Chapter 3

Affected Environment and Environmental Consequences

Tier II Final EIS

SR 167

Puyallup to SR 509

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Chapter 3 Affected Environment and Environmental Consequences

3.0 Introduction to Chapter 3

Technical studies prepared by WSDOT and various consultant teams assess the environmental consequences of the SR 167 Extension project. Fifteen disciplines or resource areas are included in the Tier II Final Environmental Impact Statement (FEIS):

1. Water Resources
2. Wetlands
3. Wildlife, Fish, and Threatened and Endangered Species
4. Air Quality
5. Noise
6. Energy
7. Hazardous Materials
8. Visual Quality
9. Public Services and Utilities
10. Land Use, Socioeconomics, and Environmental Justice
11. Farmland
12. Displacement, Disruption and Relocation
13. Transportation
14. Pedestrian and Bike Facilities
15. Cultural Resources

Each resource area is summarized in its own section within this chapter. These sections describe existing conditions and address the environmental effects of the No Build and Build Alternative with the different interchange options.

Many sections have been revised substantially since the Draft Environmental Impact Statement (DEIS) to incorporate additional studies or respond to agency and public comments. The water resources; wetlands; and wildlife, fish and threatened and endangered species sections are reorganized by basin (i.e., Hylebos Creek, Wapato Creek, and Lower Puyallup River) to present the results more consistently. Section 3.11 is reorganized to distinguish the discussions on land use, socioeconomics, and environmental justice.

Indirect and cumulative effects on individual resources are now discussed in their respective sections of Chapter 3. Cumulative effects for critical resources are summarized in Section 3.17, which also presents results from the *Net Environmental Benefits Analysis* (CH2M HILL 2005). The large 11- by 17-inch figures in the Tier II DEIS are now presented using a standard page size, making the document easier to use.

The following Environmental Matrix (Table 3.0-1) compares environmental effects and mitigation for the No Build Alternative and Preferred Build Alternative, including preferred interchange options and related facilities like the Riparian Restoration Proposal (RRP). It has also been revised and reformatted in an effort to make the table easier to read. Chapter 2 describes the Preferred Build Alternative in more detail and discusses how the preferred interchange options were selected.

Table 3.0-1: Matrix of Environmental Impacts

No Build Alternative Other improvements by WSDOT and Local Agencies	**Preferred Build Alternative** Mainline, preferred interchange options, and related facilities, including RRP
Water Resources	
Construction Impacts Clearing and grading: None from this project. Stream Crossings: No temporary or new crossings. No improvements to existing crossings. Stormwater Runoff: No change. Stream Improvements: None. Area streams remain ditch-like, with little or no riparian area, and often near roads. Flooded Area: 246 existing Hylebos acres in modeled 100-yr event. FEMA Floodplain: None for this project, but floodplain encroachment is expected from other transportation improvements and future development of the area.	**Construction Impacts** Clearing and grading: 710-719 acres, of which 286-295 acres are temporary or for RRP. Stream Crossings: 11 temporary 13 new 19 improved or removed Other: 42 near-water work sites 23 wellhead protection zones crossed. Stormwater Runoff: Decreased surface infiltration due to increased amount of impermeable ground surface. Stream Improvements: 1960-ft increase in Hylebos Creek 84.9-acre increase in Hylebos Creek riparian buffer 4340-ft increase in Surprise Lake Drain 29.0-acre increase in Surprise Lake Drain riparian buffer 73-acre increase in Wapato Creek riparian buffer Flooded Area: 187 future Hylebos acres in modeled 100-yr event, a 25% decrease from existing conditions. FEMA Floodplain: 14.5 acres
Operational Impacts Water Quality: Continued degradation might occur due to increase in traffic.	**Operational Impacts** Water Quality: Pollutant loads are expected to increase by <0.1% to 2.7% depending on parameter and basin.
Cumulative Impacts Area streams remain highly modified without improved channels and riparian areas. Continued development increases impervious area, reducing infiltration and increasing stormwater runoff. Flooded Area: 360 Hylebos acres in modeled 100-yr event with future development but no SR 167 project, a 45% increase from existing conditions.	**Cumulative Impacts** RRP offers innovative approach to control stormwater flow, with good potential for water quality treatment as well. Modeling predicts the project will reduce 100-yr event flooding in Hylebos basin by 48% compared to a 45% increase for future development without the project. NEBA of the RRP identified water quality benefits by improving impaired conditions of high instream temperatures, low dissolved oxygen, chronic low instream flows in summer, high concentrations of nutrients, fecal coliform bacteria, and suspended solids. Other benefits include reduced flooding. Overall functioning of stream-riparian-complex is expected to improve, but no single project can compensate for cumulative impacts of past and future development.
Mitigation None from this project.	**Mitigation** Standard construction sediment and erosion control; constructed wetlands; deep fill infiltration; clear span structures at most crossings; as well as traditional treatments such as biofiltration swales and detention BMPs. Establishment of riparian restoration along Hylebos Creek and Surprise Lake Drainage to minimize conventional flow control treatment that would be needed otherwise.
Unavoidable Adverse Impacts Continued degradation might occur due to increase in traffic.	**Unavoidable Adverse Impacts** Potential for change in hydrology and ponding of surface water.

