Chapter 4

Section 404(b)(1) Alternatives Analysis

May 2005

Tier II Final EIS

SR 167

Puyallup to SR 509

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Chapter 4 Section 404(b)(1) Alternatives Analysis

Section 404(b)(1) of the Clean Water Act stipulates that no discharge of dredged or fill materials into waters of the U.S., which include wetlands, shall be permitted if there is a practicable alternative which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences. In Washington, the Signatory Agency Committee (SAC, see section 2.5) has agreed to integrate compliance with Section 404(b)(1) guidelines into compliance with the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA) EIS processes. The SAC Agreement also recognizes the need to consider non-water related impacts and acknowledges that these environmental impacts may affect the decision on the least environmentally damaging practicable alternative (LEDPA). This chapter describes the SAC process that resulted in a May 2005 decision on LEDPA.

4.1 Aquatic Resource Impacts and Mitigation

There are a number of waterbodies present within the project area, including Wapato Creek, Hylebos Creek, Surprise Lake Drain, the Fife Ditch, and the Puyallup River. Portions of Hylebos Creek and Surprise Lake Drain will be filled and new sections of stream created to offset impacts. A Conceptual Mitigation Plan has been prepared that identifies sufficient potential mitigation sites within the Puyallup Subbasin. This plan also contains details for compensatory mitigation to offset stream fill activities, the relocation of Hylebos Creek and Surprise Lake Drain. This plan also details steps taken to first avoid, minimize, and then compensate for impacts to the aquatic ecosystem.

4.1.1 Stream Impacts

An approximately 2,050-linear-foot section of Hylebos Creek adjacent to I-5 will be filled due to the construction of the SR 167/I-5 Interchange. This interchange will also require the fill of approximately 1,000 linear feet of Surprise Lake Drain. Several stream crossings are associated with the Preferred Build Alternative (Table 4-1).

Table 4-1: Structure Work (total number) Over Water Bodies

Activity	Hylebos Creek	Puyallup River	Surprise Lake Drain	Wapato Creek
Culvert Replacement	1	0	0	2
Bridge Widening	2	1	0	0
New Culvert Installation	0	0	1	1
New Bridge Installation	0	0	0	5
Bridge Replacement	4	1	0	0
Remove Undersized Crossings	0	0	0	6
Temporary Crossing	2	3	0	2

Note: High spanning structures are not counted.

Proposed structures over Hylebos Creek, Surprise Lake Drain, and Wapato Creek should completely span these waterbodies, minimizing in-water work. While the placement of fill in the stream or stream bank areas will not be necessary to remove and construct crossing structures over these stream systems, there is a potential to impact these systems through erosion, increased sediment loading, and increased turbidity; all of which have the potential to temporarily impact the aquatic environment. The Preferred Build Alternative may also require the placement of up to four bridge piers within the Puyallup River.

4.1.2 Wetland Impacts

In the SR 167 Tier I environmental analysis, the following wetland inventories were utilized in determining wetland impacts for each of the corridor alternatives:

- City of Fife Inventory (Kask 1991)
- Pierce County Inventory
- City of Puyallup Inventory
- National Wetland Inventory

Based on these sources, it was determined that Corridor Alternative 2 had the least amount of direct wetland area impact (11 wetlands affected totaling 7.44 acres).

For the Tier II DEIS, wetlands were identified through field identification and delineation. Through this higher level of analysis, 42 wetlands were determined to be affected by this project totaling 32.9 to 33.6 acres of wetland fill. Section 3.3 of this EIS provides more details on wetland impacts. Table 4-2 summarizes impacts to project wetlands by wetland Category associated with the Preferred Build Alternative. Wetland Categories were determined by using the Washington State Department of Ecology's (Ecology) *Wetland Rating System for Western Washington* (1993).

Table 4-2: SR 167 Wetland Impacts by Category

Category	Wetland Impacts
II	0.8
III	32.1
IV	0.04
Total	**32.9**

4.1.3 Tier I Wetland Analysis

The U.S. Army Corps of Engineers requested during comment on the Tier II DEIS that the Tier I wetlands analysis be reexamined to further document the increase in wetland impacts. Several factors contributed to the increase.

