9 February 2006

SR 520 Bridge Replacement and HOV Project Draft EIS

6-Lane Alternative Options

Addendum to Water Resources Discipline Report

Washington State Department of Transportation

SoundTransit

U.S. Department of Transportation Federal Highway Administration

SR 520 Bridge Replacement and HOV Project EIS
6-Lane Alternative Options

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Prepared for

Washington State Department of Transportation

Federal Highway Administration

Sound Transit

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Acronyms and Abbreviations

BMP	best management practice
CSO	combined sewer overflow
Draft EIS	draft environmental impact statement
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
HOV	high occupancy vehicle
i/c	interchange
P&R	park-and-ride
PGIS	pollutant-generating impervious surface
SPCC	spill prevention controls and countermeasures
TESC	temporary erosion and sediment control
TSS	total suspended solids
WSDOT	Washington State Department of Transportation

Introduction

This addendum to the *Water Resources Discipline Report* (Parametrix 2005; Appendix L of the *SR 520 Bridge Replacement and HOV Project Environmental Impact Statement* [Draft EIS]) describes three new options to the original 6-Lane Alternative, describes the environment potentially affected by these options, and identifies any environmental consequences for these options that may differ from the original 6-Lane Alternative. Two of these options are in Seattle, and one is on the Eastside.

The comparisons made in this addendum were based on the same evaluation methodologies as in the *Water Resources Discipline Report*. These methods were used to quantify potential effects of each option in the relevant basins affected. The water resources discipline team then determined whether the options would increase or decrease the effects identified for the original 6-Lane Alternative in the *Water Resources Discipline Report*.

What are the key points of this report?

- The 6-Lane Alternative options could affect the same surface water resources identified in the *Water Resources Discipline Report* as well as the Combined Sewer and University Slough Basins north of the Montlake Cut, both of which discharge to receiving environments described in the *Water Resources Discipline Report*.
- All three options would increase the area of pollutant-generating impervious surface (PGIS) in the surface water basins surrounding the project area.
- All three options would maintain or generally reduce existing pollutant loading levels in project area surface bodies because stormwater would be treated and flows controlled before they are discharged.
- The South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would not involve any new bridge construction or create any new temporary construction effects.
- Any potential effects from constructing a second Montlake Bridge or the Union Bay Bridge (from spills of hazardous material or

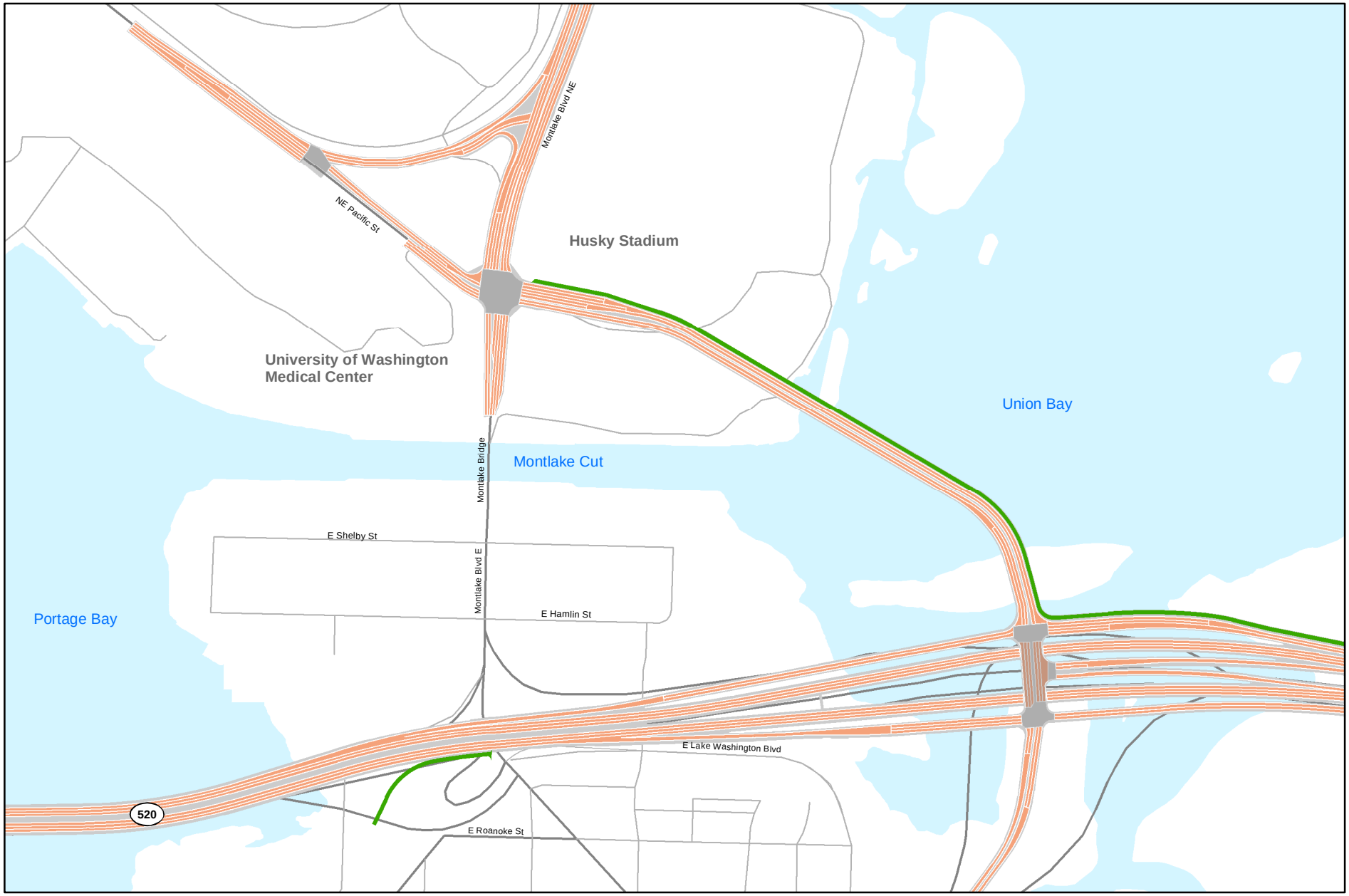
changing the pH of water from concrete work) would be mitigated through implementation of spill prevention controls and countermeasures (SPCC) and temporary erosion and sediment control (TESC) plans. Any resuspension of sediments from the installation and removal of cofferdams would be mitigated through implementing the TESC plan.