Table 3.0-1: Matrix of Environmental Impacts

No Build Alternative Other improvements by WSDOT and Local Agencies	**Preferred Build Alternative** Mainline, preferred interchange options, and related facilities, including RRP
Wetlands	
Construction Impacts No effects to existing wetlands and buffers. No increase in riparian habitat. No improvement in existing wetland functions. **Operational Impacts** Continued urbanization could result in wetland loss and degradation. **Cumulative Impacts** Cumulative effects are substantial because mitigation was not required during past development. Mitigation required for future development is not expected to offset past losses in wetland functions and values. **Mitigation** None required. **Unavoidable Adverse Impacts** Loss of wetland habitat because of continued development.	**Construction Impacts** 32.9 acres of mostly Category 3 wetlands 56.5 acres of wetland buffer RRP creates 189 acres of new riparian habitat. RRP improves functions of 74.2 acres of existing wetlands. **Operational Impacts** Wetland hydrology would be altered. **Cumulative Impacts** NEBA of the RRP included riparian wetlands and estimated 70% more cumulative benefits for RRP portion of the Build Alternative than the No Build. NEBA identified improvement of disturbed and degraded wetlands as a benefit of RRP. Overall functioning of stream-riparian-complex is expected to improve, but no single project can compensate for cumulative impacts of past and future development. **Mitigation** Wetland enhancement and creation would mitigate impacts. **Unavoidable Adverse Impacts** Loss of wetland habitat.
Wildlife, Fish, and Threatened and Endangered Species	
Construction Impacts No direct effect to wildlife, fish and vegetation. Expected effects of continuing development and increase in traffic would occur. Stream Crossings: No temporary or new crossings. No improvements to existing crossings. **Operational Impacts** Continued urbanization and traffic could result in habitat degradation. **Cumulative Impacts** Cumulative effects are substantial because past habitat loss, fragmentation, and stream alteration. Continued development will further fragment riparian habitat, add new stream crossings, and reduce potential restoration areas where floodplain connectivity and forested riparian habitats can be established. **Mitigation** None. **Unavoidable Adverse Impacts** Potential for loss of habitat.	**Construction Impacts** **Wildlife Habitat Types Affected:** 196 acres Developed, plus 86 acres of temporary disturbance 131 acres Agricultural, plus 50 acres of temporary disturbance 68 acres Grass/Shrub, plus 34 acres of temporary disturbance 17.8 acres Forest, plus 4.5 acres of temporary disturbance. Fisheries Effect: 33-35 near-water work sites Temporary reduction in water quality Stream Crossings: 11 temporary 13 new 19 improved/removed **Operational Impacts** Road would act as a barrier to some wildlife and result in the mortality of individual migratory birds and loss and fragmentation of existing habitat. Potential to effect water quality in fish bearing waters. **Cumulative Impacts** NEBA of the RRP included riparian uplands and stream habitat for fish, and estimated 70% more cumulative benefits for RRP portion of the Build Alternative than the No Build. NEBA identified several benefits of the RRP to fish and wildlife, including habitat protection, enhanced wildlife connectivity, improvements in stream limiting factors for salmon, and support of salmon recovery efforts. Overall functioning of stream-riparian-complex is expected to improve, but no single project can compensate for cumulative impacts of past and future development. **Mitigation** Avoid and minimize wherever possible. Follow regulations and permit conditions and coordinate with regulatory agencies. Provide clear span structures for most crossings. Standard construction sediment and erosion control; detention BMPs; swale to mitigate stormwater pollutant. An alternative approach to floodplain impacts by establishing floodplain and riparian restoration with wildlife corridors. **Unavoidable Adverse Impacts** Loss of wildlife habitat.

Table 3.0-1: Matrix of Environmental Impacts

No Build Alternative Other improvements by WSDOT and Local Agencies	**Preferred Build Alternative** Mainline, preferred interchange options, and related facilities, including RRP
Air Quality	
Construction Impacts None.	**Construction Impacts** Dust from excavation and grading. Minor increase in emission from construction equipment.
Operational Impacts It is anticipated that the No-Build Alternative would cause more traffic congestion than the Build Alternative in the year 2030. As stated in the Tier I ROD, the No-Build increases air pollution because of congestion. Air quality standards might not be met.	**Operational Impacts** Some of the area would show increase over existing pollutant level due to increase in traffic. Air quality standards would be met or exceeded.
Mitigation None.	**Mitigation** Standard construction measures require a fugitive dust plan.
Unavoidable Adverse Impacts None.	**Unavoidable Adverse Impacts** None.
Noise	
Construction Impacts None.	**Construction Impacts** Temporary increase in noise due to construction activities.
Operational Impacts 11 of 35 sites studied will approach or exceed FHWA criteria.	**Operational Impacts** 45 sites studied will approach or exceed FHWA criteria.
Mitigation None.	**Mitigation** Noise wall is feasible at five locations, but reasonable at only one location. Only one noise wall will be provided.
Unavoidable Adverse Impacts 2-4 dBA increase in noise level.	**Unavoidable Adverse Impacts** 2-18 dBA increase in noise level.
Energy	
Construction Impacts None for this project.	**Construction Impacts** Would use more energy than no build alternative, but no measurable impact at regional or local level.
Operational Impacts Increase in energy usage because of higher congestion and traffic volumes.	**Operational Impacts** Moderate energy saving for vehicles on the local streets due to reduced congestion.
Mitigation None.	**Mitigation** None.
Unavoidable Adverse Impacts Continued increase in traffic congestion.	**Unavoidable Adverse Impacts** None.
Hazardous Material	
Construction Impacts None.	**Construction Impacts** Potential to encounter contaminated site and asbestos or lead based paint during structure demolition. Petroleum pipeline needs to be moved.
Operational Impacts Impacts associated with normal operation of existing roads like spills affecting stormwater.	**Operational Impacts** Impacts associated with normal operation of highway like spills affecting stormwater.
Mitigation None.	**Mitigation** Hazardous material sites would be cleaned before roadway construction. Spill prevention control plans would be implemented.
Unavoidable Adverse Impacts None.	**Unavoidable Adverse Impacts** None.
Visual Quality	
Construction Impacts None for this project. Temporary impacts because of other minor improvements.	**Construction Impacts** Temporary visual impacts due to construction.
Operational Impacts Visual impacts due to incremental urbanization of corridor.	**Operational Impacts** Views would be greatly altered. There would be increased nighttime light and glare from vehicles and interchange lighting.
Mitigation None.	**Mitigation** Use architectural elements to blend roadway structure. Provide a visual screen either vegetative (landscaping) or architectural at key viewpoints.
Unavoidable Adverse Impacts None.	**Unavoidable Adverse Impacts** Altered views.