- Field identification delineated several small wetlands not identified on the existing local and federal wetland inventories.

- The Tier I corridor alternative was limited to a 220 foot wide corridor because it was assumed that there would be a narrower median and the roadway would be placed either on structure or on a lower embankment than what is used in the Tier II DEIS. During the Tier II process, it was also determined necessary to place the roadway above the existing 100-year floodplain, which results in an average vertical height of eight feet of embankment throughout the project and a correspondingly wider footprint.

- Due to traffic demands, an additional general purpose lane was added between the I-5 interchange and the Valley Avenue interchange.

- The Tier II corridor includes additional features such as interchange options, a separated bicycle path between 54th Avenue East to 12th Street East, weigh stations, and park and ride facilities which increases the project corridor in some areas up to 600 feet wide.

The three corridor alternatives (Corridors 1, 2, and 3) analyzed in the Tier I FEIS are not completely independent corridors, partially sharing the same corridor (Figure 4-1). Corridor alternatives 2 and 3 share an even greater portion of the same corridor, becoming independent north of I-5. Given the factors above and the fact that portions of Corridors 1, 2, and 3 are shared, it can be shown that potential wetland impacts would increase within Corridors 1 and 3 proportionately to Corridor 2.

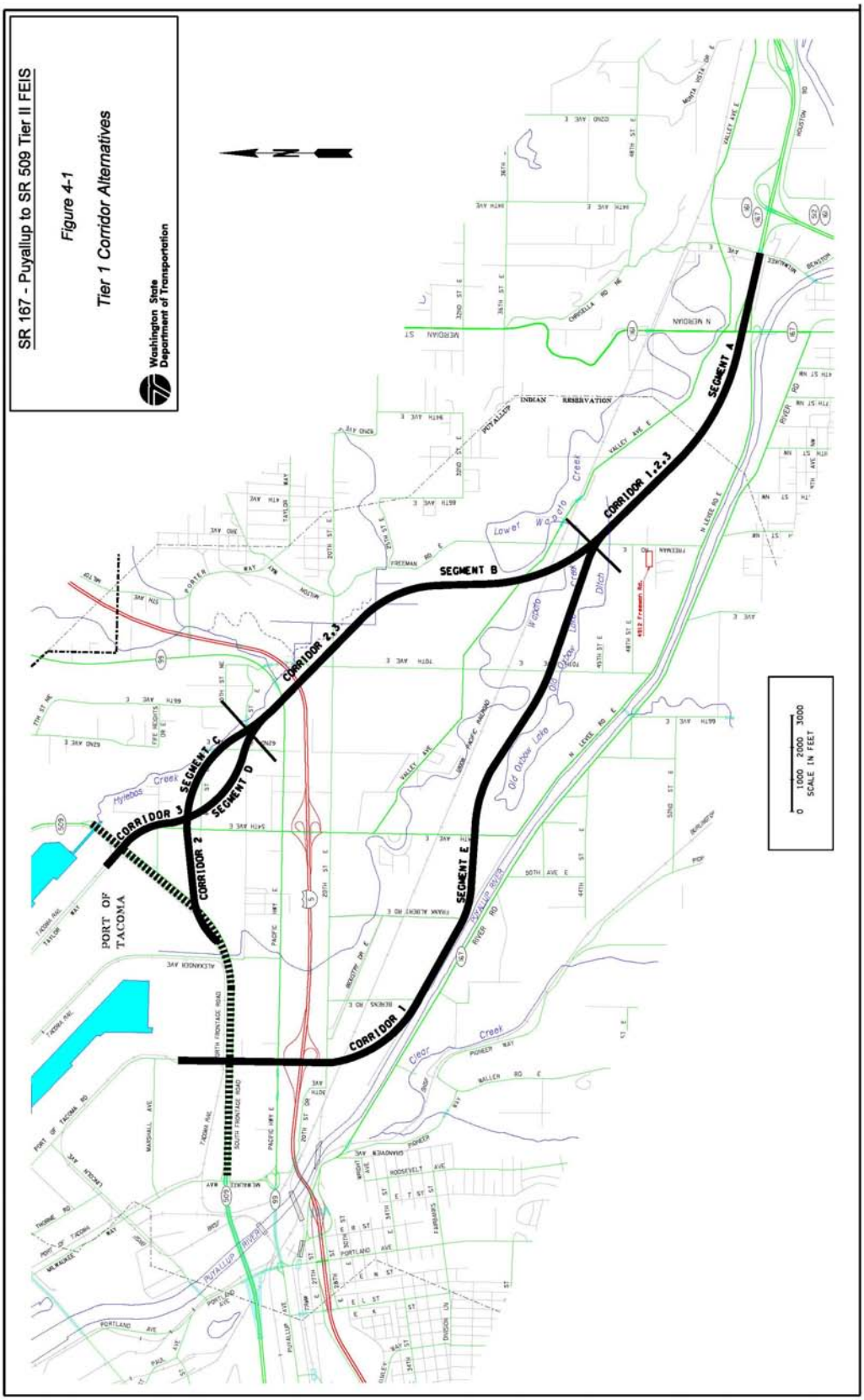
The three corridors analyzed in the Tier I FEIS can be divided into distinct segments, making analysis of increased wetland impacts possible. The three corridors can be divided into five segments: A, B, C, D, and E (Figure 4-1). Segments are determined based on those portions of all three corridors that are shared. In the Tier I FEIS, Corridor 1 identified 21 wetlands, and Corridor 2 and Corridor 3 identified 35 wetlands. In the Tier II EIS, 72 wetlands comprising over 106 acres were delineated in the vicinity of the preferred alternative (Corridor 2).