- All three options would meet state and federal water quality regulations.
- The effects of the three 6-Lane Alternative options would be essentially the same as the original 6-Lane Alternative, even for the two options that would add more PGIS, because:
  - Water quality treatment facilities would be increased to accommodate and treat additional stormwater generated.
  - All options would meet state and federal water quality regulations.
- Mitigation requirements would be the same as for the original 6-Lane Alternative.
- The water resources discipline team did not change their conclusions concerning compensation needs between the original 6-Lane Alternative and the three options.
- The three options would not result in any changes to groundwater that were not originally described in the Water Resource Discipline Report for the original 6-Lane Alternative.
- The water resources discipline team did not change their conclusions about compensation needs between the original 6-Lane Alternative and the three options.

What options are being considered in this addendum?

6 Lanes with Pacific Street Interchange Option

This option would remove the existing Montlake interchange along SR 520 and would include constructing a new SR 520 interchange, called the Pacific Street interchange, just east of the Montlake interchange. **Exhibit 1** shows the proposed lane configuration for this option.



Option Lane Configuration
Bicycle/Pedestrian Path
Shoulders and Barriers
Intersections

N

0 125 250 500 Feet

Exhibit 1. **Lane Configuration of the 6 Lanes with Pacific Street Interchange Option**

SR 520 Bridge Replacement and HOV Project

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The new interchange would be primarily located over the peninsula owned by WSDOT near the Washington Park Arboretum. A new on- and off-ramp to and from the north would extend to Pacific Street at the University of Washington. A column-supported ramp of four general purpose lanes (two lanes in each direction) would extend over Union Bay (referred to as the Union Bay Bridge in this addendum) from the new interchange and would connect at the University of Washington Husky Stadium parking lot before joining the intersection of Pacific Street and Montlake Boulevard. At that intersection, the roadway would be lowered 8 to 10 feet from the existing elevation to provide vehicle-only access. The intersection would be covered to allow pedestrian access above and away from traffic.

The roadway on Montlake Boulevard north of Pacific Street would be widened to the east until just south of Northeast 45th Street. The Union Bay Bridge would provide possibly a 70 foot vertical clearance across the ship canal portion of Union Bay. Columns would be placed just outside the width of the ship canal to not block boat traffic.

Ramps to and from Lake Washington Boulevard would still be included in this option; however, their footprint would be slightly different from the original 6-Lane Alternative. The ramp connections to and from Lake Washington Boulevard and to and from the Union Bay Bridge would construct a full diamond interchange, as opposed to a partial diamond interchange under the original 6-Lane Alternative. This full diamond interchange would provide more access to and from Lake Washington Boulevard. There would be no access to or from SR 520 at Montlake Boulevard.

From Montlake Boulevard to I-5, SR 520 would be six lanes wide (three in either direction). The profile of the Portage Bay Bridge would not differ under this option from the original 6-Lane Alternative. Buses would access SR 520 via the Union Bay Bridge through the University area, providing for a more direct connection between buses and the proposed Sound Transit North Link Station at Husky Stadium. Instead of connecting to the Montlake interchange as in the original 6-Lane Alternative, the bicycle/pedestrian path would follow the Union Bay Bridge from SR 520 and would end at the Pacific Street interchange, close to the Burke-Gilman Trail.

Second Montlake Bridge Option

The intent of the Second Montlake Bridge option is to narrow the SR 520 footprint through the Montlake neighborhood, while providing for transit (bus) access from SR 520 to the University of Washington. **Exhibit 2** shows the proposed lane configuration for this option, which would be the same as the No Montlake Freeway Transit Stop option, except that it would also include a second Montlake Bridge across the Montlake Cut. This bridge would be a parallel bascule (draw) bridge located just east of the existing Montlake Bridge. One bridge would carry northbound traffic, and one would carry southbound traffic.

South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast Option

The intent of the South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option is to improve access for buses to the South Kirkland Park-and-Ride from eastbound SR 520 and from the South Kirkland Park-and-Ride to westbound SR 520. This option, which is shown in **Exhibit 3**, would add a new transit/HOV-only westbound on-ramp from 108th Avenue Northeast and a new transit/HOV-only eastbound off-ramp to 108th Avenue Northeast.

The footprint of SR 520 east of Bellevue Way would be widened slightly to accommodate the new ramps. Both 108th Avenue Northeast and Northup Way would be widened and improved under this option. One lane would be added to 108th Avenue Northeast between the eastbound on-ramp and 38th Place Northeast. Along with the additional through lane on 108th Avenue Northeast, the northbound leg of the 108th Avenue Northeast/Northup Way intersection would be channelized to include two exclusive left-turn lanes, a through lane, and a shared through/right-turn lane.

There is also a possibility for adding a westbound second left-turn lane at the 108th Avenue Northeast/Northup Way intersection to facilitate clearing the left-turn queue and serving a higher number of westbound left-turn and through trips.

Option Lane Configuration
Bicycle/Pedestrian Path
Shoulders and Barriers
Intersections