Table 3.0-1: Matrix of Environmental Impacts

No Build Alternative Other improvements by WSDOT and Local Agencies	**Preferred Build Alternative** Mainline, preferred interchange options, and related facilities, including RRP
Public Services and Utilities	
Construction Impacts Minimal due to improvements. **Operational Impacts** Increasing delays due to traffic congestion at peak hours. **Mitigation** None. **Unavoidable Adverse Impacts** None.	**Construction Impacts** Possible detours due to road closures. Delay in emergency response time. Relocation of various utility lines and electric poles. **Operational Impacts** Improvement in emergency response time and better public services through reduced congestion. **Mitigation** Detours and road closures would be coordinated with police, fire response units, school districts and other utilities. Service providers affected by construction would be notified. **Unavoidable Adverse Impacts** Emergency response delay during construction may occur.
Land Use	
Construction Impacts None. **Operational Impacts** None. **Cumulative Impacts** Development of the project area for residential, commercial and industrial uses continues in response to local zoning. Community cohesion and social interaction could decrease as traffic problems get worse. **Mitigation** None. **Unavoidable Adverse Impacts** None.	**Construction Impacts** 303 acres of Right of Way acquisition, plus 214 acres for RRP. **Operational Impacts** None. **Cumulative Impacts** The rate of build out for high density uses in response to local zoning will increase, primarily near the new interchanges. No substantial cumulative effects on social interaction and movement within or between neighborhoods are expected. **Mitigation** Acreage needed may be minimized through additional design features such as retaining walls and appropriate design modification. **Unavoidable Adverse Impacts** Permanent conversion of the land use.
Socioeconomics	
Construction and Operational Impacts Users continue to depend upon existing transportation system. Worsening traffic could discourage neighborhood interaction and community cohesiveness. **Mitigation** None. **Unavoidable Adverse Impacts** None.	**Construction and Operational Impacts** Long lasting impacts on community cohesion and social interaction. May be some temporary disruption to businesses and right of way acquisition. Agricultural employment would decrease. One 241-unit complex on 20th Street East with a requirement to fill 20% of units with low income families.is impacted. It is estimated that 4-low income units would be impacted. Temporary construction jobs would be increased. **Mitigation** Coordination of detour routes with the community. Right of Way acquisition program as per State and Federal law in awarding compensation and assistance. **Unavoidable Adverse Impacts** Minimal.
Environmental Justice	
Construction and Operational Impacts Future road improvements by local agencies could cause effect to localized populations.	**Construction and Operational Impacts** No disportionately high and adverse effects on minority, low-income, or disadvantage populations.
Farmland	
Construction and Operational Impacts None at this time. Local agency improvements to roads may impact farmlands. **Cumulative Impacts** Farmland becomes increasing scarce in response to economic pressures and consistent with local zoning. **Mitigation** None. **Unavoidable Adverse Impacts** None.	**Construction and Operational Impacts** 182 acres of farmland effected, plus 91 acres for RRP Activities of 6 farmers would be affected. Three parcels would be fragmented but roadway would not create barrier to equipment. **Cumulative Impacts** Farmland will become increasing scarce in response to economic pressures and consistent with local zoning. **Mitigation** Erosion control measures would minimize loss of top soils. Coordination with affected farmers would be conducted. Access would be provided from local streets to fragmented parcels. **Unavoidable Adverse Impacts** Permanent conversion of farmland to Transportation use.

