The Fife I-5 Alternative would have a slightly larger overall construction footprint than either the Fife Pacific Highway or the Fife Median alternatives. The potential for disturbance of sensitive wildlife species during construction would not necessarily be higher, however, because construction of the Fife I-5 Alternative would take place in areas adjacent to I-5 that are dominated by high levels of existing noise and human disturbance. Based on the predominance of the commercial cover type within the construction footprint, the Fife I-5 Alternative's risk of contributing to the establishment or spread of noxious weeds and invasive plants would also not be substantially higher than that of the other two alternatives.

4.2.2.5 Tacoma Segment Alternatives

The construction-related impacts of the Tacoma Segment alternatives on the mature native forest, other native forest, and wetland/stream cover types would be similar; none of the alternatives would affect more than 1 acre of any of these habitat types, individually or collectively (Table J4.4-4). None of the alternatives would have any construction-related impacts on any forested wetlands. Given the existing high levels of noise and human disturbance throughout the Tacoma Segment study area, the overall size of the alternatives' construction footprints would not appreciably affect their potential to disturb sensitive wildlife species or contribute to the establishment or spread of noxious weeds and invasive plants.

Noise from pile driving for the installation of support structures for the guideway bridge over the Puyallup River may be audible as much as 1 mile away from project activities. However, the sites where pile driving may be needed are adjacent to I-5 in a heavily developed urban area. Background noise levels would likely eclipse pile driving noise a relatively short distance away. For example, USFWS (2015) determined that pile driving noise for transportation projects in rural areas would likely have no effect on nesting ESA-listed birds more than 0.25 mile away. Animals that use habitats in portions of the TDLE study area where pile driving noise might be audible species are adapted to high levels of noise and human disturbance. For these reasons, pile driving noise is unlikely to disturb wildlife more than 0.25 mile from the work site.

Big brown bat colonies and nesting birds on nearby bridges could be affected by construction noise. Such effects would be temporary and would not be expected to result in any long-term impacts on species that use habitats in the urban areas surrounding the project site. The impacts of in-water pile driving are discussed in Section 4.1.2.

4.3 Wetlands

Analyses in this subsection address the potential long-term and construction-related impacts of each alternative on wetlands and wetland buffers. Actual impacts would depend on the location and design of the final preferred alternative, the construction footprint and methods, the BMPs implemented during construction (see Section 4.8.2), and the performance of post-construction restoration. Wetland delineations and detailed impact analyses would be completed during the process of final design and permitting.

To the extent that impacts cannot be avoided or minimized through BMPs, Sound Transit would implement additional measures to reduce adverse effects and provide compensatory mitigation measures where adverse effects are unavoidable. Sound Transit has committed to achieving no net loss of ecosystem function on a project-wide basis (Sound Transit 2007). As discussed in Section 5, compensatory mitigation would be implemented in accordance with applicable Tribal, federal, state, and local requirements and guidelines.

The WSDOT SR 167 Completion Project, which includes the riparian restoration program and overlaps with the TDLE footprint, is currently under construction. Impact values of wetland and wetland buffers that occur in overlapping project areas may change after construction, when SR 167 is complete. During the permitting process, wetland boundaries and impact calculations will be reevaluated after a preferred alternative is chosen. See Section 4.7, Cumulative Impacts for more information on the SR 167 Completion Project.

4.3.1 Long-Term Impacts

Under each of the project alternatives, direct long-term impacts on wetland resources would occur where permanent features, such as light rail guideways, roads, and stations, overlap wetlands or wetland buffers.

Filling or excavating within wetlands or wetland buffers would diminish wetland functions through the loss of area, changes to surface or subsurface water flows, alteration of hydric soils, or long-term changes to vegetation. Project actions that may entail such impacts include clearing, grading, construction of buildings, parking areas (surface and garage), stormwater facilities, roadways, and guideways (including support columns for elevated guideways).

Permanent project-related impacts on wetland and wetland buffer vegetation would occur where segments of guideway overlap wetlands or wetland buffers. Not all wetlands underneath elevated structures (e.g., tracks or stations) would be permanently filled. However, trees and other tall vegetation would not be allowed to grow near track segments. This would result in the permanent conversion from trees and tall shrubs to short-statured shrubs and herbaceous vegetation. In addition, the long-term presence of structures above vegetation would reduce the amount of sunlight and precipitation the plants receive, potentially making these areas more sparsely vegetated.

Interception of precipitation by overhead structures would also have the potential for long-term impacts on wetland hydrology. For any given wetland, the severity of those impacts would depend on the proportion of the wetland that is affected, as well as the extent to which precipitation contributes to wetland hydrology at that site.

For these reasons, comparisons of the impacts of the alternatives are based on the overlap between any project features (including elevated structures) and wetlands or wetland buffers. In some cases (for example, where the impact area of an alternative would overlap a large proportion of a wetland), impacts that do not encompass an entire wetland may degrade wetland functions to such an extent that the entire wetland would be considered lost. Such determinations will be based on professional judgment and will be made after the Preferred Alternative has been selected by the Sound Transit Board. After the Preferred Alternative has been chosen, determinations of wetland losses would be part of the process of applying for permits and determining mitigation needs.

Impact areas are summarized in Table J4.4-5 and are depicted in Figures J4.4-1 through J4.4-11. Impacts associated with each alternative are discussed in the subsections that follow. The impact values and areas in the table and figures represent conservative estimates of the impacts of the alternatives. Actual anticipated impacts will be determined when an alternative is selected to be built and the project design is sufficiently advanced to undergo permitting review.

Not all areas within the project footprint would be converted to structures or hard surfaces. Some wetland and buffer areas, for example, would be converted to other vegetation community or cover types. For example, a palustrine forested community may be converted to a

palustrine scrub-shrub community, or a wetland or wetland buffer may be converted to stormwater facilities or landscaping. For these reasons, the values and areas reported in this analysis indicate the relative degree of potential impacts on wetlands and wetland buffers.

In any of these segments, if two or more alternatives would have identical effects on your resource area of concern, those alternatives can be addressed together.