Segment A

Segment A extends from the project terminus in Puyallup to a point just west of 82nd Avenue East where Corridor 1 diverges from Corridors 2 and 3. Segment A is shared by all three corridor alternatives. In the Tier I FEIS, no wetlands were identified within this segment. In Tier II, seven wetlands were delineated within this segment, with wetland impacts equaling approximately 7.59 acres. This increase in wetland impacts occurs within all three corridors.

Segment B

Segment B extends from the north end of Segment A to where Corridors 2 and 3 diverge, just south of 12th Street East and east of 62nd Avenue East. Segment B is shared by Corridors 2 and 3. In the Tier I FEIS, 30 wetlands were identified within this segment with wetland impacts equaling approximately 7.0 acres. In Tier II, 52 wetlands were delineated within this segment with wetland impacts equaling 24.08 acres. This increase in identified wetland impacts is the same for Corridors 2 and 3.


SR 167 - Puyallup to SR 509 Tier II FEIS
Figure 4-1
Tier 1 Corridor Alternatives
Washington State Department of Transportation
N
SEGMENT A
SEGMENT B
SEGMENT C
SEGMENT D
SEGMENT E
CORRIDOR 1,2,3
CORRIDOR 2,3
CORRIDOR 3
CORRIDOR 2
CORRIDOR 1
PORT OF TACOMA
PUYALLUP INDIAN RESERVATION
Lower Wapato Creek
Wapato Creek Ditch
Old Oxbow Lake
Hylebos Creek
Clear Creek
Puyallup River
0 1000 2000 3000
SCALE IN FEET

Segment C

Segment C extends from the north end of Segment B to SR 509 in the vicinity 8th Street East. This segment is specific to Corridor 2 only. In the Tier I FEIS, 5 wetlands were identified with impacts equaling approximately 0.44 acre. In Tier II, 13 wetlands were delineated, with impacts equaling 1.22 acres.

Segment D

Segment D extends from the north end of Segment B to Taylor Way. This segment is specific to Corridor 3 only. In the Tier I FEIS, five wetlands were identified with wetland impacts equaling 8.98 acres. Using the existing information from local and national inventories and applying a 400-foot corridor, currently definable wetland impacts would increase to approximately 12.41 acres (see SR 167 Tier I FEIS Figure 4-23 [Sheet 1 of 5]).

Segment E

Segment E extends from the north end of Segment A to SR 509 at Port of Tacoma Road. Segment E is specific to Corridor 1 only. In the Tier I FEIS, 21 wetlands were identified with impacts equaling 14.55 acres. As with Segment D, using the existing information from local and national inventories and applying a 400-foot corridor, currently definable wetland impacts would increase to approximately 28.67 acres (see SR 167 Tier I FEIS Figure 4-21 [Sheets 1 – 5 of 6]).