Table 3.0-1: Matrix of Environmental Impacts

No Build Alternative Other improvements by WSDOT and Local Agencies	**Preferred Build Alternative** Mainline, preferred interchange options, and related facilities, including RRP
Displacement, Disruption and Relocation	
Construction and Operational Impacts None at this time. **Mitigation** None. **Unavoidable Adverse Impacts** None.	**Construction and Operational Impacts** 57 Single Family units 12 Multi-Family units / 17 Manufactured Homes 23 Businesses 4 Public Facilities 2 Farms **Mitigation** Relocation assistance for displaced residents and businesses. **Unavoidable Adverse Impacts** Displacement of residents and businesses.
Transportation	
Construction Impacts Minimal due to improvement in local work. **Operational Impacts** Some of the local intersections would be over capacity. **Mitigation** Local agencies may do improvements to local network. **Unavoidable Adverse Impacts** More congestion on local network.	**Construction Impacts** Possible detours and delays due to road closures. Minimal disruption in Union Pacific Railroad operation. **Operational Impacts** Major improvements in traffic flow and circulation. 20th Street East would be realigned because of I-5 interchange. **Mitigation** Detours and road closure would be planned and coordinated to have least impact. Coordination with railroad authority to minimize impact. **Unavoidable Adverse Impacts** Temporary construction delays.
Pedestrian and Bike Facilities	
Construction Impacts Minimal due to improvement in local network. **Operational Impacts** None at this time. Increased traffic would reduce safety to non-motorized travelers. Future improvements depend on local regulation and funding availability. **Mitigation** Local agencies may improve pedestrian and bike lanes. **Unavoidable Adverse Impacts** None.	**Construction Impacts** Possible detours and delays due to road closures. Additional heavy traffic on some roads. Fractured roadway surface and increased dust may be encountered. **Operational Impacts** Non-motorized traffic would not be allowed from 54th Avenue East to 20th Street East on proposed SR 167. Separate shared-use path constructed between 54th Avenue East to SR 99 is a benefit for bikes and pedestrians. **Mitigation** Detours and road closures would be planned and coordinated with local government to have least impact. Dust would be suppressed with water where feasible during construction. **Unavoidable Adverse Impacts** Construction delays.
Cultural Resources	
Construction Effects None. **Operational Effects** None. **Cumulative Effects** Cumulative effects on prehistoric and historic sites are substantial because of past, present, and future disturbance. Cumulative effects on traditional cultural properties of the Puyallup Tribe are mostly undocumented. **Mitigation** None. **Unavoidable Adverse Effects** None.	**Construction Effects** One prehistoric site has been identified that is considered eligible for National Register of Historic Places (NRHP) would be impacted.. 3 NRHP-eligible historic structures are impacted. Possible disturbance to undocumented archaeological sites; and disturbance to Pierce County Inventory historical structures. **Operational Effects** None. **Cumulative Effects** Cumulative effects on prehistoric and historic sites are substantial because of past, present, and future disturbance. Consultations with Puyallup Tribe avoided additional cumulative effects on traditional cultural properties, which remain mostly undocumented. **Mitigation** Memorandum of Agreement (MOA) with SHPO and Tribe mitigates for adverse effects. Discovery Plan developed under a future MOA will describe procedures if archaeological sites are encountered during construction. **Unavoidable Adverse Effects** Possible disturbance of archaeological remains during construction.

Chapter 3 analyzes the impacts of the alternatives on the different areas of the environment (referred to as elements of the environment under the State Environmental Policy Act [SEPA]). The selection process for deciding which environmental areas to review is discussed in Section 1.3.3. Each section in Chapter 3 includes an introduction, a list of studies and coordination conducted, a description of the affected environment, an analysis of the impacts of the No Build and Build Alternatives, and suggested or required mitigating measures.

The analysis of impacts includes direct, indirect, and cumulative impacts. The National Environmental Policy Act (NEPA) and SEPA rules recommend that the level of impact analysis be related to impact of the alternatives and options. As the impacts increase, so should the depth of the analysis. The analysis should allow for a comparison of the alternatives and options. To the extent possible, detailed technical studies should be summarized rather than quoted. The result should be a concise comparison that allows the reader to draw conclusions.

3.1 Study Area

The terms "study area" and "project area" are used interchangeably throughout Chapter 3. For the SR 167 Tier II EIS, the actions being evaluated are the proposed transportation improvements throughout the SR 167 corridor in combination with past, present, and future land use development and other relevant non-project actions primarily within Pierce County.