Table J4.4-5 Potential Long-Term Wetland Impacts by Alternative

Alternative	Total Wetland Impacts (acres)[1,2]	Wetland Impact by Ecology Category (acres)[1,2,3]	Impacted Wetland I.D.	Total Wetland Buffer Impacts (acres)[1,2,4]	Impacted Wetland Buffer I.D.
Federal Way Segment					
Preferred FW Enchanted Parkway	0.54	Category II: 0.20 Category III: 0.34 Category IV: <0.01	WFW-03, WFW-06, WFW-11, WFW-13, WFW-15, WFW-32	2.78	WFW-01, WFW-03, WFW-04, WFW-06, WFW-10, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32
FW Design Option	0.56	Category II: 0.20 Category III: 0.36 Category IV: <0.01	WFW-03, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15	3.18	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-10, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32
South Federal Way Segment					
SF Enchanted Parkway	2.65	Category I: 0.16 Category II: 1.67 Category III: 0.83 Category IV: <0.01	WFW-17, WFW-19, WFW--24, WMI-01, WMI-02, WMI-03, WMI-06, WMI-07, WMI-08, WMI-09a, WPCFI-02, WPCMIFI-01	5.79	WFI-25, WFW-05, WFW-17, WFW-18, WFW-19, WFW-24, WFW-25, WMI-01, WMI-02, WMI-03, WMI-04, WMI-06, WMI-07, WMI-08, WMI-09a, WMI-09c, WMI-09d, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF I-5	3.77	Category I: 0.16 Category II: 1.67 Category III: 1.93 Category IV: <0.01	WFW-19, WFW-20, WFW--21, WFW-24, WFW-26, WFW-27, WMI-01, WMI-02, WMI-03, WMI-06, WMI-07, WMI-08, WMI-09a, WPCFI-02, WPCMIFI-01	8.52	WFI-25, WFW-05, WFW-17, WFW-18, WFW-19, WFW-20, WFW-21, WFW-22, WFW-24, WFW-25, WFW-26, WFW-27, WMI-01, WMI-02, WMI-03, WMI-04, WMI-06, WMI-07, WMI-08, WMI-09a, WMI--09c, WMI-09b, WMI-0-9d, WMIFW-01, WPCFI-01, WPCFI--02, WPCMIFI-01
SF 99-West	6.31	Category I: 1.11 Category II: 4.65 Category III: 0.54 Category IV: 0.01	WFW-36, WFW-38, WFW-39, WFW-43, WFW-44, WFW-46, WFW-47, WFW-48, WMI-09a, WMI-10, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-02, WPCMIFI-01	11.18	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WMIFW--01, WPCFI-01, WPCFI-02, WPCMIFI-01

Table J4.4-5 Potential Long-Term Wetland Impacts by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1,2]	Wetland Impact by Ecology Category (acres)[1,2,3]	Impacted Wetland I.D.	Total Wetland Buffer Impacts (acres)[1,2,4]	Impacted Wetland Buffer I.D.
SF 99-West with Porter Way Design Option	6.68	Category I: 1.18 Category II: 4.97 Category III: 0.54	WFW-36, WFW-38, WFW-39, WFW-43, WFW-44, WFW-46, WFW-47, WFW-48, WMI-09a, WMI-09b, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-02, WPCMIFI-01	11.38	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF 99-East	7.33	Category I: 1.02 Category II: 6.01 Category III: 0.30	WFW-34, WFW-36, WFW-37, WFW-39, WFW-42, WFW-43, WFW-47, WMI-09a, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-02, WPCMIFI-01	10.95	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WFW-49, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF 99-East with Porter Way Design Option	7.75	Category I: 1.09 Category II: 6.37 Category III: 0.30	WFW-34, WFW-36, WFW-37, WFW-39, WFW-42, WFW-43, WFW-47, WMI-09a, WMI-09b, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-02, WPCMIFI-01	11.13	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WFW-49, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
Fife Segment					
Fife Pacific Highway	2.24	Category II: 0.01 Category III: 0.97 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30	3.76	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25,WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Pacific Highway and 54th Avenue Design Option	2.04	Category II: 0.01 Category III: 0.77 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30	3.70	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02

Table J4.4-5 Potential Long-Term Wetland Impacts by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1,2]	Wetland Impact by Ecology Category (acres)[1,2,3]	Impacted Wetland I.D.	Total Wetland Buffer Impacts (acres)[1,2,4]	Impacted Wetland Buffer I.D.
Fife Pacific Highway and 54th Span Design Option	2.29	Category II: 0.01 Category III: 0.87 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30, WFI-33	3.90	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WFI-33, WPCFI-02
Fife Median	2.24	Category II: 0.01 Category III: 0.97 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30	3.76	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Median and 54th Avenue Design Option	2.04	Category II: 0.01 Category III: 0.77 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30	3.70	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Median and 54th Span Design Option	2.29	Category II: 0.01 Category III: 1.02 Category IV: 1.26	WFI-03, WFI-04, WFI-08a, WFI-08d, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30, WFI-33	3.90	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WFI-33, WPCFI-02
Fife I-5	3.16	Category II: 0.07 Category III: 1.82 Category IV: 1.26	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30,	3.38	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-31, WPCFI-02
Fife I-5 and 54th Avenue Design Option	2.96	Category II: 0.07 Category III: 1.63 Category IV: 1.26	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30	3.28	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WPCFI-02
Fife I-5 and 54th Span Design Option	3.20	Category II: 0.07 Category III: 1.87 Category IV: 1.26	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-11, WFI-12, WFI-14a, WFI-17, WFI-25, WFI-28, WFI-30, WFI-33	3.48	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-33, WPCFI-02

Table J4.4-5 Potential Long-Term Wetland Impacts by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1,2]	Wetland Impact by Ecology Category (acres)[1,2,3]	Impacted Wetland I.D.	Total Wetland Buffer Impacts (acres)[1,2,4]	Impacted Wetland Buffer I.D.
Tacoma Segment					
Preferred Tacoma 25th Street-West	<0.01	Category III: <0.01	WTA-04	0.05	WTA-02, WTA-04
Tacoma 25th Street-East	<0.01	Category III: <0.01	WTA-04	0.05	WTA-02, WTA-04
Tacoma Close to Sounder	<0.01	Category III: <0.01	WTA-04	0.05	WTA-02, WTA-04
Tacoma 26th Street	<0.01	Category III: <0.01	WTA-04	0.05	WTA-02, WTA-04

Notes:

(1) As discussed in the introduction to this section, the values in this table do not represent actual anticipated impacts. Instead, they indicate the relative degree of potential impacts on wetlands and wetland buffers.

(2) Totals may vary from the sum of individual numbers due to rounding.

(3) Wetland ratings (Hruby 2014) are preliminary and subject to review by permit authorities.

(4) Values presented in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream buffers. Wetland areas and stream areas, defined by the OHWM, are excluded from wetland buffer areas.

4.3.1.1 No-Build Alternative

The No-Build Alternative (which includes full build-out of the Sound Transit 3 System) would not have any direct long-term impacts on wetlands in most of the study area. Conversely, implementing the No-Build Alternative would preclude potential beneficial environmental effects over the long term, such as tempering increases in motor vehicle traffic in the region and facilitating the concentration of residential and commercial growth in planned growth centers.

As discussed in the analysis of impacts on aquatic resources, the No-Build Alternative includes the planned OMF South project. Two of the alternative sites under consideration for OMF South would entail the construction of approximately 1.4 miles of guideway extending south from the Federal Way Downtown Station. If either of these alternatives is selected, the following wetlands and/or wetland buffers would be affected by construction and operation of OMF South: Wetlands WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-11, WFW-12, WFW-13, WFW-15, and WFW-32.

Several of the wetlands and streams that will be affected by Phase 1 of the SR 167 Completion Project fall within the TDLE study area and may thus be diminished or eliminated, even under the No-Build Alternative. The TDLE study area also includes some sites identified by FHWA and WSDOT (2018) as potential wetland mitigation sites. As such, the No-Build Alternative may also include some wetland creation, restoration, and/or enhancement in the study area.

