Appendix D
Water Resources

What are the major watersheds in the corridor?

Watersheds are ecological basins that are characterized by state designated Water Resource Inventory Areas (WRIAs). There are two watersheds within the State Route (SR) 167 Corridor Study Area including:

- The Green/Duwamish Watershed - WRIA 9
- The Puyallup Watershed - WRIA 10

These watersheds encompass the river, creeks, floodplains, and wetlands within the Corridor Study area that all drain into either the Green River or the Puyallup River.

The SR 167 Corridor was included in a WSDOT Watershed Characterization Study[1] that contained the lower reaches of the Green River as far downstream as the confluence with the Black River in Tukwila; and upstream to the Green River Gorge (southeast of Black Diamond). It also includes many of the Green River tributaries including the Black River / Springbrook Creek system, Mill Creek, the Soos Creek system, and Newaukum Creek.

The same study area contained Puyallup Watershed from the lower reaches of the Puyallup in Fife near I-5 (about RM 2.5) upstream to a point south of Orting near the confluence of Fiske Creek (approximately RM 26.5). Important tributary streams to the Puyallup that relate to the SR 167 Corridor are located primarily in the Lower White River to the Buckley area.

The Lake Tapps system is important to address in the hydrologic analysis of the study area, although it is an artificial lake located out of the main stream channels. It was created by diverting water from the White River at about RM 24, near

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[1] *Enhancing Transportation Project Delivery Through Watershed Characterization SR-167 Study,* Report to the WSDOT Urban Corridors Office, May 2005

Buckley. The water is carried by flume and canal to the lake, and by tunnel and flume back to the White River.

2 What are the subbasins in the SR 167 Corridor?

Subbasins are portions of watersheds that are typically protected as a regional ecosystem. The subbasins within the SR 167 Corridor include:

- Black River Sub basin
- Mill Creek
- Lower White West
- Mid Puyallup North
- Black River Subbasin

The Black River Sub basin drains 17,031 acres. Springbrook Creek flows into the remnant Black River channel, and enters the Green River through the Black River Pumping Station. Tributaries include Mill Creek (Kent), Garrison Creek, and Panther Creek. The following section describes the current of each subbasin.

Black River Subbasin

The Black River Sub basin is one of the most developed areas in the Green River watershed. Based on 1998 LANDSAT imagery with 74 percent urban land cover. Intense commercial and industrial land uses cover most of the valley floor. Residential uses cover headwater areas on the Covington uplands. The remaining forest is concentrated in stream valleys and ravines that flow down from the Covington uplands into Springbrook Creek.

Mill Creek

Mill Creek drains 9,673 acres on the Federal Way uplands and Auburn-Kent valley floor. Based on 1998 LANDSAT imagery Sixty percent of the Mill Creek Subbasin is covered by urban land uses. Residential uses are concentrated in the western portion of the basin, on the Federal Way uplands above Peasley Canyon. Commercial and industrial development has been

increasing rapidly on the valley floor, and is usually built on fill that has been placed within floodplains and wetlands along the lower reaches of Mill Creek.

Lower White West

The Lower White West Sub basin includes all areas draining to the White River from approximately River Mile (RM) 12 to the confluence with the Puyallup River near Sumner, except for areas within the Lake Tapps Subbasin, which is reported separately. Total subbasin area is 16,359 acres or 25.6 sq. mi. Significant tributaries within the subbasin include Strawberry (Salmon Springs) Creek, Bowman Creek, and an unnamed ditch draining the west side of the White River Valley between Sumner and Auburn.

Based on 1998 LANDSAT imagery, the Lower White West Subbasin is split evenly between urban (52 percent) and non-urban (48 percent) land covers. The most intense commercial and industrial land uses occur within the cities of Auburn, Algona, Pacific, and Sumner. The valley floor of the White River is primarily agricultural and rural residential land use between Auburn and Sumner; land cover is predominantly forest above Auburn. Moderate to high-density residential and commercial development occurs over much of the rest of the valley, and is interspersed with forest in the upland areas.

Future land use in the Lower White West Subbasin is predicted to reflect a moderate increase in residential and commercial development, increasing the TIA from 40 percent to 49 percent.