N

0 125 250 500 Feet

Exhibit 2. **Lane Configuration of the Second Montlake Bridge Option**

SR 520 Bridge Replacement and HOV Project

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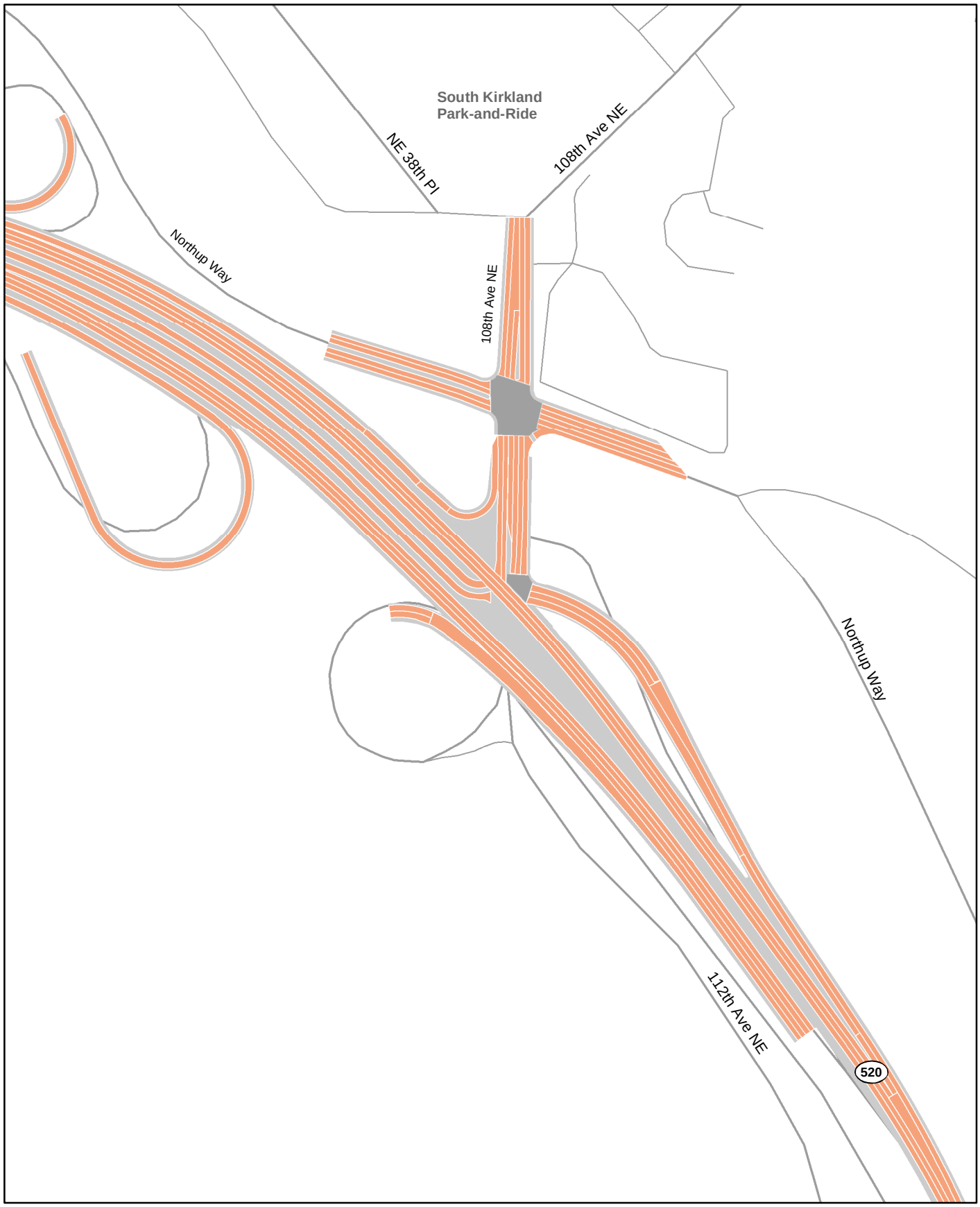


Option Lane Configuration
Shoulders and Barriers
Intersections

N

0 125 250 500 Feet

Exhibit 3. **Lane Configuration for the South Kirkland Park-and-Ride Transit Access - 108th Avenue Northeast Option**
SR 520 Bridge Replacement and HOV Project

What additional information was collected for this analysis?

The water resources discipline team obtained additional information from the following sources:

- *Addendum to Stormwater Management Report, 6-Lane Alternative Options* for the *Draft SR 520 Bridge Replacement and HOV Project EIS*. Prepared by CH2M HILL for Washington State Department of Transportation, Federal Highway Administration, and Sound Transit. October 2005
- City of Seattle's Stormwater, Grading and Drainage Control Code. Seattle Municipal Code Title 22.800. Vol. 3: Flow Control Technical Requirements Manual; Vol. 4: Stormwater treatment Technical Requirements Manual. Seattle, Washington. November 2000.
- *Final Environmental Impact Statement for the University Of Washington Master Plan Seattle Campus*. Section IIIC – Water. University of Washington Capitol Projects Office, September 10, 2001.

Surface Water

Affected Environment

Project area water resources were described in detail in the *Water Resources Discipline Report*. Any additional water resources that could be affected by these options are described below.

Would the affected environment change in the Seattle project area?

The two options proposed for the Seattle project area could affect the same surface water resources as identified for the original 6-Lane Alternative in the *Water Resources Discipline Report*. In addition, the extension of the project area to include the Pacific Street interchange and 25th Avenue Northeast extends the surface water affected to include two additional basins: Combined Sewer and University Slough. The Combined Sewer basin discharges to the Ship Canal. The University Slough basin discharges to Union Bay. Both of these were described in the *Water Resources Discipline Report*.

Currently, stormwater runoff in the University Slough basin generated by the existing 25th Avenue Northeast pavement is conveyed to two sections of a combined sewer system. The section south of the University of Washington sports complex flows south toward Portage Bay; the section north flows along 25th Avenue Northeast, where it is conveyed in a stormwater pipe to Union Bay via University Slough (University of Washington 2001).

Would the affected environment change in the Eastside project area?

No new surface water resources would be affected by the option proposed for the Eastside project area. All project-generated runoff would be discharged to the same creeks and receiving environments as discussed in the *Water Resources Discipline Report*.

Potential Effects of the Project on Surface Water

What methods were used to evaluate effects?

The water resources discipline team evaluated potential effects on the surface water bodies in the expanded project areas using the same WSDOT and Washington State Department of Ecology (Ecology) approved methods as the *Water Resources Discipline Report* (Appendix T to the Draft EIS). The primary guidelines for analysis were the WSDOT *Environmental Procedures Manual* (WSDOT 2004b) and the *Highway Runoff Manual* (WSDOT 2004a). Similarly, we evaluated temporary effects on surface water during construction using the same methods described in the discipline report— specifically, we looked at construction activities that could disturb soil and in-water sediments and evaluated the potential for accidental spills of hazardous materials.

The 6-Lane Alternative options would affect only specific basins when compared to the entire original 6-Lane Alternative. In this evaluation, differences between the options and original 6-Lane Alternative were first determined within the relevant basins and then summed across all basins to develop a single representative increase or decrease.