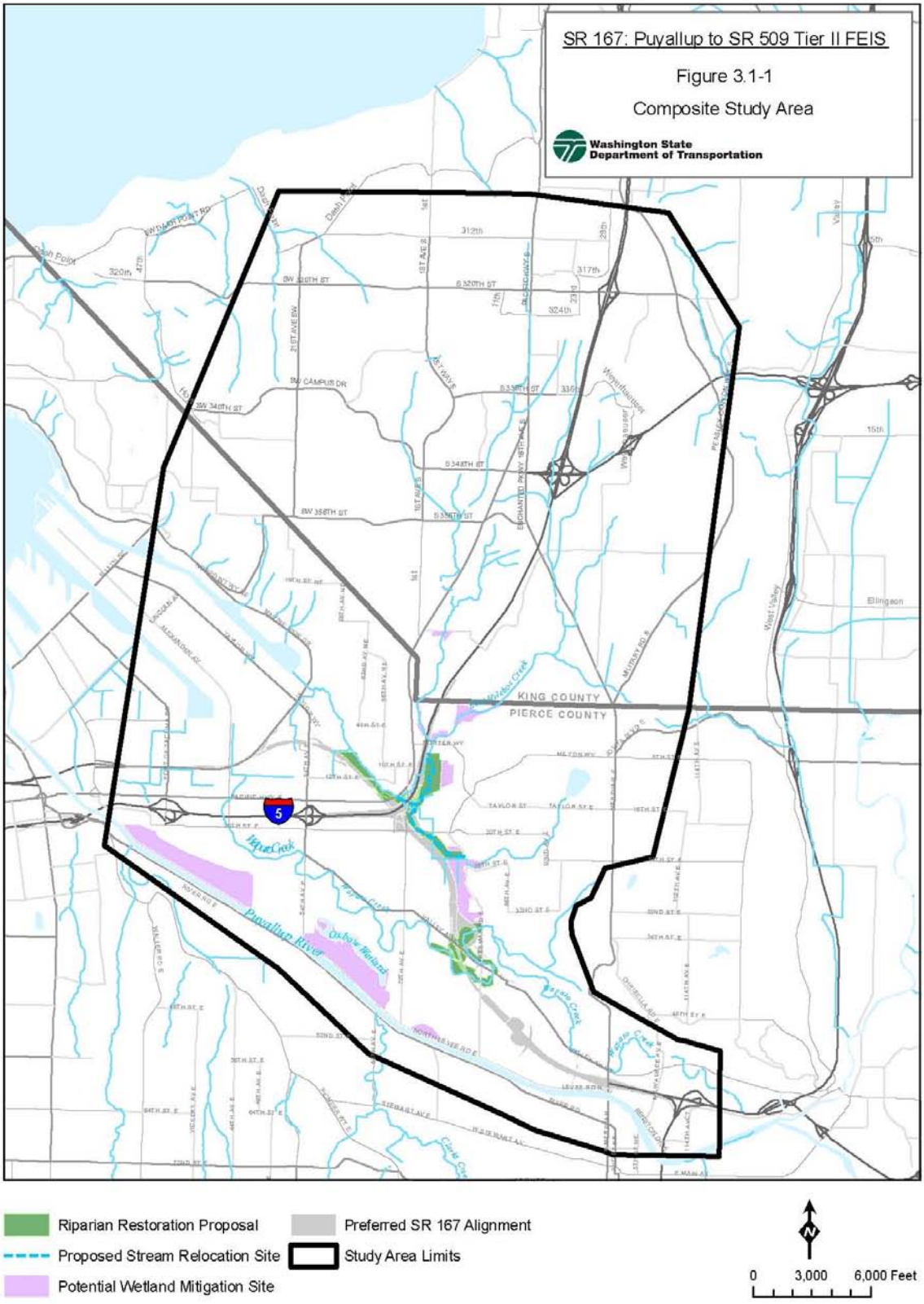
3.1.1 Direct Impact Area

Direct impacts from a project are those that occur at the same place and same time as the project. They are generally predictable and associated with the project actions. As shown in Figure 3.1-1, the study area begins at the Port of Tacoma Road and extends in a southeasterly direction to the SR 512/SR 167 interchange. The study area extends north and east of the proposed SR 167 to the hillsides above the floodplain of the Puyallup River, encompassing the Hylebos Basin. To the south and west, the study area extends to the Puyallup River.

3.1.2 Indirect and Cumulative Impacts

Indirect impacts are defined by the Council on Environmental Quality as impacts that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR Section 1508.8)." Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (WSDOT 2005).

Color aerial photos taken in June 2002 by the USGS were used to interpret the extent of recent development within the project area (TerraServer 2004). The geographic boundary considered when addressing indirect impacts for the project includes the area up to 0.5 mile from the ROW boundaries of the interchange options.


SR 167: Puyallup to SR 509 Tier II FEIS
Figure 3.1-1
Composite Study Area
Washington State Department of Transportation
KING COUNTY
PIERCE COUNTY
Riparian Restoration Proposal
Proposed Stream Relocation Site
Potential Wetland Mitigation Site
Preferred SR 167 Alignment
Study Area Limits
0
3,000
6,000 Feet

Cumulative impacts are defined by the Council on Environmental Quality regulations implementing NEPA as the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR Section 1508.7). Cumulative impacts can result from individually minor, but collective actions taking place over a period of time.

The indirect impacts and cumulative impacts analyses relied on information gained through the SR 167 Tier I EIS; the discipline reports prepared for the Tier II process; and meetings with the Environmental Protection Agency, U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife. The scope of the analyses was based on public and agency input requested during formal scoping meetings in the EIS process; informal and formal input received from the public and agencies as a result of public meetings; and the results of prior research and technical analyses of direct and indirect effects conducted as part of the SR 167 EIS discipline studies. Information on baseline conditions was obtained through natural resource agencies responsible for their management, non-governmental environmental organizations and local government.

The following resources were considered to have impacts that required further detailed evaluation of indirect and cumulative impacts:

- Chapter 3.2 Water Resources
- Chapter 3.3 Wetlands
- Chapter 3.4 Wildlife, Fisheries and Threatened and Endangered Species
- Chapter 3.11 Land Use, Socioeconomic Impacts, and Environmental Justice
- Chapter 3.12 Farmland
- Chapter 3.16 Cultural Resources

Geographic Boundaries

Geographic boundaries for evaluating potential indirect and cumulative impacts were identified for each critical resource to reflect the area of logical influence for that critical resource. A geographic boundary for each resource analysis was identified by expanding the area of analysis to the point at which all potentially indirect and cumulative impacts would be captured and beyond which the resource would not be substantially affected. A geographic boundary of one quarter mile around interchanges was initially identified for the analysis of indirect impacts. This is because indirect impacts are expected to be linked to the rate of development, which would occur at these new interchanges.

For analyses of natural environment elements such as fish and aquatic habitat, the most meaningful natural boundary (in this case, the affected watershed) was then identified and used as the geographic boundary for analyses. This does not mean that substantial indirect and cumulative impacts were necessarily found to occur within these geographic units.

Where natural boundaries were not meaningful, a different analytical boundary was selected that would be meaningful. In addition, information was not always available for the desired geographic boundary. In that case, the most closely related data was used as the basis for best professional judgment of resource impacts. The regulatory interests of agencies with jurisdiction also influenced some analytical boundaries. Water quality and fish impacts were requested by sub-basin (sub-watershed) and accommodated where possible.

Temporal Boundaries

Similar to the geographic boundaries for evaluating potential indirect and cumulative impacts, temporal boundaries also were identified for each resource analysis depending on the accumulation characteristics of the effects being assessed and the regulatory interests of agencies with jurisdiction. Temporal boundaries define the period of time for which the analysis is conducted. Past temporal boundaries were often limited by available data and vary by element.

The year 2030 was selected as the future temporal boundary because it is the design year for the project. The design year represents the point at which we anticipate the project will reach its design capacity. This means that the traffic on the roadway would be able to travel at speeds for which the roadway was planned.

In addition, this time period is consistent with the horizon year of *Destination 2030* (PSRC 2001), the metropolitan transportation plan for the central Puget Sound region, and encompasses the time period for the region's long-range plan as described in *Vision 2020,* the region's growth management, economic, and transportation strategy. These two documents represent the planned land use development for the area and are by far the most consequential reasonable foreseeable actions that overlap geographically and temporally with the SR 167 project. *Destination 2030* identifies the SR 167 Extension as a part of the regional transportation plan.