Mid Puyallup

The Mid-Puyallup North Subbasin includes all areas draining to the Puyallup River from the confluence with the Carbon River (RM 19.9) near Orting downstream to a point approximately 500 feet upstream of the I-5 bridge (RM 2.5), except for areas draining to the White River, Fennel Creek, Clark Creek, the upper portion of lower Wapato Creek, and the upper portion of Clear Creek. Total subbasin area is 17,080 acres (26.7 sq. mi.). Significant tributaries include the White River, the Carbon River, Clear Creek, Clark Creek, Wapato Creek, Fennel Creek, and Canyon Falls Creek.

Based on 1998 LANDSAT imagery, the Mid-Puyallup North Subbasin is split evenly between urban (51 percent) and non-urban (49 percent) land covers. The most intense commercial and industrial land uses occur within the cities of Puyallup and Sumner. The valley floors of the Puyallup and White Rivers outside of these cities consist primarily of agricultural and rural residential land use. Moderate- to high-density residential and commercial development occurs in the upland areas. Forested areas are concentrated on hill slopes and in ravines between the upland and valley areas.

Future land use in the Mid Puyallup North Sub basin is predicted to reflect a moderate increase in residential and commercial development, increasing the Total Impervious Area (TIA) from 39 percent to 46 percent.

3 What major rivers and creeks are in the corridor?

The major rivers and creeks, within the subbasins, are:

- Green River
- Panther Creek
- Springbrook Creek
- Garrison Creek
- Mill Creek
- Puyallup River and
- White River

Green River

The Green River meanders through the northern three-quarters of the project area, north of South 15th Street in Auburn. The Green River extends to the East and well-beyond SR167. Streams, wetlands, groundwater, and precipitation within an area of 2,686 acres feed that portion of the Green River that is immediately within the SR 167 project area.

Although it receives natural flows from precipitation and tributaries, the Howard Hanson Dam in Auburn also regulates

the Green River's flow. This dam keeps the river's flow to less than 12,000 cubic feet per second. Although the dam is used to increase flows in the Green River to maintain a minimum flow for fish, flows have not met the Department of Ecology's minimum stream flow requirements for 21 of the last 30 years.

The Green River system's habitat value for fish and wildlife is fairly low. North of South 15th Street in Auburn, nearly 80 percent of the river's course is between levees. These levees keep the river from flowing over its banks and in to neighboring wetlands and flood plain areas. The levees and dam have reduced the area in the historic flood plain by 91 percent. While protecting neighboring areas from flooding, the levees reduce the quality of fish and wildlife habitat in and along the Green River.

In addition to being between levees, the area of land next to the river, known as the riparian zone, is poorly vegetated. Approximately 28 percent of the riparian zone is forested, meaning that nearly three-quarters of the Green River's course lacks valuable shade for fish and lacks valuable habitat for other species that use the river system.

The Green River is within 200 feet of SR 167 within the City of Kent and between the SR516 and South 262nd Street. SR 167 crosses over the Green River at South of the SR 516/ SR 167 Interchange.

Panther Creek

Panther Creek is a smaller tributary to Springbrook Creek. The creek's headwaters are at Panther Lake in unincorporated King County. There are a number of wetlands associated with Panther Creek.

Springbrook Creek

Springbrook Creek is a smaller tributary to the Black River. The creek's course and riparian vegetation have been modified from historical conditions. The result is a relatively straight stream channel with an engineered cross-section. Vegetation is dominated by non-native, invasive plant species. Springbrook Creek has significant areas that are likely to include wetlands.

Land uses in the vicinity are primarily light industrial and commercial.

Garrison Creek

Garrison Creek is a smaller tributary to the Springbrook Creek. Garrison Creek traverses a more wooded ravine that is flanked by steep slopes and seep wetlands. Atop the steep slopes land uses are predominantly residential. Recently, an area of the stream that was impacted by a landslide was restored. Overall, the habitat within the ravine is fairly good quality.

Mill Creek

In the study area, there are two stream channels with the name "Mill Creek". One Mill Creek is a smaller tributary to Springbrook Creek and traverses the City of Kent. The other Mill Creek is a more significant sized creek that is strongly associated with the SR 167. This project description focuses on the larger Mill Creek that generally flows through from the Federal Way uplands to the Green River.