For the Seattle project area, data from the *Addendum to the Stormwater Management Report* (CH2M HILL 2005b; Tables A-1 and A-2) were used to determine the changes reported in **Exhibit 4**, and the locations of stormwater treatment facilities are shown in **Exhibit 5**. Differences between the original 6-Lane Alternative and Eastside project area option are presented in **Exhibit 6**, and Eastside stormwater treatment facilities are shown on **Exhibit 7**. While most features are similar between the original 6-Lane Alternative and the options, there are differences. These include:

- Changes in the amount of impervious surface
- Changes in the size of proposed treatment facilities reflecting changes in PGIS
- Relocated and new treatment facilities
- Flow controlled stormwater discharges to the City of Seattle's combined sewer system

Exhibit 4. **Differences between the Original 6-Lane Alternative and the Seattle Options**

Type of Change	Original 6-Lane Alternative Compared with	
	6 Lanes with Pacific Street Interchange	**Second Montlake Bridge**
New Basins Affected	University Slough, and Combined Sewer Basins	Combined Sewer Basin
Change in Impervious Surface Relative to Original 6-Lane Alternative	14.2 additional acres of added impervious surface	Adds 3.5 new acres of impervious surface
Change in Flow Control/Detention Relative to original 6-Lane Alternative[a]	New detention required for discharges to combined sewer system and Portage Bay	New detention required for discharges to combined sewer system
New or Modified Treatment Facility and Discharge Locations (Treatment Facilities and Locations not included are identical with those included in the original 6-Lane Alternative)	• UB1: Wetland relocated under roadway • UB2: Relocated to southwest of original footprint, discharging to Union Bay between peninsula and west shoreline • UB3: New facility, upgraded outfall • CS2: New detention facility • PB3: New facility, upgraded outfall • PB4: New facility, upgraded outfall • US1: New facility • Bridge pier wetlands eliminated between west shore and Foster Island	• CS1: New detention facility, upgraded outfall • CS2: New detention facility, upgraded outfall

UB1, UB2, UB3 – Union Bay Stormwater Treatment Facilities; PB3, PB4 – Portage Bay Stormwater Treatment Facilities; US1 – University Slough Stormwater Treatment Facility; CS1, CS2, - Combined Sewer Stormwater Treatment Facilities.
[a]A description of each type of treatment and detention facility is provided in the *Water Resources Discipline Report*.

Will the amount of impervious surface added by each new option differ from that added by the original 6-Lane Alternative?

Seattle

Depending on the option selected, the two Seattle 6-Lane Alternative options would increase the amount of impervious surface in Seattle project area basins (in combination with the original 6-Lane Alternative). Combining the original 6-Lane Alternative with the 6 Lanes with Pacific Street Interchange option would add an additional

8.7 acres of new impervious surface. The Second Montlake Bridge option would add 3.5 acres of new impervious surface within the project area.

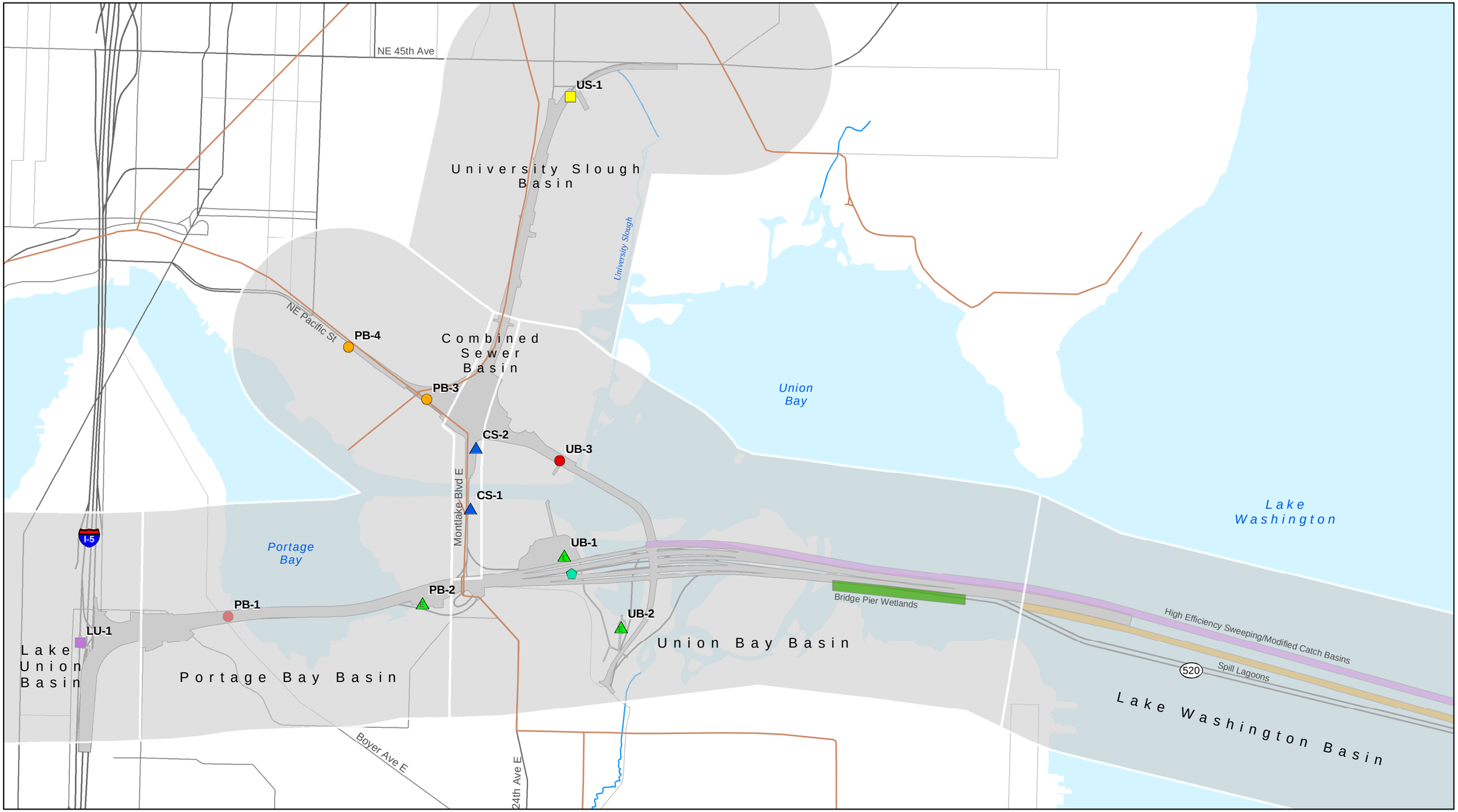
Eastside

The South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would add 3.2 acres of impervious surface in the Eastside project area.