4.3.1.2 Federal Way Segment Alternatives

The potential long-term impacts of the Federal Way Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-5. Both the Preferred FW Enchanted Parkway Alternative and the FW Design Option have a little more than a half-acre of direct long-term impacts; however, the Preferred FW Enchanted Parkway Alternative would have slightly fewer direct long-term impacts to wetlands than with the FW Design Option. The additional 0.02 acre that is impacted under the FW Design Option is located at the northern end of the track as it crosses Wetland WFW-07, a small Category III wetland. The Preferred FW Enchanted Parkway

Alternative completely avoids direct long-term impacts to Wetland WFW-07. The tracks would be elevated in areas where there is the most amount of wetland area, particularly in the southern portion of this segment. Direct long-term impacts to wetland buffers would be greater under the FW Design Option. The differences are due to the FW Design Option tracks transecting Wetland WFW-07 buffer.

4.3.1.3 South Federal Way Segment Alternatives

The potential long-term impacts of the South Federal Way Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-5. Three short, at-grade portions occur in the SF I-5 and SF Enchanted Parkway Alternatives where there are no wetlands. The SF Enchanted Parkway Alternative would have substantially fewer long-term impacts on wetlands compared to all other alternatives.

The SF I-5 Alternative results in approximately 1.1 more acres of long-term impacts than the SF Enchanted Parkway Alternative. The difference results mainly from the impacts of the SF I-5 Alternative on four wetlands (WFW-20, WFW-21, WFW-26, and WFW-27) that would be avoided by the SF Enchanted Parkway Alternative. These four additional wetlands, all of which are associated with East Fork Hylebos Creek Tributary 0016A, generally have moderate functions, scoring as Category II and III wetlands. Two of them, however (Wetlands WFW-26 and WFW-27) are mitigation sites and would require special consideration for permitting.

The remaining two SR 99 alternatives (SF 99-West, SF 99-East, and when either are paired with the Porter Way Design Option) have two to three times more impacts compared to the SF Enchanted Parkway Alternative (Table J4.4-5). The majority of impacts to wetlands along any of the SR 99 alternatives would affect Category II wetlands, and a substantial portion of impacts would also affect Category I wetlands. Many of the wetlands found under these alternatives are associated with West Fork Hylebos Creek, North Fork Hylebos Creek, and their tributaries and provide valuable habitat to fish and other wildlife. The SF 99-East and SF 99-East with Porter Way Design Option alternatives have the greatest impacts and affect approximately 1 acre more wetland habitat than SF 99-West and SF 99-West with Porter Way Design Option. The Porter Way Design Option adds more than one-third acre of direct long-term impacts by crossing the West Hylebos Creek twice and affecting its associated wetlands, Wetlands WMI-09a and WMI-09b, both Category II wetlands.

As with direct impacts on wetlands, the Preferred SF Enchanted Parkway Alternative would have substantially fewer long-term impacts on wetland buffers compared with the SF I-5 Alternative and even fewer impacts than the alternatives along SR 99 (Table J4.4-5).

4.3.1.4 Fife Segment Alternatives

The potential long-term impacts of the Fife Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-5. All tracks and stations for each alternative in the Fife Segment would be elevated. The Fife Pacific Highway E and Fife Median alternatives are grouped together because they share the same analysis footprint. These two alternatives along Pacific Highway E would have fewer long-term impacts to wetlands than the Fife I-5 Alternative (Table J4.4-5). This difference is primarily because the Pacific Highway E alternatives would avoid Wetland WFI-02, whereas the Fife I-5 Alternative would not avoid Wetland WFI-02. In addition, the alternatives along Pacific Highway E would affect a much smaller area of Wetland WFI-08a, a Category III wetland associated with Wapato Creek, compared to the Fife I-5 Alternative.

Comparing the two design options, the 54th Avenue Design Option would have fewer impacts than the 54th Span Design Option, in part because the 54th Avenue Design Option avoids impacting Wetlands WFI-33 and WFW-11, both Category III wetlands. The Fife Pacific Highway and Fife Median alternatives have equal impacts to when paired with 54th Avenue Design Option.

The preferred Fife Station, which would result in some long-term impacts on Wetland WFI-17, is included in all alternatives. Neither the 54th Avenue Design Option station nor the 54th Span Design Option station would directly affect wetlands.

Opposite from its impacts to wetlands, the Fife I-5 Alternative would result in the fewest long-term impacts to wetland buffers, followed by its paring with 54th Avenue Design Option, then by 54th Span Design Option.

4.3.1.5 Tacoma Segment Alternatives

The potential long-term impacts of the Tacoma Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-5. Most tracks for the alternatives in the Tacoma Segment would be elevated. The only at-grade portions occur where there are no wetlands identified. The Tacoma alternatives would have minimal (less than 0.01 acre) long-term impacts on wetlands. The two bridge options over the Puyallup River, long-span or pier-supported, would not directly impact wetlands. Either option may result in some shading of Wetland WTA-04, which is a wetland in shoreline jurisdiction.

Long term impacts to wetland buffers for the Tacoma alternatives are approximately the same with the Tacoma 26th Street alternative slightly larger due to additional impacts on Wetland WTA-02's buffer.

4.3.2 Construction Impacts

Although detailed construction limits have not yet been defined at this phase in the project design, potential project construction limits have been estimated (see Section 2.5). These temporary impact areas are summarized in Table J4.4-6 (Potential Construction-related Wetland Impacts, by Alternative) and would be in addition to the long-term direct impacts described in Section 4.3.1.

Table J4.4-6 Potential Construction-Related Wetlands Impacts, by Alternative

Alternative	Total Wetland Impacts (acres)[1]	Wetland Impact by Ecology Category (acres)[1,2]	Impacted Wetland I.D.	Wetland Buffer Impacts (acres)[1,3]	Impacted Wetland Buffer I.D.
Federal Way Segment					
Preferred FW Enchanted Parkway	1.62	Category II: 1.56 Category III: 0.04 Category IV: 0.02	WFW-01, WFW-03, WFW-04, WFW-11, WFW-13, WFW-15, WFW-32	7.83	WFW-01, WFW-03, WFW-04, WFW-06, WFW-10, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32
FW Enchanted Parkway with FW Design Option	1.65	Category II: 1.56 Category III: 0.07 Category IV: 0.02	WFW-01, WFW-03, WFW-04, WFW-07, WFW-11, WFW-13, WFW-15, WFW-32	7.50	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-10, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-32

Table J4.4-6 Potential Construction-related Wetlands Impacts, by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1]	Wetland Impact by Ecology Category (acres)[1,2]	Impacted Wetland I.D.	Wetland Buffer Impacts (acres)[1,3]	Impacted Wetland Buffer I.D.
South Federal Way Segment					
SF Enchanted Parkway	4.90	Category I: 0.59 Category II: 3.02 Category III: 1.27 Category IV: 0.03	WFW-05, WFW-17, WFW-18, WFW-19, WFW-24, WFW-25, WMI-01, WMI-02, WMI-03, WMI-06, WMI-07, WMI-08, WMI-09a, WMI-09c, WMI-09d, WPCFI-01, WPCFI-02, WPCMIFI-01	8.59	WFI-25, WFW-05, WFW-17, WFW-18, WFW-19, WFW-24, WFW-25, WMI-01, WMI-02, WMI-03, WMI-04, WMI-06, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF I-5	5.84	Category I: 0.59 Category II: 3.11 Category III: 2.12 Category IV: 0.03	WFW-17, WFW-18, WFW-19, WFW-20, WFW-21, WFW-22, WFW-24, WFW-25, WFW-26, WFW-27, WMI-01, WMI-02, WMI-03, WMI-06, WMI-07, WMI-08, WMI-09a, WMI-09c, WMI-09d, WPCFI-01, WPCFI-02, WPCMIFI-01	12.24	WFI-25, WFW-05, WFW-17, WFW-18, WFW-19, WFW-20, WFW-21, WFW-22, WFW-24, WFW-25, WFW-26, WFW-27, WMI-01, WMI-02, WMI-03, WMI-04, WMI-06, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF 99-West	4.71	Category I: 1.01 Category II: 3.53 Category III: 0.15 Category IV: 0.02	WFW-17, WFW-18, WFW-36, WFW-37, WFW-38, WFW-39, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-09a, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WPCFI-01, WPCFI-02, WPCMIFI-01	12.61	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF 99-West with Porter Way Design Option	7.91	Category I: 2.33 Category II: 5.20 Category III: 0.38	WFW-17, WFW-18, WFW-36, WFW-37, WFW-38, WFW-39, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01	16.12	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW--36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
SF 99-East	6.49	Category I: 2.18 Category II: 4.23 Category III: 0.06 Category IV: 0.03	WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WMI-09a, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01	15.16	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WFW-49, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-10, WMI-11, WMI-12, WMI-13, WMI-14, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01