The cumulative impacts of the No Build Alternative, which assumes implementation of *Vision 2020* and programmed and funded transportation improvements, were identified as the most meaningful baseline for comparing potential cumulative impacts of the Build Alternative on critical resources, ecosystems, and human communities of concern.

To help place indirect and cumulative impacts in context, an effort was made to find data on anticipated environmental and social change. However, little information was found. The review included internet searches and phone conversations with Pierce County, Port of Tacoma, Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Conservation Commission, Puget Sound Water Quality Action Team, Environmental Protection Agency, and U.S. Fish and Wildlife Service. When data were not readily available through Internet searches or WSDOT databases, personal contact was made with representatives from each of the agencies asking for trend data for the parameters analyzed. Additional trend information was obtained from the Northwest Environmental Watch. These references are identified in the section to which the information pertains.

Indirect and cumulative impacts detailed in the Tier II FEIS sections on specific resources are summarized in Section 3.17. Results of a cumulative *Net Environmental Benefits Analysis* are also presented in that section.

Activities Contributing to Cumulative Impacts

Activities occurring within the study area that are likely to contribute to the cumulative impacts include additional State and local road projects, continued commercial and industrial development, the planned expansion of the Port of Tacoma, and development associated with public facilities such as sports parks, pedestrian trails, and schools. *Port Vision 2020* is a study conducted by the Port of Tacoma to update and expand a 1990 analysis that led to extensive capital improvements. The planned improvements now include new wharf construction, wharf extensions, terminal expansions, new terminal construction, new container yards, and expansion of intermodal facilities (Port of Tacoma 2004).

State and local road improvements will occur within the time period specified for this analysis. The city of Fife (Fife) has jurisdiction over most of the land within the study area. Fife is currently working on design and environmental permitting for intersection improvements at 70th Avenue East/Valley Avenue East, and has identified several other road and interchange improvement; road extensions, and road widening projects within the study area in the transportation plan (2002). Similar road projects can be expected on a smaller scale from other local jurisdictions within the study area. The WSDOT Northwest Region is currently conducting the Triangle Study, which is examining scenarios to improve mobility in the I-5/SR 161/SR 18 area. Multiple transportation projects could result from this study, some of which may extend into the project area.

Land in the study area is zoned for commercial, industrial, and residential development. Future development projects will convert currently undeveloped land (vacant lots, farmlands, etc.). Transportation programs included in the Puget Sound Regional Council *Destination 2030* transportation plan, including the SR 167 Build Alternative, are expected to increase pressure for growth along major transportation corridors with the Urban Growth Area (PSRC 2001). Land use (development, logging, transportation improvements) which occurs upstream from the general study area also has the potential to contribute to cumulative impacts, especially to water quality due to sedimentation, erosion, and stormwater runoff.

In addition to the proposed SR 167 Extension project, proposed or anticipated actions and trends through the year 2020 include:

- Expansion of shipping operations at the Port of Tacoma. To accommodate anticipated increase in container volumes, the port plans to expand existing terminals and develop terminals for new clients. Simultaneous with terminal expansion the port plans waterway, rail, and road infrastructure improvements. (Port of Tacoma Port Vision 2020 1999).

- Construction of Freight Action Strategy for Seattle-Tacoma Corridor improvements included the construction of the Port of Tacoma Road Grade Separation Project and Shaw Road Grade Separation Project in Puyallup, both of which have been completed.

- Continuing industrial/manufacturing and commercial development of vacant, buildable parcels in Fife, Milton, and Puyallup valley area. This involves conversion of agricultural and open space within the urban areas of Fife, Milton, and Puyallup to industrial, commercial, and residential uses (such as the proposed CMC Heartland development of 850 homes and condominiums, a 150-bed assisted-living facility in Fife, and the Lloyds, Inc. development in Milton).

- Development of Puyallup Tribal properties in the Port of Tacoma and the Fife/Puyallup valley.

- Development of Pacific National Soccer Park.

Planned transportation system improvements in the vicinity of the proposed SR 167 highway extension as identified in the *Pierce County Six Year Improvement Program* (Pierce County 2000) are:

- Widening and reconstructing Canyon Road to extend north from Pioneer Way to connect with 70th Avenue East. This roadway would link the planned Port of Tacoma employment center in Frederickson with the Port of Tacoma and northward;

- Widening and reconstructing Valley Avenue from Freeman Road East to 20th Street East.

Planned transportation system improvements in the vicinity of the proposed SR 167 Extension Project as identified in the *WSDOT Highway System Plan* (WSDOT 1998) and *Destination 2030* (PSRC 2001) are:

- Improving the connections between SR 18, I-5, and SR 161 ("Triangle Project");

- Widening SR 161 from 36th Street to I-5;

- Constructing Core HOV lanes along I-5 from Seattle to SR 512;

- Constructing Core HOV lanes along SR 167 from Puyallup to Seattle;

- Widening SR 16 from Tacoma Narrows Bridge to I-5, to include SR 16/I-5 interchange improvements.

3.1.3 Project Setting

Climate

Generally mild weather within the study area is the result of maritime polar air masses that form over the Pacific Ocean. The air masses are delivered to the Puget Sound region by westerly winds creating maritime climate conditions. The low marine temperatures and relatively warmer land mass frequently produce fog within the study area.

Within the Lower Puyallup River valley precipitation averages 40 inches per year with 75 percent rain, the primary form of precipitation, occurring between October and March (USGS 1986). Average summer temperatures are 62.9 °F with an average daytime high of 76.4 °F. The average winter temperature is 40.5°F with an average winter minimum of 33.1°F (Gray and Osbourne 1994). Prevailing winds develop out of the southwest with the average high speed of 10.4 miles per hour occurring during January.