Segment E, west of Frank Albert Road, runs parallel to the Puyallup River. In this area, Segment E would cross what has now been identified as a potential compensatory wetland mitigation site for this project. Wetland delineation has not yet occurred at this site, but it is expected that field identification and delineation would increase the amount of wetland impacts associated with Corridor 1 through the wetland mitigation site.

The Tier II DEIS partially delineated one wetland in the vicinity of Freeman Road (the north end of Segment A). Corridor 1 would impact Wetland G, and extending a 400-foot corridor through this wetland would result in 1.63 acres of wetland impacts (see SR 167 Tier II DEIS Figure 3.3-9). Therefore, currently definable wetland impacts associated with Segment E are approximately 30.30 acres, using these factors.

Table 4-3 summarizes wetland impacts, per segment, for both the Tier I FEIS and Tier II DEIS.

Table 4-3: Wetland Impacts per Segment

Segment	Tier I EIS (acres)	Tier II EIS (acres)
A	0.00	7.59[a]
B	7.00	24.08[a]
C	0.44	1.22[a]
D	8.98	>12.41[b]
E	14.55	>30.30[b]

a) Actual project impacts based on field identification and delineation shown in Tier II EIS
b) Estimated impacts based on 400' corridor width and wetland inventories shown in the Tier I EIS

Because both Corridor 1 and 3 share portions of Corridor 2, increases in wetland impacts for Corridor 2 would also be seen as an increase in wetland impacts for Corridor 1 and 3. Table 4-4 details which segments are associated with which corridor and estimated wetland impacts that would occur under Tier II. Note that Corridor 1 and 3 impacts would most likely increase substantially with field delineation along the entire corridor length.

Table 4-4: Revised Estimated Tier I Corridor Wetland Impacts

Corridor Alternative [a]	Segments	Tier I FEIS Wetland Impacts	Revised Estimated Wetland Impacts
Corridor 1	A & E	14.55	>37.89 [c]
Corridor 2	A, B, & C	7.44	32.9 [b]
Corridor 3	A, B, & D	15.98	>44.08 [c]

a) Corridor Alternative from the Tier I EIS.
b) Corridor 2 impacts are not an estimate, but actual project impacts from the Tier II EIS.
c) Currently definable estimates. These impacts would most likely increase proportionally with field delineation along the entire corridor.

Based on the above description of changes in wetland impacts between the Tier I FEIS and Tier II DEIS, it can be reasonably concluded that potential impacts within Corridors 1 and 3 would have increased proportionately with the preferred Corridor 2 impacts had the level of identification and analysis been consistent for all corridors.

4.2 Least Environmentally Damaging Practicable Alternative (LEDPA)

As described above, the proposed project is being analyzed under a two-tiered environmental process, with a Tier I FEIS and a Tier II DEIS having been completed. The Tier I FEIS was issued in April 1999,and a Record of Decision (ROD) was issued in June 1999. The ROD identified the Corridor 2 Alternative as the preferred alternative and concurred that it was the LEDPA.

The Tier II DEIS analyzes a single Build Alternative, within Corridor 2 (preferred alternative). The Federal Highway Administration (FHWA) and Washington State Department of Transportation (WSDOT) have taken steps to avoid and minimize impacts to the aquatic ecosystem.

4.2.1 Preliminary Design Avoidance and Minimization

During preliminary design, it was determined that the mainline alignment did not meet current design standards. Five different alignments were evaluated. The preferred alignment shifted the mainline away from Hylebos Creek in order to meet state and Federal design standards. This shift also resulted in a reduction of wetland and floodplain impacts in the corridor segment between SR 509 and I-5. This redesign resulted in the avoidance of nine wetland areas and a reduction of 6.9 acres of wetland impacts, see Table 4-5.