How would Eastside basins be affected compared to the original 6-Lane Alternative?

To evaluate any potential effects from adding impervious surface in the Eastside project area, we needed to first evaluate how much impervious surface the South Kirkland Park-and-Ride option would add within the project area. Then the proposed project's total contribution of impervious surface can be weighed against the total amount of impervious surface in the basin (Brabec et al. 2002). Currently, 697.2 acres of the 2,515.9 total acres (or approximately 27 percent) comprising the four affected Eastside basins are covered by impervious surfaces. The South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would increase the level of impervious surface to 28.2 percent (**Exhibit 8**).

The addition of the South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would not change the increase in the amount of basin wide impervious surface that would result from the original 6-Lane Alternative alone (**Exhibit 8**).



Stormwater Management Facilities

- Water Quality Wet Vault with Flow Control
- Emerging Technology BMP
- Media Filter and Pretreatment Vault
- Pretreatment Vault
- Water Quality Wet Vault
- Stormwater Treatment Wetland
- Detention Vault
- Bridge Pier Wetland
- Spill Lagoons
- High Efficiency Sweeping/Modified Catch Basins
- Basins
- 6 Lane with Pacific Street Interchange Footprint
- King County Sewer Trunkline

E - denotes enhanced treatment

Note: Screened back symbols denote facility with no/minor change from orginal 6-Lane Alternative.

Source: City of Seattle GIS (2003)

N

0 500 1,000 Feet

Exhibit 5. **Locations of Proposed Stormwater Management Facilities in the Seattle Project Area**

SR 520 Bridge Replacement and HOV Project

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Exhibit 6. **Differences between the Original 6-Lane Alternative and the Eastside Option**

Type of Change	South Kirkland Park-and-Ride Transit Access - 108th Avenue Northeast
Change in New Impervious Surface Relative to original 6-Lane Alternative	3.2 additional acres of added impervious surface
New or Modified Treatment Facility and Discharge Locations (Treatment Facilities and Locations not included are identical with those included in the original 6-Lane Alternative)	• YC4: Additional treatment/detention vault, new discharge location to Yarrow Creek • YC5: Additional treatment/detention vault, new discharge location to Yarrow Creek • YC6: Additional treatment/detention vault, new discharge location to Yarrow Creek

N/A = Not Applicable
YC4, YC5, YC6 – Yarrow Creek Basin Stormwater Treatment Facilities.

Note: The percent increase in Seattle basin impervious surface was not calculated for the original 6-Lane Alternative because of the significant alteration of how stormwater is conveyed in this area. Most of the stormwater in this area is currently discharged to the Seattle stormwater system and does not infiltrate or discharge to any local streams that could be affected by changes in peak flows. Instead, all stormwater generated by existing and future project impervious surfaces is discharged to either Lake Union, Portage Bay, the Montlake Cut, Union Bay, or Lake Washington. None of these surface water bodies are considered sensitive to changes in peak flow, and would not be adversely affected by increases in the volume of stormwater generated by new impervious surfaces. Consequently, this addendum does not compare basinwide impervious surface areas in Seattle.

What are the differences in pollutant mass loading between the original 6-Lane Alternative and the options?

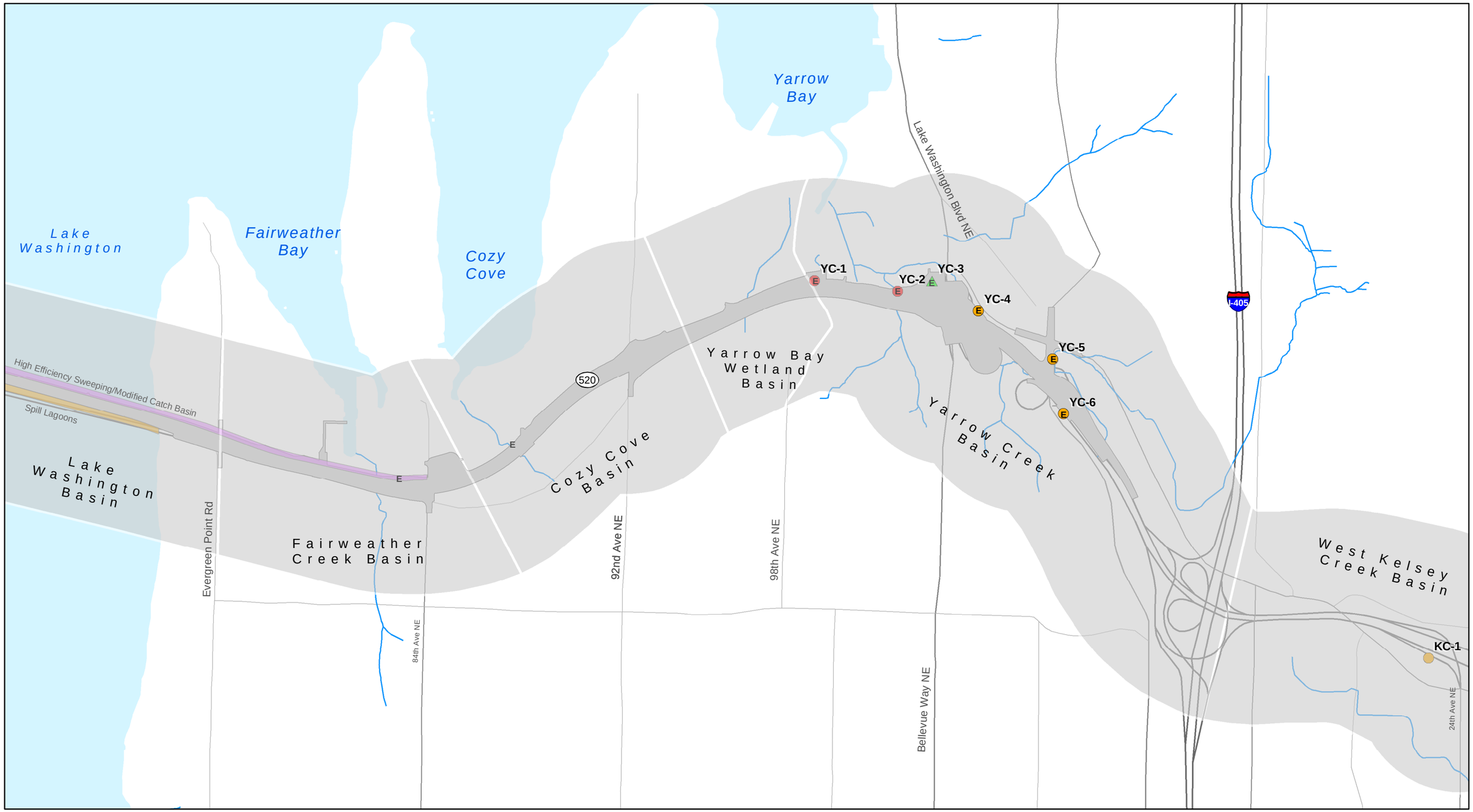
The water resources discipline team calculated the quality of stormwater generated by the proposed project's impervious surface areas in three of the four Seattle area basins applying the same procesdures used in the *Water Resources Discipline Report*. We also applied the same loading analysis and input values to help us distinguish treated pollutant mass loading for the options (**Exhibit 9**). Stormwater generated by the Second Montlake Bridge option would be conveyed to Seattle's combined sewer system. It would then be conveyed and treated at one of King County's wastewater treatment plants and discharged to Puget Sound.