Topography

The SR 167 project area is situated within the broad flat floodplain of the Puyallup valley and adjacent northern uplands. The dominant physiographic feature within the valley is the Puyallup River, which flows to the northwest and discharges to Commencement Bay. Within the floodplain, small streams flow to the northwest along gradients of less than 2 percent before discharging into Commencement Bay. Bluffs rise approximately 400 feet above the valley floor, forming upland terraces to the north of the project location. Streams flowing from upland lakes dissect the terraces prior to converging with the valley streams.

Geology

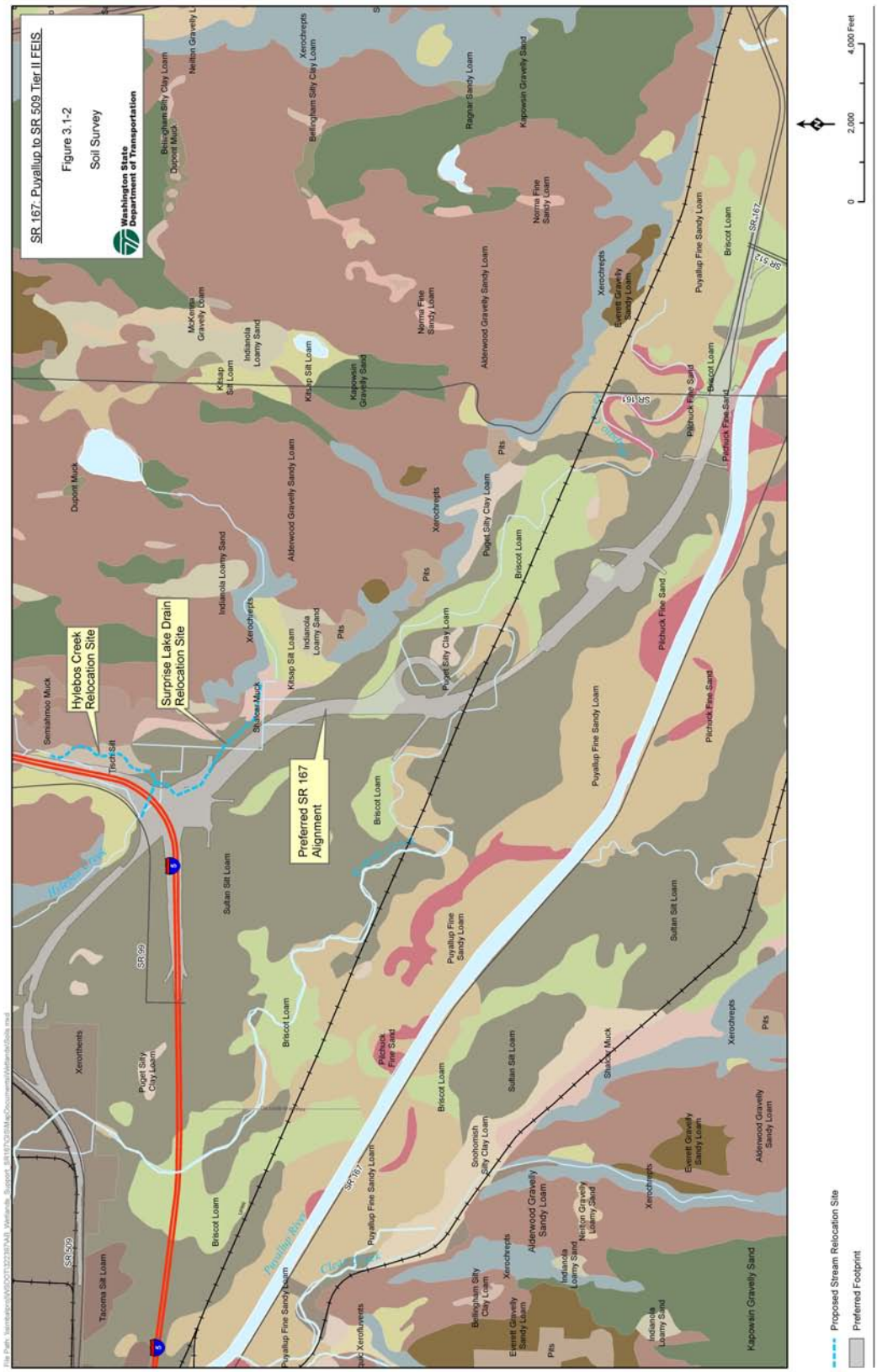
Glacial and fluvial geomorphologic processes have dominated the evolution of the geology and topography within the project area over the last 15,000 years. Four major glaciations left stratified deposits of till and outwash sediments in the Puget Lowland (Dragovich et al. 1994). Deposits within and near the project area accumulated during the final Fraser Glaciation.

Vashon Drift deposits to the northeast of the Puyallup valley consist of advance outwash overlain by compacted till. This sequence is overlain by Vashon recessional outwash along the I-5 corridor north of Fife. Additionally, streams deposited alluvium during warmer interglacial events. The alluvial units consist of sands, silts, and clays (Earth Tech 1998). The Puyallup valley was cut in advance outwash deposits by recessional meltwaters approximately 14,000 years ago (Dragovich et al. 1994).

Approximately 5,800 years ago the Osceola mudflow originated at Mt. Rainier and traveled as far as Fife. West of Puyallup, the mudflow deposited clay-rich, cobbles, gravels and boulders atop the marine sediments of what was then the Puyallup River Delta. Since then the delta has prograded westward to its present location within Commencement Bay. Glacial, mudflow, and marine deposits are presently covered by a veneer of alluvial silts and sands deposited on the floodplain of the Puyallup River.