Table J4.4-6 Potential Construction-related Wetlands Impacts, by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1]	Wetland Impact by Ecology Category (acres)[1,2]	Impacted Wetland I.D.	Wetland Buffer Impacts (acres)[1,3]	Impacted Wetland Buffer I.D.
SF 99-East with Porter Way Design Option	9.92	Category I: 3.52 Category II: 6.11 Category III: 0.29	WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01	18.74	WFI-25, WFW-05, WFW-17, WFW-18, WFW-34, WFW-36, WFW-37, WFW-38, WFW-39, WFW-42, WFW-43, WFW-44, WFW-45, WFW-46, WFW-47, WFW-48, WFW-49, WMI-07, WMI-08, WMI-09a, WMI-09b, WMI-09c, WMI-09d, WMI-11, WMI-12, WMI-13, WMIFW-01, WPCFI-01, WPCFI-02, WPCMIFI-01
Fife Segment					
Fife Pacific Highway	1.31	Category II: 0.07 Category III: 1.24	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	5.16	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Pacific Highway and 54th Avenue Design Option	1.69	Category II: 0.07 Category III:1.61	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	5.14	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-07, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Pacific Highway and 54th Span Design Option	1.84	Category II: 0.07 Category III: 1.76 Category IV: <0.01	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WFI-33, WPCFI-02	5.24	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WFI-33, WPCFI-02
Fife Median	1.31	Category II: 0.07 Category III: 1.24	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	5.16	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Median and 54th Avenue Design Option	1.69	Category II: 0.07 Category III: 1.61	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	5.14	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WPCFI-02
Fife Median and 54th Span Design Option	1.69	Category II: 0.07 Category III: 1.62	WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WFI-33, WPCFI-02	5.24	WFI-01, WFI-02, WFI-03, WFI-04, WFI-06, WFI-08a, WFI-08b, WFI-08d, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-32, WFI-33, WPCFI-02

Table J4.4-6 Potential Construction-related Wetlands Impacts, by Alternative (continued)

Alternative	Total Wetland Impacts (acres)[1]	Wetland Impact by Ecology Category (acres)[1,2]	Impacted Wetland I.D.	Wetland Buffer Impacts (acres)[1,3]	Impacted Wetland Buffer I.D.
Fife I-5	4.99	Category II: 0.69 Category III: 4.31	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	7.93	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-16, WFI-17, WFI-18, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WPCFI-02
Fife I-5 and 54th Avenue Design Option	5.43	Category II: 0.69 Category III: 4.74	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WPCFI-02	7.97	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25,WFI-26, WFI-28, WFI-30, WPCFI-02
Fife I-5 and 54th Span Design Option	5.44	Category II: 0.69 Category III: 4.75	WFI-02, WFI-03, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-30, WPCFI-02	8.07	WFI-02, WFI-03, WFI-04, WFI-05, WFI-06, WFI-07, WFI-08a, WFI-10, WFI-11, WFI-12, WFI-14a, WFI-14b, WFI-16, WFI-17, WFI-21, WFI-22, WFI-24, WFI-25, WFI-26, WFI-28, WFI-30, WFI-33, WPCFI-02
Tacoma Segment					
Preferred Tacoma 25th Street-West	0.01	Category III: 0.01	WTA-01, WTA-04	0.08	WTA-02, WTA-04
Tacoma 25th Street-East	0.01	Category III: 0.01	WTA-01, WTA-04	0.08	WTA-02, WTA-04
Tacoma Close to Sounder	0.01	Category III: 0.01	WTA-01, WTA-04	0.13	WTA-02, WTA-04
Tacoma 26th Street	0.01	Category III: 0.01	WTA-01, WTA-04	0.05	WTA-02, WTA-04

Notes:

(1) Totals may vary from the sum of individual numbers due to rounding

(2) Wetland ratings (Hruby and Yahnke 2023) are preliminary and subject to review by permit authorities.

(3) Wetland buffer impact values in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream buffers. Wetland areas and stream areas, defined by the OHWM, are excluded from wetland buffer areas.

Temporary, construction-related impacts on wetland resources would occur where wetlands or wetland buffers are affected by clearing and ground-disturbing work but are restored and revegetated following construction. Such areas are within the project limits (including temporary construction easements) but not within the permanent impact footprint. Based upon the federal definition used by the Corps, “temporary” means these impacts would not be permanent, and wetland areas would be restored within 4 years after construction starts. Temporary impacts may include temporary alteration of wetland area, soils, hydrology, and/or vegetation. Temporary impacts may result from the use of staging areas, temporary work areas, access roads, stream relocations, cofferdams, clearing, stockpiles, erosion and sediment controls, or other temporary structures necessary to complete construction of the permanent facilities. Construction-related dewatering may temporarily alter groundwater discharge to wetlands. Wetland and wetland buffer functions could also be impacted by soil compaction, accidental spills of hazardous substances, noise and other human-caused disturbances, sedimentation, and introduction of invasive species.

The duration of temporary impacts on wetlands can vary depending on the type of vegetation that is affected. For instance, temporary impacts on emergent wetlands are generally

short-lived, with functions typically returning to pre-impact performance within one growing season. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs may require several years or decades to achieve the size and stature necessary to provide pre-construction functions such as canopy habitat.

Construction of TDLE parking facilities at the stations in South Federal Way and Fife could be delayed up to 3 years after initial service opens. If that occurs, the construction-related effects described above would occur at these two station locations at the time the parking facilities are built.

The following sections outline the range of potential temporary construction impacts that could occur under each alternative. Actual impacts would depend on the final configuration and design, construction footprint and methods, BMPs implemented during construction (see Section 4.8.2), and performance of post-construction restoration. Direct construction impacts would be identified and quantified during final design and permitting.

4.3.2.1 No-Build Alternative

The No-Build Alternative would not have any temporary, construction-related impacts on wetlands. Areas temporarily affected by construction of the planned OMF South and SR 167 Completion projects (which are part of the No-Build Alternative) would be restored separately from TDLE.