Overall, treated stormwater discharged from the 6 Lanes with Pacific Street Interchange option will result in higher pollutant mass loadings for both the mean rain event and all combined events in a year compared to the original 6-Lane Alternative (**Exhibit 9**).

The water resources discipline team also quantified the possible changes in mean rain event and annual pollutant mass loading for treated stormwater for the South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option (**Exhibit 10**). The pollutant mass loading from this option summed over all basins would be greater than that predicted for the original 6-Lane Alternative (**Exhibit 10**).

Would different construction activities for the options affect water resources in the project area?

Overall, the potential effects of construction in the land-based project components would be the same for the three options and the original 6-Lane Alternative (**Exhibit 11**) and would not create any new temporary construction effects not already addressed in the *Water Resources Discipline Report*. The major area of difference would be construction of new over-water structures (the 6 Lanes with Pacific Street Interchange option's Union Bay Bridge and the second bridge over the Montlake Cut; **Exhibit 5**). The major effect of constructing these bridges would be the potential resuspension of contaminated sediments and increased turbidity during the installation and removal of cofferdams associated with pier construction (**Exhibit 11**). Any potential effects from constructing these bridges (caused by hazardous material spills or changes in pH from concrete work) would be mitigated through implementation of SPCC and TESC plans. Any sediments created from the installation and removal of cofferdams would be mitigated through implementing the TESC plan and additional best management practices (BMPs) if needed.



Stormwater Management Facilities

- Water Quality Wet Vault with Flow Control
- Water Quality Wet Vault
- Stormwater Wetland with Detention

E - denotes enhanced treatment

- Spill Lagoons
- High Efficiency Sweeping/Modified Catch Basins
- Basin
- South Kirkland Park-and-Ride Transit Access - 108th Ave NE Footprint

Source: City of Bellevue GIS (2004)

N

0 500 1,000 2,000 Feet

Exhibit 7. **Locations of Proposed Stormwater Management Facilities in the Eastside Project Area**

SR 520 Bridge Replacement and HOV Project

Note: Screened back symbols denote facility with no/minor change from orginal 6-Lane Alternative.

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Exhibit 8. **Percent Increase in Amount of Impervious Surface in Affected Eastside Basins**

6-Lane Alternative/Option	Existing Total Impervious Surface in Effected Eastside Basins (acres)	Future Total Impervious Surface in Effected Eastside Basins (acres)	Future Basin-Wide % Impervious Surface in Effected Eastside Basins	Percent increase in Impervious Surface in Effected Eastside Basins
Original 6-Lane Alternative	697.2	712.7	28.3%	2.2%
South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast	697.2	710.2	28.2%	1.9%

Exhibit 9. **Changes in Mean Rain Event and Annual Treated Pollutant Mass Loading for the Seattle Options Compared to the Original 6-Lane Alternative**

	Change in Mean Pollutant Mass Loading per Rain Event (pounds/event)			Change in Annual Mean Pollutant Mass Loading (pounds/year)		
Basins	**Copper**	**Zinc**	**TSS**	**Copper**	**Zinc**	**TSS**
6 Lanes with Pacific Street Interchange Option - Changes in Treated Pollutant Mass Loading						
Portage Bay West	0	0	0	0	0	0
Portage Bay East	-0.001	-0.004	-1.3	-0.067	-0.369	-114.8
Union Bay (UB1)	0.007	0.040	12.3	0.621	3.426	1066.2
Union Bay (UB2)	-0.001	-0.006	-1.9	-0.096	-0.527	-164.0
Union Bay (UB3)	0.001	0.006	0.9	0.086	0.508	82.0
West Bridge Approach	0	0	0	0	0	0
Lake Washington	0	0	0	0	0	0
City Combined Sewer (CS1)	0	0	0	0	0	0
City Combined Sewer (CS2)	0.001	0.005	3.9	0.080	0.471	341.7
Portage Bay (PB3)	0.000	0.001	0.8	0.016	0.094	68.3
Portage Bay (PB4)	0.000	0.002	1.6	0.032	0.188	136.7
University Slough	0.002	0.003	2.8	0.203	0.282	239.2
Second Montlake Bridge Option - Changes in Treated Pollutant Mass Loading						
Portage Bay West	0	0	0	0	0	0
Portage Bay East	0	0	0	0	0	0
Union Bay (UB1)	0	0	0	0	0	0

Exhibit 9. **Changes in Mean Rain Event and Annual Treated Pollutant Mass Loading for the Seattle Options Compared to the Original 6-Lane Alternative**