Soils

Soils in the project areas are shown in Figure 3.1-2. Sultan series soils dominate the Puyallup valley along the planned SR 167 corridor. The soils are situated with slopes of less than 2 percent and were formed in alluvial deposits covered with deciduous and coniferous trees. The permeability of these soils is moderately slow (0.2 to 0.6 inch per hour). Sultan soils are generally not suitable for supporting heavy loads.


SR 167 Puyallup to SR 509 Tier II FEIS
Figure 3.1-2
Soil Survey
Washington State Department of Transportation
Hylebos Creek Relocation Site
Surprise Lake Drain Relocation Site
Preferred SR 167 Alignment
Proposed Stream Relocation Site
Preferred Footprint
0
2,000
4,000 Feet
SR 99
SR 509
SR 167
SR 512
SR 161
Puyallup River
Clarks Creek
Xerorthents
Tacoma Silt Loam
Puget Silty Clay Loam
Semiahmoo Muck
Tisch Silt
Sultan Silt Loam
Briscot Loam
Puyallup Fine Sandy Loam
Pilchuck Fine Sand
Snohomish Silty Clay Loam
Alderwood Gravelly Sandy Loam
Indianola Loamy Sand
Nelton Gravelly Loamy Sand
Bellingham Silty Clay Loam
Everett Gravelly Sandy Loam
Kapowsin Gravelly Sand
Pits
Xerochrepts
Shalcar Muck
Dupont Muck
Kitsap Silt Loam
McKenna Gravelly Loam
Kitsap Silt Loam
Alderwood Gravelly Sandy Loam
Norma Fine Sandy Loam
Ragnar Sandy Loam

Also found locally within the valley, with one notable occurrence underlying a portion of the I-5 corridor east of the Port of Tacoma Road Interchange, is Briscot loam. The poorly drained Briscot loam soils were formed in alluvium under a deciduous and coniferous canopy. The permeability of these soils is classified as moderately slow.

Puyallup fine sandy loam is present along the eastern edge of the project area at the SR 167/SR 161 (North Merdian) Interchange. Puyallup fine sandy loam was formed in a sandy mixed alluvium under tree cover. These soils are classified as being well drained and having a moderately rapid permeability (2.0 to 6.0 inches per hour).

Xerothents are present along the western edge of the project area at the proposed SR 167/ SR 509 Connection. Xerothents, which were commonly wetlands, are locations that have been filled with dredged material and/or trash.

Three types of upland soils are found along the I-5 corridor north of Fife including; the Tisch silt, Kitsap silt loam 2 to 8 percent slopes, and Alderwood gravelly sandy loam 6 to 15 percent slopes. Tisch silt is a very poorly drained soil that originated from diatomaceous earth, volcanic ash, and decaying plant remains in upland depressions. These soils have a moderately slow permeability and a high water capacity. Kitsap silt loam 2 to 8 percent slopes is a moderately well drained soil that formed from glacially derived lake sediments in the Puget Sound uplands. The permeability of these soils is very slow (less than 0.06 inch per hour) and the water capacity is high. Alderwood gravelly sandy loam 6 to 15 percent is moderately well drained and is derived from glacial till. These soils have a very slow permeability and the water capacity is low.

Surface Water

The SR 167 project area lies within Water Resource Inventory Area 10 known as the Puyallup-White Basin. Proposed SR 167 highway improvements cross portions of Hylebos Creek, Wapato Creek, and Lower Puyallup River sub-basins. Primary surface waters in the study area include Hylebos Creek, Surprise Lake Drain, Fife Ditch, Hylebos Waterway, Wapato Creek, Old Oxbow Lake Ditch, and Puyallup River.

Population and Land Use

The proposed project runs through portions of the cities of Fife, Puyallup, Milton, Edgewood, Tacoma, and Pierce County. The bulk of the study area resides within the city limits of Fife. The area is zoned for industrial, commercial, and mixed residential and commercial uses. Existing land use within the proposed area is primarily industrial, commercial, vacant/undeveloped, and agricultural. Land use north of I-5 is primarily commercial and industrial. Vacant/undeveloped, agricultural, residential, and commercial uses are found along the southern segment of the project in the Fife/Puyallup valley. Within the last decade, the Fife valley area has increasingly become more industrialized with manufacturing and warehouse/distribution facilities replacing agricultural land.

The project would support and facilitate growth in the study area. The project is consistent with local and regional land use plans that have already addressed

growth in the study area. A similar level of projected growth is expected to occur in the study area with or without the project. The project may affect the rate and timing of growth and where development occurs, but it would not induce growth. Combined with market forces and economic conditions particularly from the Port of Tacoma's anticipated growth and expansion, development is expected to occur and has been occurring within this immediate area.

The *City of Fife Comprehensive Transportation Plan* (2002) contains a plan "with SR 167" and "without SR 167." Most of the future projects proposed are listed in both plans, with only a small number of improvements either added or removed due to the construction of SR 167. An extension of Frank Albert Road is included as part of the "with SR 167" plan, but not if SR 167 is not constructed. Nine additional road projects are proposed to improve traffic flow if SR 167 is not constructed, but they would not increase freight traffic mobility to and from the Port of Tacoma to the degree that the SR 167 project would.

Considerable population growth has occurred in the study area and is forecasted to continue through 2030 in Pierce County. Over the last 10 years, Pierce County population increased 19.5 percent from 586,203 to 700,600. During the same period the cities of Fife and Puyallup have grown at a more rapid rate (31.9 percent and 29.6 percent, respectively). Future growth estimates through 2020 for Pierce County show a similar growth rate to that experienced in the past (OFM 2000).