4.3.2.2 Federal Way Segment Alternatives

The Preferred FW Enchanted Parkway Alternative would have slightly fewer direct construction-related impacts to wetlands and wetland buffers than the FW Design Option (Table J4.4-6). The FW Design Option would impact Wetland WFW-07 (an additional 0.03 acre), a small Category III wetland, at the northern end of the track. The Preferred FW Enchanted Parkway Alternative would avoid direct, construction-related impacts to Wetland WFW-07 and its buffer.

4.3.2.3 South Federal Way Segment Alternatives

The potential construction-related impacts of the South Federal Way Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-6. The SF 99-West Alternative would have the fewest direct, construction-related impacts to wetlands, followed by the SF Enchanted Parkway Alternative, the SF I-5 Alternative, and the SF 99-East Alternative. The SF 99-West Alternative has 0.19 acre fewer construction-related impacts than the SF Enchanted Parkway Alternatives and 1.13 acres fewer impacts than the SF I-5 Alternative. However, the SF 99-West impacts more area of high-quality wetlands (Category I and II wetlands) than either SF Enchanted Parkway or SF I-5 Alternatives. Under either of the SF 99 alternatives, the Porter Way Design Option would increase construction-related impacts on wetlands by more than 3 acres compared to SF Enchanted Parkway and SF I-5 alternatives, in part because it crosses the West Hylebos Creek and its associated wetlands twice.

The study area contains many large, complex wetlands associated with streams that provide high water quality, hydrologic, and habitat functions Most of the wetland area affected by construction-related impacts under all the alternatives would consist of Category II wetlands. All of the alternatives would also affect Category I wetlands; the greatest number of construction-related impacts to Category I wetlands would occur under the SF 99-East Alternative paired with Porter Way Design Option.

Construction-related impacts to wetland buffers would be the smallest under the SF Enchanted Parkway Alternative, followed by the SF I-5 Alternative, because they are in highly developed areas that do not contain extensive vegetation buffers. The SF 99-East with Porter Way Design Option would have the greatest impacts to buffers because there are more wetlands with vegetated, functional buffers that are less confined by development than those under other alternatives.

4.3.2.4 Fife Segment Alternatives

The potential construction-related impacts of the Fife Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-6. The Fife Pacific Highway and Fife Median alternatives have the same footprint and the same wetland impacts. These two alternatives along Pacific Highway E would have substantially fewer construction-related impacts than the I-5 alternative, mainly stemming from fewer impacts on Wetland WFI-02, a Category III wetland. Of the two design options, the 54th Avenue Design Option would have fewer impacts than the 54th Span Design Option because it avoids impacting Wetland WFI-33, a Category III wetland.

The Fife I-5 Alternative (with and without the two design options) would have almost 3 acres more wetland buffer impacts than the Fife Pacific Highway/Median alternatives.

4.3.2.5 Tacoma Segment Alternatives

The potential construction-related impacts of the Tacoma Segment alternatives on wetlands and wetland buffers are compared in Table J4.4-6. The differences between all four Tacoma Segment alternatives are minimal and for this discussion are considered the same. Construction would directly impact Wetlands WTA-01 and WTA-04, which are Category III wetlands associated with the Puyallup River. No construction-related impacts on wetlands are associated with the two bridge options. During the current phase of design, the project footprint near the Puyallup River was revised to eliminate temporary impacts on Wetland WFI-10 (Category I wetland) during construction.

Wetland buffers have the greatest construction-related impacts under the Tacoma 26th Street Alternative and the fewest under the Tacoma Close to Sounder Alternative. Buffers for Wetland WTA-02 and WTA-04 would be affected under all alternatives.

4.4 Threatened and Endangered Species

Potential impacts on ESA-listed fish would occur where project construction or operation would affect waters that are known or expected to support use by one or more of these species or their designated critical habitat. As discussed in Section 3.1.2, ESA-listed fish are known or expected to be present in the following streams in the study area:

- West Fork Hylebos Creek (Chinook salmon and steelhead; critical habitat for Chinook salmon).
- Hylebos Creek (Chinook salmon and steelhead; critical habitat for Chinook salmon).
- Wapato Creek (Chinook salmon and steelhead; no critical habitat).
- Puyallup River (Chinook salmon, steelhead, and bull trout).

Potential impacts on aquatic species and habitats (including threatened and endangered species) in these streams are analyzed in Section 4.1. As noted in that discussion, if a pier-supported bridge is built at the Puyallup River crossing, installation of pile-supported temporary work trestles and in-water piers could kill or injure ESA-listed fish in the river. A biological

assessment is being prepared to document compliance with the ESA and to support consultation with USFWS and NMFS. The assessment would also include a review of potential effects on essential fish habitat, as required by the Magnuson-Stevens Fishery Conservation and Management Act.

As discussed in Section 3.4.1, no ESA-listed plant or wildlife species are known or expected to be present in the study area. For this reason, none of the TDLE alternatives would have the potential for any adverse effects on ESA-listed plant or wildlife species.

4.5 Areas Protected Under Local Critical Areas Ordinances and Shoreline Master Programs

Potential impacts on areas protected under local critical areas ordinances would occur where the project footprint overlaps areas identified as wetlands or FWHCAs. Potential impacts on wetlands are analyzed in Section 4.3. Impacts on specific habitat types and areas identified as FWHCAs are analyzed in other sections of this chapter, as follows:

- Streams, lakes, and other waters of the state: Section 4.1 (Aquatic Species and Habitat).
- Riparian areas: Section 4.1 (Aquatic Species and Habitat).
- Mature forest: Section 4.2 (Vegetation, Wildlife, and Wildlife Habitat).

Forested areas where special-status wildlife species have a primary association may also be designated as FWHCAs. Impacts on such areas are discussed in Section 4.2 (Vegetation, Wildlife, and Wildlife Habitat).

Impacts within areas managed under shoreline master programs include the crossings of the Puyallup River and Hylebos Creek. The alternatives have nearly identical impact footprints within the shoreline jurisdiction in both areas.

4.6 Indirect Impacts

Indirect impacts include those effects that are related to the project but not part of it, and that may occur separated by distance or time. Other sources of indirect effects may be related to changes in the pattern of land use, population density, or water quality in the areas affected by the project. Indirect impacts may also occur through the implementation of mitigation measures for other environmental impacts, or through supporting projects that are not yet defined or considered part of the project alternatives.

For aquatic species and habitat, indirect impacts would be minimal because the surrounding areas are already heavily developed. TDLE is not expected to interfere with future projects that may provide habitat improvements such as road projects that may improve fish passage, or projects that may enhance vegetated and wetland areas in the project corridor. TDLE would be designed to ensure that it would not preclude future culvert replacement(s) by WSDOT to provide fish passage. Facilities that provide water quality treatment could minimize long-term indirect impacts on water quality in streams that provide habitat for fish sensitive to the toxic effects of contaminants in stormwater runoff. However, as discussed in the analysis of long-term impacts, treated water discharged from such facilities and untreated water that bypasses those facilities during major storm events may contain contaminants that can harm fish and other aquatic life. In addition, the presence of light rail structures near streams would limit options for riparian habitat restoration in the future.

Long-term indirect impacts on vegetation, wildlife, and wildlife habitat could include habitat loss or increased disturbance due to changes in land use patterns near the proposed station locations. Such impacts would be unlikely under any of the project alternatives, however, because all proposed station locations are in densely developed commercial and/or industrial areas.