Table 4-5: Comparison of Tier I and Tier II Wetland Impacts Between SR 509 and I-5

Wetland	Size (Acres)	Tier I Corridor Impacts (Acres w/400 ft Corridor)	Tier II Corridor Impacts (Acres)
AA	0.57	0.57	0.00
BB	0.84	0.84	0.00
CC	0.13	0.01	0.00
DD	0.66	0.66	0.00
EE	0.12	0.12	0.00
FF	1.14	0.25	0.00
GG	0.52	0.27	0.00
HH	1.51	0.20	0.00
LL	1.21	1.21	0.38
MM	3.22	3.22	0.18
OO	0.32	0.11	0.00
TOTAL	**10.24**	**7.46**	**0.56**

The majority of Corridor 2 floodplain impacts in Tier I were associated with Hylebos Creek (SR 167 Tier I EIS Figure 4-18). Elevating the freeway on structure in the segment adjacent to Hylebos Creek minimized impacts to this floodplain area. The shift in the alignment in Tier II resulted in avoiding Hylebos Creek floodplain areas (SR 167 Tier II EIS Figure 3.2-1).

Near the Valley Avenue Interchange, it was determined that the Tier I mainline alignment did not meet design standards for horizontal stopping sight distance. The redesign of the alignment allowed placement between the meanders of Wapato Creek. This revised alignment in the vicinity of Valley Avenue also allows for the project to establish an approximately 300-foot riparian buffer around Wapato Creek, as part of the Riparian Restoration Proposal.

Wetland impacts were minimized to the greatest extent practicable. As the design development process continued, additional opportunities for avoidance and minimization were incorporated and are described below.

4.2.2 Mainline Avoidance and Minimization

Streams

The proposed project crosses four streams: Wapato Creek, Hylebos Creek, Surprise Lake Drain, and the Puyallup River. All crossing structures will span the associated stream with the possible exception of the Puyallup River Bridge, minimizing in-water construction. Table 4.1 summarizes the structures (bridges and culverts) that will cross waterbodies in the Preferred Alternative.

Two undersized bridges on Hylebos Creek at 8th Street East and 62nd Avenue East will be removed. An approximately 600-linear-foot section of the existing Hylebos Creek adjacent to I-5 will be left in place, providing off channel habitat

opportunities. Six undersized crossings will be removed and two culverts will be replaced on Wapato Creek, near the Valley Avenue Interchange. These improvements will serve to minimize permanent impacts within the floodplain.

The relocation of Hylebos Creek and Surprise Lake Drain will also minimize any future permanent impacts to these waterbodies. Relocation will create a stream channel that is longer, has more meanders, improved substrate, and provides better aquatic habitat than currently exists in this location.

Potential impacts to aquatic environments associated with bridge construction and replacement and culvert installation can be minimized to the greatest extent possible through the use of approved performance measures. Best Management Practices (BMPs) for bridge removal are described in detail in the Biological Assessment. In addition, potential impacts from bridge construction can be avoided and minimized by development and implementation of the TESC plan and a Spill Prevention Control and Countermeasure (SPCC) plan. The TESC is a working document that details BMPs that will be used during construction to prevent erosion and control sedimentation. During the construction of the project, erosion and sediment control BMPs will be continuously monitored and the TESC plan modified in response to changing site and weather conditions. The SPCC plan specifies the procedures, equipment, and materials used to prevent and control spills of contaminated soil, petroleum products, contaminated water, and other hazardous substances.

Wetlands

The project has minimized impacts to wetlands to the greatest extent practicable at the current level of design. Due to relatively flat terrain and shallow groundwater, it would not be possible to meet the purpose and need of this transportation project without impacts to wetlands within the Puyallup River Valley.

As shown in the SR 167 Tier II DEIS, a conventional stormwater pond system meeting Ecology standards would require a minimum of approximately 24 acres of ponds associated with the Valley Avenue Interchange. The relatively flat terrain and shallow groundwater in this area would require the construction of large, bermed ponds. It would be very difficult to find locations for these ponds that did not impact additional existing wetland areas and Wapato Creek. A Riparian Restoration Proposal (RRP) has been prepared for the Valley Avenue Interchange for stormwater flow control, which could avoid a potential two acres of wetland impacts that would be associated with a conventional stormwater pond system. For more information about RRP, see Chapter 3.2.

4.2.3 Interchange Options Avoidance and Minimization

In addition to avoiding and minimizing impacts to aquatic ecosystems within the mainline, the project team developed a number of interchange design options.