	Change in Mean Pollutant Mass Loading per Rain Event (pounds/event)			Change in Annual Mean Pollutant Mass Loading (pounds/year)		
Basins	**Copper**	**Zinc**	**TSS**	**Copper**	**Zinc**	**TSS**
Union Bay (UB2)	0	0	0	0	0	0
Union Bay (UB3)	0	0	0	0	0	0
West Bridge Approach	0	0	0	0	0	0
Lake Washington	0	0	0	0	0	0
City Combined Sewer (CS1)	0.002	0.013	9.460	0.191	1.129	820.181
City Combined Sewer (CS2)	0.004	0.025	18.132	0.366	2.165	1572.014
Portage Bay (PB3)	0	0	0	0	0	0
Portage Bay (PB4)	0	0	0	0	0	0
University Slough	0	0	0	0	0	0

TSS = total suspended solids
yr = year

Exhibit 10. **Changes in Mean Rain Event and Annual Treated Pollutant Mass Loading for the Eastside Option Compared to the Original 6-Lane Alternative**

	Change in Mean Pollutant Mass Loading per Rain Event (pounds/event)			Change in Annual Mass Loading (pounds/year)		
Basins	**Copper**	**Zinc**	**TSS**	**Copper**	**Zinc**	**TSS**
Fairweather Bay West	0	0	0	0	0	0
Fairweather Bay East	0	0	0	0	0	0
Cozy Cove	0	0	0	0	0	0
Yarrow Bay Westland	0	0	0	0	0	0
Yarrow Creek	0.003	0.013	5.03	0.29	1.15	436.06

TSS = total suspended solids
yr = year

Exhibit 11. **Temporary Construction Effects Different than the Original 6-Lane Alternative**

Options	Temporary Construction Effects Not Discussed for Original 6-Lane Alternative	Additional Mitigation Required for Option
6 Lanes with Pacific Street Interchange	Construction of Union Bay Bridge could affect Union Bay through spills of hazardous material and lowering of the pH from new concrete work. Installation and removal of cofferdams could resuspend contaminated sediments and increase turbidity.	Supplemental development and implementation of TESC and SPCC plans
Second Montlake Bridge	Construction of second Montlake Bridge could affect Ship Canal through spills of hazardous material and discharges of low pH from new concrete work.	Supplemental development and implementation of TESC and SPCC plans
South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast	No new temporary construction effects associated with this option.	No additional mitigation required

What are the overall effects of options on surface water bodies compared to the original 6-Lane Alternative?

- All three options could affect the same surface water resources identified in the *Water Resources Discipline Report*. In addition, the 6 Lanes with Pacific Street Interchange and Second Montlake Bridge options could affect the Combined Sewer and University Slough basins north of the Montlake Cut, both of which discharge to the same receiving environments described in the *Water Resources Discipline Report*.
- All three options would increase the area of PGIS in the surface water basins surrounding the project area.
- All three options would maintain or reduce existing pollutant loading levels to surface water bodies within the project area relative to existing conditions as stormwater would be treated and flows controlled before being discharged.
- The South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would not involve any new bridge construction or create any new temporary construction effects.

- Any potential effects from constructing a second Montlake Bridge or the Union Bay Bridge (from spills of hazardous material or changing the pH of water from concrete work) would be mitigated through implementation of SPCC and TESC plans. Any resuspension of sediments from the installation and removal of cofferdams would be mitigated through implementing the TESC plan.
- All three options would meet state and federal water quality regulations.
- Effects of all three options would be essentially the same as the original 6-Lane Alternative because:
  - Water quality treatment facilities would be increased to accommodate and treat additional stormwater generated.
  - All options would meet state and federal water quality regulations.
- Mitigation requirements would be the same as the original 6-Lane Alternative.
- The water resources discipline team did not change their conclusions about compensation needs between the original 6-Lane Alternative and the three options.

Surface Water Mitigation

Would there be any difference in the mitigation necessary for surface water effects?

The original 6-Lane Alternative and the three options follow the WSDOT *Highway Runoff Manual* for the design of stormwater treatment and detention (where necessary); therefore, there would be no new or additional mitigation requirements. As described in the *Water Resources Discipline Report*, permanent negative effects of the build alternatives would be avoided through the inclusion of the stormwater treatment facilities as described in the *Stormwater Management Report* (CH2M HILL 2004). These facilities would either maintain or reduce current pollutant loading levels to water bodies in the project area. Negative effects on surface water bodies during construction would be avoided or minimized by implementing water quality pollution control measures outlined in the required TESC and SPCC. Potential turbidity

occurring in Seattle and Eastside surface water bodies from construction activities would be minimized through avoidance and preventions measures: These include:

Avoidance – Using retaining walls to minimize effects to streams, wetlands, and other environmentally sensitive areas. Except where absolutely necessary, construction equipment would not enter below the ordinary high water mark of Eastside streams. Staging areas and stockpiling areas would be located away from surface water bodies in both areas of the project.

Prevention – Appropriate BMPs would be applied to reduce erosion and reduce or minimize the potential of sediments entering water bodies located within the project area. Erosion and sediment control measures could include mulching, matting, and netting; filter fabric fencing; quarry rock entrance mats; sediment traps and ponds; surface water interceptor swales and ditches; and the placing construction material stockpiles away from streams. In addition, a TESC plan would be prepared and implemented to minimize and control pollution and erosion. Erosion and sediment control BMPs would be implemented and maintained during construction. No new long-term water quality effects are expected, although even with BMPs, some temporary short-term water quality effects (such as increases in stream turbidity) are possible, particularly during large storm events. These effects would be small and not likely to adversely affect stream water quality.

Would there be any difference in the compensation needs for unavoidable negative effects to surface water?

Based on the analysis described above, there would be no changes or compensation needs for the options compared to the original 6-Lane Alternative. As with the original 6-Lane Alternative, no compensation for any of the three options would be required because negative effects to surface water would be avoided or minimized by using stormwater facilities as part of the project design. Discharges from the three options would meet *Highway Runoff Manual* requirements and water quality regulations.

Groundwater

Affected Environment

Project area groundwater was described in detail in the *Water Resources Discipline Report*. Any additional groundwater resources that could be affected by these options are described below.

Are any new groundwater resources affected by the new options?

The extensions of the project area in both the Seattle and Eastside project areas overlay the same aquifers discussed in the *Water Resources Discipline Report*. No new groundwater resources or wellhead protection zones would be affected by the three options being considered.

Potential Effects of the Project on Groundwater

What methods were used to evaluate effects on groundwater resources?