If in-water work for a pier-supported bridge over the Puyallup River leads to detectable decreases in fish abundance in the Puget Sound, the availability of prey for Southern Resident killer whales could be reduced. The potential for this to occur, as well as any potential indirect impacts on Southern Resident killer whales, would be evaluated during ESA Section 7 consultation with NMFS.

Indirect impacts from TDLE may result in long-term wetland degradation from stormwater discharges and alterations in wetland hydrology. Impacts to wetland hydrology would be minimized through the development of stormwater management facilities that meet the standards established by local, state, and federal agencies with regulatory authority. Facilities that provide water quality treatment could minimize long-term indirect impacts on water quality in wetlands.

4.7 Cumulative Impacts

Past actions have greatly changed the ecological landscape in the study area and vicinity, and ongoing and reasonably foreseeable future actions could contribute to additional cumulative impacts. To address the effects of past development, restoration programs and projects (e.g., aquatic and terrestrial habitat improvement projects, culvert replacement projects to eliminate barriers to fish passage barriers) are being planned and implemented throughout the region. The potential for any of the TDLE alternatives to result in adverse cumulative impacts would be related to the direct impacts of that alternative. In other words, a project alternative with a greater extent and/or intensity of adverse impacts on ecosystem resources would have a greater risk of adverse cumulative impacts.

Permitted impacts for FWLE are 1.25 acres of wetland, 4.9 acres of wetland buffer, and 0.24 acre of riparian forest buffer (Sound Transit 2023). In addition, the Final EIS for FWLE identified impacts on 35 acres of forested habitat (Sound Transit 2016a). That EIS also analyzed impacts associated with the relocation of approximately 1,000 linear feet of stream channel (Bingaman Creek, which will be rerouted to meander around the columns supporting the elevated guideway). These impacts will be mitigated through the permitting process with regulatory agencies and local jurisdictions. The Federal Transit Administration (2017) determined that FWLE will not impact fish passage in Bingaman Creek or elsewhere; the project was designed to allow WSDOT to implement fish passage improvements on Bingaman Creek in the future, if necessary. In addition, by complying with WSDOT's and local jurisdictions' rules concerning tree replacement and the maintenance of visual quality, FWLE is expected to increase the amount of vegetated area over the long term.

Other reasonably foreseeable future projects that could adversely affect ecosystem resources in the study area include Sound Transit's OMF South, the City of Federal Way's City Center Access project, and Phase 1 of WSDOT's SR 167 Completion Project. These projects are largely on developed or partially developed parcels. Nevertheless, possible short-term and long-term impacts of these projects include loss or degradation of vegetation, wildlife habitat, streams, wetlands, and associated buffer areas. Impacts of the planned OMF South and the Federal Way City Center Access projects would contribute to those of the South Federal Way Segment alternatives.

SR 167 Completion Project Phase 1a was completed in 2021, and construction of Stage 1b, which includes installation of the riparian restoration program, is currently underway. Phase 1 of the SR 167 Completion Project includes the creation and/or restoration of approximately 2.6 miles of stream habitat and 110 acres of riparian buffer associated with Hylebos Creek, Surprise Lake Creek, and Wapato Creek. Based on a review of maps in the environmental reevaluation document for that project, some of the stream relocation sites and riparian habitat restoration areas along the mainstem of Hylebos Creek would be affected by the alternatives in the Fife Segment. The restored riparian areas along Hylebos Creek will be returned to the Puyallup Tribe of Indians when construction is completed. If one of the action alternatives is selected, careful coordination between Sound Transit, WSDOT, and the Puyallup Tribe of Indians would be essential in these areas to avoid or minimize effects on restored areas.

Phase 1 of the SR 167 Completion Project will also enlarge or replace several existing stream crossing structures. These structures will allow for continued fish passage or provide additional fish passage into stream reaches to which access is currently impeded. The new structures also provide additional movement opportunities for terrestrial wildlife, including under I-5 (FHWA and WSDOT 2018).

Several of the wetlands that will be affected by Phase 1 of the SR 167 Completion Project fall within the TDLE study area (FHWA and WSDOT 2018). If these wetlands are diminished or eliminated before TDLE construction begins, the total extent of TDLE-related wetland impacts could decrease. Even if this is the case, the impacts of the TDLE Fife Segment build alternatives on wetlands in the Hylebos Creek and Wapato Creek watersheds would contribute cumulatively to those of the SR 167 Completion Project.

Another consideration is mitigation for wetland impacts by both the SR 167 Completion Project and TDLE. The TDLE study area includes some sites that are currently under construction for habitat restoration to mitigate for wetland impacts from the SR 167 Completion Project. If any of the TDLE alternatives affect a wetland mitigation site for the SR 167 Completion Project, additional mitigation requirements may be triggered. In addition, mitigation sites where ecological uplift has been achieved for the SR 167 Completion Project will no longer be available as potential mitigation sites for TDLE-related impacts.

Coupled with the impacts of the past, present, and future projects described above, the impacts of the project alternatives could contribute cumulatively to reductions in the area and function of ecosystem resources in the study area. The potential for future projects to adversely affect ecosystem resources in the study area would be limited by regulatory review and/or permitting processes under Tribal, federal, state, and local regulations. These reviews and permitting processes would trigger the implementation of measures to avoid or minimize impacts on ecosystem resources, as well as compensatory mitigation for unavoidable impacts on wetlands, streams, and their buffers.

5 POTENTIAL MITIGATION MEASURES

Sound Transit's policy on ecosystem mitigation is to avoid impacts on environmentally sensitive resources and provide adequate mitigation to ensure no net loss of ecosystem function and acreage as a result of agency projects (Sound Transit 2007). The proposed project would mitigate impacts on ecosystem resources in accordance with the mitigation sequencing requirements established by SEPA, the CWA, and local critical areas ordinances. In this context, mitigation sequencing is defined as first avoiding and minimizing, then rectifying, reducing, compensating, and monitoring environmental impacts (WAC 197-11-768). As described above, the project alternatives would first avoid or minimize potential impacts on ecosystem resources to the greatest degree possible, and Sound Transit is committed to providing compensatory mitigation when avoidance is not practicable.

Proposed mitigation measures would include specific goals and objectives and specify monitoring criteria against which potential mitigation measures can be compared. Sound Transit would consider compensatory opportunities for advance mitigation, mitigation banks, and in-lieu fee programs, in collaboration with Tribal and regulatory agencies. Proposed compensatory mitigation measures and location(s) would be developed so that reviewing agencies can determine the likelihood of meeting all stated objectives. Conservation measures would be finalized during permitting.

5.1 Avoidance and Minimization of Impacts

The project alternatives incorporate the avoidance and minimization of impacts as a guiding principle during preliminary and final design. The build alternatives for the proposed project would avoid or minimize potential impacts on ecosystem resources whenever practicable. Sound Transit would comply with standard specifications, BMPs, and applicable Tribal, federal, state, and local mitigation requirements during design, construction, and post-construction activities. Measures would be incorporated into construction plans as specifications, as applicable. Sound Transit would meet all regulatory requirements and continue to implement proactive avoidance and minimization measures related to these BMPs in adherence with Tribal, federal, state, and local regulations. This would include conducting work over and within stream channels only during the approved in-water work window for each watercourse. Conservation measures arising from ESA Section 7 consultation would also be implemented.