54th Avenue Interchange

At 54th Avenue East, the preferred Loop Ramp Option had the least amount of wetland impacts. This option minimizes impacts to Wetland JJ, resulting in an impact reduction of approximately half an acre (Figure 2-2).

Valley Avenue Interchange

An analysis of wetland impacts at Valley Avenue indicated that the Freeman Road Option has the least amount of wetland impacts. The project team reevaluated Valley Avenue Interchange options, in an effort to confirm wetland impacts and identify measures to minimize impacts. The project team determined that bridging Wapato Creek and Wetland QQ as part of the preferred Valley Avenue Option, a span of approximately 100 feet, would reduce wetland impacts by half an acre (Figure 2-6). Wetland QQ is a Category II wetland, and avoiding this wetland reduces the project's Category II wetland impacts to 0.8 acre, 2 percent of overall wetland impacts.

In addition, the project team determined that an adjustment to the design of the Freeman Road Option was necessary in order to avoid a 4(f) historic resource on Freeman Road. Widening Freeman Road on one side will impact Wetland A7, increasing wetland impacts by 0.16 acre at this option (Figure 2-12). This reevaluation revised wetland impacts associated with the Valley Avenue Interchange such that the variance between options is statistically insignificant.

Future development of the area due to the commercial/industrial zoning of agricultural lands also has the potential to change the wetland impact analysis. A reevaluation of wetland impacts prior to start of construction, should capture land use changes that will affect current delineated wetlands within the project area.

Other Environmental Factors

Other environmental factors necessary to determine overall project impacts included wetland buffer impacts, wildlife habitat impacts, stream crossings (aquatic habitat), and floodplain impacts. Stream crossing impacts (aquatic priority habitat) are based on a 50-foot riparian buffer impact at the crossing. High precedence was given to minimizing displacements of current residences and businesses and to avoiding impacts to cultural resources, including sites of Tribal importance. In addition, precedence was also given to avoiding floodplains and the relative opportunities associated with the interchange options to improve and restore aquatic and riparian habitats. The environmental factors prioritized as part of determining the preferred interchange option at Valley Avenue are described in Chapter 2.

The analysis of environmental and other factors demonstrated that the preferred Valley Avenue Option is the most practicable alternative.

SR 161 Interchange

No wetland impacts are associated with this interchange.

4.2.4 Future Avoidance and Minimization Opportunities

FHWA and WSDOT will also continue to evaluate potential opportunities to incorporate additional avoidance and minimization efforts as project design approaches completion. Future avoidance and minimization measures may include (but are not limited to):

- Minor changes to design alignment;
- Using steeper fill slopes;
- Using retaining walls to eliminate fill slopes;
- Using culverts to hydrologically connect wetlands bisected by the highway;
- Using a bridge design that spans the Puyallup River, avoiding the placement of piers within the river.

4.2.5 Beneficial Aspects of the Project

The RRP will provide a riparian buffer area to Hylebos Creek between 8th Street East and I-5 to address stormwater flow control. The RRP will also be applied to the relocated sections of Hylebos Creek and Surprise Lake Drain, as well as to Wapato Creek. The implementation of riparian restoration will restore or enhance riparian resources (including associated wetlands) within the project area.

The use of riparian restoration will both stabilize streambanks and help reverse the trend of human encroachment into riparian areas. The plan will include removing structural encroachments into the floodplain and flood prone areas adjacent to Hylebos Creek. The riparian buffer will extend from 300 to 600 feet wide and will link to several existing wildlife corridors. Existing wildlife corridors include the 110-acre Milgard Restoration Site, 860 acres in Federal Way along the West Fork of Hylebos Creek, 260 acres along the East Fork of Hylebos Creek, and 220 acres associated with Surprise Lake.

There are several additional benefits of the RRP, in terms of protecting or rehabilitating Lower Hylebos Creek, Surprise Lake Drain, and Wapato Creek.

- Studies have shown that urban streams with intact riparian buffers ($\geq$100 feet) are healthier than urban streams with degraded buffers (Steedman 1988; Horner et al. 1996; and Jones et al. 1996).
- RRP would stabilize streambanks with native riparian vegetation and by increasing the amount of large woody debris (LWD) in the stream, which would prevent channel erosion.
- A major problem, as described in the limiting factors analysis (Kerwin 1999), is directly or indirectly related to a lack of riparian buffers and LWD. RRP would convert these impacted streams back to more naturally functioning streams.