Approximately 9,673 acres of the Federal Way uplands and Auburn-Kent Valley floor drain to Mill Creek. Historically, the creek's basin was subject to regular disturbance from flooding and unstable slopes

Mill Creek's headwaters are the eastern edge of the Federal Way uplands. Important components contributing to the creek's flow include four lakes (Star, Geneva, Fenwick, and Dolloff), wetlands, and seeps. In the valley floor, Mill Creek crosses SR 167 in a number of locations between SR 18 and its confluence with the Green River, just south of the SR 516/ SR 167 interchange.

Flooding frequently occurs in the Mill Creek subbasin. One significant cause to flooding in the basin results from levees at its confluence with the Green River. Levees from both the Green River and at the mouth of Mill Creek back water up and into adjacent lands south of the confluence. In addition to the levee configuration at the Green River, flooding occurs as a result of local runoff from basin tributaries, a seasonally high water table, poorly maintained drainage ditches, and inadequately sized culverts. Flooding frequently causes

property damage to roads, crops, livestock, businesses, and homes.

Puyallup River

The Puyallup River flows into Commencement Bay in Tacoma. The Mid-Puyallup North Subbasin, which is within the study area, is 51 percent urban land cover with the most intense area of commercial and industrial development in Puyallup and Sumner. Outside of Puyallup and Sumner, the land uses are primarily agricultural and rural residential. Forested areas dominate hill slopes along the valley.

The Mud Mountain Dam and extensive levees influence water flow and flooding on the Puyallup River. With the flood control system, only 36 percent of the historic flood plain exists today. Nonetheless, flooding still occurs, particularly around Orting.

Flows have been dropping despite higher than average precipitation and despite curtailing the issuance of water rights on streams in the basin. It is estimated that increased groundwater withdrawals from exempt wells and increased impervious surfaces have contributed to the decline in water flows.

Although much of the Puyallup River's riparian corridor is characterized by urban development, 48 percent of the riparian zone is forested. Most of this forest is on slopes that define the valley's walls.

Within the subbasin, approximately 40 percent of the historic wetland area still exists. Of these wetlands, 72 percent are depressional wetlands and 28 percent are riverine. Andramous fish likely have access to approximately 25 percent of wetlands in the subbasin.

White River

Historically, the White River flowed into the Green River. In 1906, a logjam altered the river's course, and today, the White River flows from the East and into the Puyallup River, with flows eventually reaching Commencement Bay in Tacoma.

The White River's flow is managed in part by the Mud Mountain Dam and the White River Hydroelectric Project diversion dam. Other structures that affect the White River include levees from its confluence with the Puyallup River to the Muckleshoot Indian Reservation. Within the Muckleshoot Indian Reservation, some of the levees have been allowed to breach to attempt to restore the river's natural meanders.

The White River's banks are impaired in some areas, with levees between its confluence with the Puyallup River and the Muckleshoot Indian Reservation. The levees have resulted in only 4 percent of the historic flood plain existing today.

Within the subbasin, approximately 31 percent of historic wetlands still exist today. Of the remaining wetlands, 72 percent have been altered. Depressional wetlands represent 47 percent and riverine wetlands represent 49 percent of the subbasin. Anadromous fish are estimated as using 33 percent of the basin's natural deepwater lakes and wetlands.

Attachment A – Watershed Characterization Study for SR 167

Enhancing Transportation Project Delivery through Watershed Characterization SR-167 Study, Report to the WSDOT Urban Corridors Office, May 2005

This document is attached in CD Format. It is an Adobe Acrobat (.pdf) format and is designed for double-sided printing. Some pages are left blank intentionally for correct printing.

Main Body of SR-167 Watershed Characterization Report

Appendix A: Potential Stormwater Mitigation Sites

Appendix B: Potential Natural Resource Mitigation Sites

Appendix C: Potential Fish Habitat Mitigation Restoration Sites - Coming Soon!

Appendix D: Supporting Documentation for Chapter III

Appendix E: Supporting Documentation for Chapter IV

Appendix F: Supporting Documentation for Chapter V

Appendix G: Supporting Documentation for Chapter VI

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