These strategies, along with others designed to avoid or minimize effects on other resources, would be implemented to effectively minimize the potential impacts on sensitive ecosystem resources. Examples of additional strategies include minimizing vegetation clearing, restoring temporarily affected areas, and preparing and implementing a revegetation plan.

5.1.1 Avoidance and Minimization During Design Development

The development of the design for TDLE was strongly influenced by the presence and location of habitat features, vegetation conditions, and potential for fish and wildlife usage. The design was intended to minimize impacts on ecosystem resources and was reconfigured in several areas to further reduce impacts on important environmental features.

Most of the project has been located within heavily developed areas and/or along major road corridors. The project abuts these major highways (I-5, SR 99) with the minimum margin allowed under transportation safety and planning requirements.

Where feasible, Sound Transit performed detailed delineations of stream and wetland features along Hylebos Creek and its tributaries. These delineations were used by project designers to avoid or minimize impacts on these resources.

The project footprint was adjusted and reduced in some areas to avoid and minimize impacts on streams, riparian areas, wetlands, and mature forested areas, where feasible. For example, the footprint of staging areas near the Puyallup River was revised to eliminate impacts on Wetland WFI-10, a Category I (mature forested) wetland.

Vegetation clearing and related habitat impacts were avoided and minimized by focusing design elements, particularly staging and lay-down areas, in locations that were already developed or heavily disturbed. All proposed stations, parking areas and pedestrian access features are located in developed areas.

The location of the proposed bridge crossing over the Puyallup River is in an urbanized area, at the site of the former I-5 bridge location (demolished in 2022), between the newly constructed I-5 bridge and a railroad bridge. The proposed approaches and construction staging area for TDLE are currently in use as staging areas for the reconstruction of I-5 by WSDOT. The selected crossing site uses the footprint of an existing bridge and avoids nearby riparian forests. As a result, the crossing sites would impact only small areas of already-disturbed riverbank vegetation, minimizing impacts on riparian habitats. Limited by the deep shade of the large existing bridge, the impacted vegetation consists of patches of Himalayan blackberry and willows that are confined to a narrow band by the levee access road (see Sections 3.1.2.13 and 3.3.3). The long-span bridge option would clear-span the river, requiring no pilings in the riverbed and thereby avoiding direct impacts on the river and its aquatic habitats. The pier-supported bridge option was designed to use the minimum number of piles needed for structural support.

5.1.2 Construction Best Management Practices

Sound Transit has developed BMPs to avoid and minimize impacts during construction to the extent feasible. Many of these BMPs are based on the conditions likely to be set forth in project permits. The following subsections identify BMPs that would be implemented for sensitive areas in general, as well as BMPs specifically targeting fish and aquatic habitats, including water quality.

5.1.2.1 General BMPs for All Sensitive Areas

Sound Transit or the construction contractor would delineate construction limits with fencing and signage to prevent inadvertent impacts on ecosystem resources such as wetlands, riparian vegetation, or sensitive upland habitats. The intent of the fencing and signage would be to prevent impacts on sensitive sites outside the construction limits. The construction limits would be clearly marked with high-visibility construction fencing before clearing or ground-disturbing activities begin. Clearing and ground-disturbing activities outside the construction limits would not be allowed. Temporarily cleared vegetation would be restored after construction is complete. Site restoration would include replanting disturbed areas with appropriate native vegetation, as soon as practicable. Sound Transit would also implement appropriate measures to minimize the risk of introduction and spread of noxious and invasive plant and animal species.

To minimize the risk of harm to species protected under the Migratory Bird Treaty Act, Sound Transit would consult with staff from WDFW or USFWS about measures to conserve migratory birds and their nests.

Sound Transit or its construction contractor would develop a Temporary Erosion and Sediment Control (TESC) plan that would be implemented during construction. The TESC plan would identify measures for preventing sediment from soil or rock stockpiles, excavated materials, or excess soil materials being conveyed by high water or storm runoff into sensitive habitats, including stream channels, wetlands, and riparian areas outside the construction limits. The contractor would implement the plan before discharging or allowing runoff from the site. Monitoring requirements specified in the TESC would provide feedback to make sure that the erosion control practices are operating properly and effectively. In addition, BMPs would be implemented to limit soil compaction in sensitive areas.

5.1.2.2 Fish and Aquatic Habitat Protection

Construction activities within or below the OHWM of waterbodies in the study area would comply with the terms and conditions set forth in the HPA and other permits (such as the CWA Section 404 permit) issued for the project, including provisions designed to avoid or minimize the potential for adverse effects on habitat in receiving waters. Such provisions may include seasonal limits or other restrictions on construction below the OHWM to minimize the risk of adverse effects on fish during highly sensitive life history stages (e.g., spawning, rearing).

In accordance with typical requirements of an HPA, if LWD must be moved to allow the reasonable use of an over-water or in-water facility, the LWD would be returned to the water downstream, where it would continue to provide aquatic habitat function.

Sound Transit has committed to minimizing the need to place existing streams in new culverts and has designated the TDLE alternatives to avoid new stream piping wherever possible. If project construction necessitates the modification or replacement of any existing culverts in waters of the state, the design of the replacement culverts would comply with the fish passage requirements specified in WAC 220-110-200. Any affected streambeds or stream banks adjacent to culverts would be permanently restored with plantings of native or approved woody and herbaceous species within 1 year of completion of each phase of construction. Bank protection, if required, would follow the guidelines set forth in Washington State's Integrated Streambank Protection Guidelines (Cramer et al. 2003).

Water quality protection would be addressed through compliance with the CWA Section 401 water quality certificate and the National Pollutant Discharge Elimination System (NPDES) construction stormwater general permit issued for the project. The goal of the permit is to reduce or eliminate stormwater pollution and other impacts on surface waters from construction sites. The project would also be required to develop a stormwater pollution prevention plan (SWPPP) that implements BMPs for identifying, reducing, eliminating, or preventing sediment and erosion problems on site. The SWPPP would include a TESC plan; spill prevention, control, and countermeasures plan; concrete containment and disposal plan; dewatering plan; and a fugitive dust plan.

Specific BMPs for avoiding or minimizing potential impacts on water quality include the following:

- Operating heavy equipment above the OHWM, except as specifically authorized under the HPA issued for the project.
- Covering temporarily stored materials with plastic or other impervious material during rain events to prevent sediments from being washed from the storage area to surface waters.
- Inspecting all temporary and permanent erosion and sedimentation control measures on a regular basis and maintaining and repairing them as needed to ensure continued performance of their intended function.

- Preventing the discharge of turbid water to streams and wetlands. Turbid wastewater may be routed to temporary or permanent detention facilities or to upland areas that provide adequate infiltration.
- Cleaning and inspecting all equipment to be used for construction activities before it arrives at the project site to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly. Should a leak be detected on heavy equipment used for the project, the equipment would be repaired before use. Construction equipment and vehicles would be maintained to prevent them from leaking fuel or lubricants.
- Preventing contact of uncured concrete and/or concrete byproducts with streams or water conveyed directly to streams during construction, in accordance with WAC 220-110-270(3). A concrete truck chute cleanout area or equally effective BMP would be established to properly contain wet concrete.

