment D

Segment D (see Exhibit 4.9-4 in Section 4.9 of the Final EIS) passes through the cities of Bellevue and

Redmond. The area drains to several small tributaries to Kelsey Creek: West Tributary Kelsey Creek, Goff Creek, and Sears Creek. There would be considerably more detention and water quality treatment facilities in this segment compared with the other segments because there are no detention-exempt receiving waters. The NE 20th Alternative (D3) would require the largest number of detention vaults (16) in this segment.

A portion of the elevated route of the State Route (SR) 520 Alternative (D5) runs along an open, vegetated area paralleling the south side of SR 520. This situation provides the opportunity for route runoff to be dispersed beneath the guideway, eliminating the need for stormwater facilities. A similar stretch of elevated rail using this dispersal technique was constructed for the Central Link in Tukwila.

A constructed wetland would provide treatment for runoff from the maintenance facility. In addition, a small constructed wetland and a wetpond would be constructed to provide stormwater management at the Overlake Transit Center.

F4.9.5 Segment E

Segment E (see Exhibit 4.9-5 in Section 4.9 of the Final EIS) lies within the City of Redmond. Nearly all of the runoff from the southern portion of Segment E would be routed directly to the Sammamish River (a water body exempt from detention requirements) and would therefore not require detention. Project runoff within downtown Redmond lies within the city's downtown stormwater service area which also conveys collected stormwater directly to the Sammamish River. Stormwater treatment, prior to river discharge, is also provided within this stormwater service area. Therefore, the portions of the project that lie within the downtown stormwater service area would not be required to provide either detention or treatment.

A portion of the *Preferred Marymoor Alternative (E2)* is proposed to be constructed along the south shoulder of SR 520. Plans for expanding of this highway call for converting of this shoulder to an ecology embankment that would be used to infiltrate and treat highway runoff. The highway expansion would likely be completed before the East Link Project and would reduce the area available for the construction of *Preferred Alternative E2*. To accommodate the highway requirements, if E2 is selected, Sound Transit proposes to reconstruct the highway shoulder to a more compact median application of the ecology embankment that would provide the required treatment of highway runoff using less land area. An underdrain would be installed to collect infiltrated highway runoff.

In the eastern portion of Segment E, a park-and-ride lot and a maintenance facility are proposed. This area has permeable soils and an onsite constructed wetland and infiltration pond could be used for runoff. This area lies within the Redmond Wellhead Protection Area, and infiltration of stormwater would require special measures so that groundwater quality would be not affected.

TABLE F4.9-3
Number of Vaults and Wetland/Pond Surface Area

Segments	Alternatives[a]	Small Detention and Water Quality Vaults (Quantity) [b]	Medium Detention and Water Quality Vaults (Quantity)[c]	Large Detention and Water Quality Vaults (Quantity)[d]	Constructed Wetland Water Surface Area (acres)	Detention Pond Water Surface Area (acres)
A	*A1*	1	0	0	0	0
B	*B2M-C11A*	0	1	0	0.5	0
	B2M-C9T	0	1	0	0.5	0
	B1	3	3	0	0.5	0
	B2A	1	1	1	0.5	0
	B2E	0	1	0	0.5	0
	B3	2	1	1	0	0
	B3 - 114th Extension Design Option	2	1	1	0	0
	B7	0	1	1	0	0
C	*C11A*	0	2	0	0	0
	C9T[e]	0	2	0	0	0
	C1T	2	1	0	0	0
	C2T	2	0	0	0	0
	C3T	2	0	0	0	0
	C4A	3	0	0	0	0
	C7E	0	1	0	0	0
	C8E	1	1	0	0	0
	C9A	1	1	0	0	0
	C14E	2	0	0	0	0
D	*D2A*	1	2	2	1.1	0.8
	D2A - 120th Station Design Option	1	2	2	1.1	0.8
	D2A - NE 24th Design Option	0	3	2	1.1	0.8
	D2E	1	4	2	1.1	0.8
	D3	0	4	10	1.1	0.8
	D5	0	1	3	1.1	0.8
E	*E2*	1	0	0	0.8	0
	E1	0	0	0	0.8	0
	E2 – Redmond Transit Center Design Option	1	0	0	0.8	0
	E4	0	0	0	0.8	0

[a] Italics indicates the identified preferred alternative(s) for each segment.

[b] A "small" vault has a storage capacity less than 0.6 acre-feet.

[c] A "medium" vault has a storage capacity between 0.6 and 1.4 acre-feet

[d] A "large" vault has a storage capacity greater than 1.4 acre-feet.

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