- Aquatic habitat would be improved by RRP and aid in salmon recovery. The relocation of Surprise Lake Drain would create much needed over-winter rearing habitat for juvenile salmon.

- Water quality in Lower Hylebos Creek and Surprise Lake Drain could be improved by RRP. The riparian buffers would filter non-point sources of pollutants from surface runoff before they discharge to the creeks. Riparian buffers filter sediment, trash, and debris from floodwaters. Also, forested buffers provide shade, which reduces summer temperatures and increases dissolved oxygen.

- Flow control would be provided by RRP. The proposal would improve floodplain storage and hyporheic flow. Also, reconverting developed lands back to forested conditions would reduce surface runoff from those areas, and increase infiltration and aquifer recharge.

The full extent of flow control benefits would not be estimated until the final design is established and the Hydrological Simulation Program Fortran model results are analyzed. The estimate of floodplain storage would vary with time, because the channels would once again be allowed to migrate. As new channels would be created during flood events and old channels abandoned, riparian wetlands and backwater channels would be formed.

The RRP would substantially increase wetland functions in the Hylebos and Wapato Creek sub-watersheds. Currently, Wetland 9 is a large area dominated by reed canarygrass. Wetland T is farmed. The wetlands near Wapato Creek are currently disturbed by grazing and farming practices. These existing wetlands in the RRP would function to better provide floodwater storage and water quality enhancement. An analysis of potential wetland enhancements is provided in Table 4-6.

An undetermined amount of additional wetlands would also likely be created in the process of stream stabilization in the riparian areas by restoring hydrology. In addition, buffers at wetland sites adjacent to Hylebos Creek, Surprise Lake Drain, and Wapato Creek would also be enhanced under the riparian restoration proposal.

The RRP would also have beneficial effects on the agricultural wetlands and riparian areas adjacent to Wapato Creek and Surprise Lake Drain. This would be accomplished by acquiring some agricultural lands and removing structures and impervious surfaces, and filling ditches and severing drain tiles and pipes that increase runoff (for example, in the vicinity of Wetland T). Through their acquisition, these lands would be conserved rather than converted to commercial or industrial development, and the riparian areas could become wetland and wetland buffer areas.

Table 4-6: Existing Wetlands Enhanced by Riparian Restoration Proposal

Wetland	RRP Area (acres)	Existing Wetland Area (acres)	Remaining RRP Area (acres)
Hylebos Creek Sub-Watershed			
9		44.9	
Y		0.8	
T		6.9	
AA		0.5	
BB		1.0	
CC		0.1	
DD		0.5	
Estimated Total	114	54.7	59.3
Wapato Creek Sub-Watershed			
PP		1.5	
QQ		0.5	
RR		0.5	
UU		2.3	
V		1.0	
Estimated Total	62.5	5.8	56.7
Project Total	**176.5**	**60.5**	**116**

Water quality in Hylebos and Wapato Creeks could directly benefit from reduced input of fertilizer, herbicides, insecticides, and other chemicals used in farming. The RRP would improve the functions in farmed wetlands by allowing them to revert back to a variety of wetland types. The Surprise Lake Drain RRP will convert an area of active farmland, which the City of Fife has zoned for industrial and commercial development.

4.3 Conclusion

Based on the above discussion, impacts to the aquatic ecosystem will be avoided and minimized to the greatest extent possible. Compensatory mitigation, as detailed in the *SR 167 Conceptual Mitigation Plan* (WSDOT 2005), will provide mitigating measures for any unavoidable permanent project impacts to waters of the United States. The project design has been adjusted to the greatest extent possible, to minimize impacts to project vicinity stream systems and wetlands. Once final impacts through complete design are identified, a Final Mitigation Plan will be prepared to provide compensation to stream and wetland impacts.

Based on the described efforts to avoid and minimize impacts to aquatic ecosystems in both the Tier I and Tier II EIS process, it can be concluded that the current Build Alternative, with preferred interchange options, is LEDPA.