The water resources discipline team followed the same review process used in the *Water Resources Discipline Report* to evaluate any potential permanent effects on groundwater quantity and quality.

How would the project permanently affect groundwater?

Seattle

As was determined for the original 6-Lane Alternative in the *Water Resources Discipline Report*, the Seattle options would have either minimal or no effect on the quantity or quality of groundwater in the Seattle project area. The increased impervious surface associated with the two options in the Seattle project area would have minimal or no effect on groundwater recharge because the increased impervious surface of the roadway would only cover a fraction of the total recharge area of the aquifer. The size of these aquifers is not known; however, they typically are much larger than the surface water basins above

them. These minimal reductions in potential recharge areas based on surface water basin sizes are conservative.

Groundwater quality would not be affected because both of the Seattle options would treat stormwater prior to discharging to Lake Union, Portage Bay, and Lake Washington. Considering the net movement of groundwater from adjacent aquifers into Lake Union, Portage Bay, and Lake Washington (and not back into these aquifers from these lakes), stormwater discharged to these water bodies would not be a source of groundwater contamination in these aquifers.

Eastside

The South Kirkland Park-and-Ride Transit Access – 108th Avenue Northeast option would also have either minimal or no effect on the quantity or quality of Eastside project area groundwater. As discussed above for the Seattle project area, the increased impervious surface associated with build alternatives would also have minimal or no effect on groundwater recharge because the roadway covers only a fraction of the total recharge area of the groundwater system. Additionally, this option would have no effect on the Group B well located in the Eastside project area (see Exhibit 42 in the *Water Resources Discipline Report*).

How would project construction temporarily affect groundwater?

Potential effects on groundwater during construction of 6-Lane Alternative options would be related to:

- The project's disturbed area footprint during construction
- Any dewatering required during construction

Construction of roadways and bridges may temporarily alter the flow of groundwater (but not back into the aquifer from the lakes). An example of construction activities that could affect groundwater include temporary piles that are driven into the ground to provide a framework for bridge or wall construction. These piles or shafts can become obstacles to groundwater flow. Another construction activity that could temporarily alter groundwater flow are dewatering wells. These are used to lower groundwater levels to allow construction below ground in a dry environment. This could cause a temporary reversal of groundwater flow towards the construction area; however, these effects would be localized and temporary. It's possible that additional

dewatering beyond that already required for the original 6-Lane Alternative could occur with the 6 Lanes with Pacific Street Interchange option at the Montlake Boulevard/Pacific Street intersection and the new Pacific Street interchange ramps.

No additional temporary effects on groundwater used for drinking in the project area beyond those already identified as being negligible for the original 6-Lane alternative would be associated with any of the 6-Lane Alternative options. Any temporary effects to groundwater-supported surface water systems would be minimal because water removed during construction would be discharged to surface water systems. Intermittent dewatering associated with the 6 Lanes with Pacific Street Interchange option could temporarily alter groundwater flow direction; however, the groundwater flow direction would return to normal after construction is completed. No additional effects of the project on the water wells were identified.

Groundwater Mitigation

What has been done to avoid or minimize negative effects to groundwater?

For measures to minimize negative effects to groundwater, refer to the mitigation discussed for surface water in the *Surface Water Mitigation* section of this addendum. Stormwater treatment facilities would be constructed to protect groundwater quality. During construction, any negative effects would be avoided or minimized by the use of BMPs and the TESC and SPCC plans.

Groundwater generated from dewatering activities during construction would be stored in either temporary treatment ponds at or near the location of the permanent stormwater treatment wetlands or in portable steel tanks. Water would be stored for a sufficient amount of time to allow particles to settle, or chemical flocculants could be used to reduce suspended particles, before the water is discharged to the stormwater system. For more details, see Appendix H, *Geology and Soils Discipline Report* (CH2M HILL 2005a), and its addendum (CH2M HILL 2006).

How could the project compensate for unavoidable negative effects to groundwater?

The 6-Lane Alternative options would increase the amount of land covered by PGIS in the project area; however, this increase would not

cause a detectable change to groundwater recharge. Pollutant loading to stormwater discharges would be the same or less than they are with the options. Since permanent effects on groundwater would be negligible, and human use of groundwater in the project area is limited, no additional compensation is required.

Potential effects on groundwater during construction of the options would be negligible. Any potential effects would be minimized through the implementation of the TESC and SPCC plans.

References

Brabec, E., S. Schulte, P. Richards. 2002. Impervious surfaces and water quality: a review of current literature and its implications for watershed planning. Journal of Planning Literature, 16(4): 499-514.

CH2M HILL. 2005a. *Geology and Soils Discipline Report.* Appendix H to the SR 520 Bridge Replacement and HOV Project Draft EIS. Prepared for Washington State Department of Transportation, Federal Highway Administration, and Sound Transit. March 8, 2005.

CH2M HILL. 2005b. *Addendum to Stormwater Management Report, SR 520 Bridge Replacement and HOV Project Draft EIS, 6-Lane Alternative Options*. Prepared for Washington State Department of Transportation, Federal Highway Administration, and Sound Transit. October 2005.

CH2M HILL. 2006. *Addendum to Geology and Soils Discipline Report*, *SR 520 Bridge Replacement and HOV Project Draft EIS, 6-Lane Alternative Options*. Prepared for Washington State Department of Transportation, Federal Highway Administration, and Sound Transit. January 19, 2006.

City of Seattle. 2000. Stormwater, Grading and Drainage Control Code. Seattle Municipal Code Title 22.800. Vol. 3: Flow Control Technical Requirements Manual; Vol. 4: Stormwater Treatment Technical Requirements Manual. Seattle, Washington. November 2000.

Parametrix, Inc. 2005. *Water Resources Discipline Report*. Appendix L of the SR 520 Bridge Replacement and HOV Project Draft EIS. Prepared for Washington State Department of Transportation, Federal Highway Administration, and Sound Transit. May 3, 2005.

University of Washington Capital Projects Office. 2001. *Final Environmental Impact Statement for the University of Washington Master Plan Seattle Campus*, Volume I. September 10, 2001.

Washington State Department of Transportation (WSDOT). 2004a. *Highway Runoff Manual*. Publication Number 31-16. March 2004.

Washington State Department of Transportation (WSDOT). 2004b. *Environmental Procedures Manual*. Publication Number 31-16. March 2004.