5.1.3 Design and Operation Best Management Practices

The project would install permanent stormwater runoff treatment and flow control facilities where needed according to the requirements of the most recently adopted Ecology Stormwater Management Manual for Western Washington. Where applicable and feasible, the project would incorporate stormwater conveyance and management facilities that promote infiltration. Sound Transit would design and construct permanent stormwater treatment facilities and flow-control measures to minimize impacts on stream water quality and flow.

The project would select, design, and install runoff treatment BMPs that are best suited to the site conditions and best capable of achieving the required levels of treatment (subject to negotiation with the local jurisdiction and/or Ecology). The project would not reroute existing drainage configurations to the extent that stormwater from one basin or subbasin is conveyed and discharged to another.

The project would implement integrated pest management techniques, in accordance with current Ecology water quality agreements, to minimize the impact on aquatic and terrestrial environments.

5.2 Rectifying and Reducing Impacts over Time

To the extent that impacts cannot be avoided or minimized through BMPs, Sound Transit would implement restoration measures to rectify temporary impacts and reduce their effects over time. Immediately following project construction, Sound Transit would begin restoring temporarily disturbed wetlands, streams, and buffer areas. The length of time that would be required for site restoration to effectively replace habitat functions would vary. To the extent feasible, temporarily disturbed wetlands, streams, and their buffers would be restored to preconstruction conditions, or better, and planted with appropriate native species when construction activities are finished. Sound Transit would conduct detailed site surveys to reestablish topography. Restoration would include soil decompaction and amendment where needed, followed with vegetation replacement. Upland vegetation disturbed within construction staging areas would be revegetated with native species generally within 1 year following construction. Invasive, nonnative vegetation disturbed during construction would be removed and the site restored with native vegetation to improve the overall habitat for wildlife.

5.3 Compensatory Mitigation

For unavoidable long-term impacts on wetlands, streams, and their buffers, Sound Transit would develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal, Tribal, state, and local requirements and guidelines. These include the federal Final Compensatory Mitigation Rule (40 CFR Part 230); interagency guidance (Wetland Mitigation in Washington State; Ecology 2021); and the applicable local critical areas ordinances and shoreline regulations. Mitigation would be coordinated with regulatory agencies, employing a watershed approach and the mitigation tools available to the project. Where the project affects any fish-bearing streams or fish passage structures, Sound Transit would coordinate with the appropriate Tribes and agencies (e.g., WSDOT, WDFW) on mitigation concepts, restoration priorities and methods.

If compensatory mitigation for wetland or stream impacts is required, ground-disturbing work and human activity associated with mitigation project implementation could disturb wildlife or temporarily degrade habitat. Any such impacts would be short-lived and would be offset by long-term improvements in habitat conditions at the mitigation site.

Sound Transit would also comply with local ordinances regarding tree replacement ratios. Tree removal within the I-5 corridor would be mitigated according to the WSDOT Roadside Policy Manual.

Sound Transit plans to follow federal mitigation rules (73 FR 19594, April 10, 2008), which prioritize approved mitigation banks and in-lieu fee programs, where available.

5.3.1 Approved Mitigation Bank

TDLE lies within the service area of the Port of Tacoma's Upper Clear Creek mitigation bank. This mitigation bank was certified in June 2020 and could be used to offset project impacts in the Hylebos Creek watershed if credits are available at the time of permitting. Mitigation banking accreditation takes considerable lead time for planning and approval, so it is unlikely that another mitigation bank could become certified in time to serve the project.

5.3.2 County In-Lieu Fee Programs (Mitigation Reserves Program)

King and Pierce Counties have developed in-lieu fee programs, but only the King County Program is applicable to this project. The Pierce County Freshwater In-Lieu Fee Program (ILF) was certified in 2015 (Pierce County 2020c). However, the program is currently applicable only for impacts within the watersheds of Chambers and Clover Creeks, neither of which includes TDLE. If additional sites were added to the Pierce County ILF program within the Hylebos or Puyallup River watersheds, then use of this program may be possible.

The King County In-Lieu Fee Program is called the Mitigation Reserves Program, which was approved by the Corps in March 2012 (King County 2011). The program includes service areas within the watersheds affected by TDLE (i.e., Green River and Central Puget Sound) that are in King County. The City of Federal Way updated critical areas ordinances allow for compensatory mitigation to be provided through a certified in-lieu fee program.

5.3.3 Project-Specific Mitigation Developed by Sound Transit

Sound Transit might be required to mitigate for unavoidable impacts on wetlands, streams, and salmon habitat through permittee-responsible, project-specific mitigation in accordance with the

federal Final Compensatory Mitigation Rule (40 CFR Part 230) and joint wetland mitigation guidance developed by Ecology, the Corps, and the EPA (Ecology et. al. 2021). The guidance supports the implementation of a watershed approach to selecting mitigation sites. This approach allows for a greater degree of flexibility in selecting mitigation sites and potentially greater value created for the watershed than the previous regulatory focus on onsite mitigation. Sound Transit anticipates using this approach to determine the appropriate location, amount, and types of compensatory mitigation to compensate for the specific type and degree of functions affected by TDLE.

Opportunities to mitigate for permanent stream impacts may include restoration of in-stream habitat, stream daylighting, replacement of culverts blocking fish passage, creation of off-channel habitat, or purchase of salmon credits from an approved bank. Stream mitigation would be developed in coordination with Tribal partners, resource agencies, local jurisdictions, and permit authorities.

Opportunities for wetland mitigation may occur in the study area and within the greater project vicinity. In cooperation with resource agencies, Sound Transit would develop plans to mitigate the effects of the project on wetlands, streams, and buffers. To the extent possible, compensatory mitigation sites would be identified and compensate for lost values in-kind. It may be necessary to use several sites and mitigation approaches given the project size, the variety of impacts, complexity of identifying mitigation opportunities, and mitigation requirements. The availability of potential mitigation sites may be limited. Many sites where mitigation could feasibly be implemented have already been dedicated for habitat restoration as compensatory mitigation for the impacts of other projects, such as WSDOT's SR 167 Completion Project.

The project would adhere to the mitigation requirements (such as mitigation ratios) specified by federal regulators, Tribes, state resource agencies, the cities of Federal Way, Milton, Fife, and Tacoma, Pierce County (a portion of the project occurs in unincorporated Pierce County), the Mitigation Banking Instrument for the Upper Clear Creek mitigation bank, and (if King County's in-lieu fee program is used) the King County Mitigation Reserves Program. Impacts on streams would be mitigated through restoration actions developed in collaboration with federal, state, and local regulators, and Tribal biologists.

Compensatory wetland mitigation would be provided for construction impacts lasting more than one growing season, and for permanent conversion of wetlands from one vegetation type to another (e.g., forested wetland to emergent or scrub-shrub wetland), as well as for indirect impacts on wetlands. Generally, compensation for long-term temporary impacts is 1/4 of the typical ratio for long-term permanent impacts and 1/2 for conversion of wetlands. Impacts on buffers would generally be replaced at a minimum ratio of 1:1 using buffer enhancement. In areas where stream buffers and wetland buffers overlap, mitigation for impacts would be based on the local jurisdiction's requirements for mitigating impacts either on wetland buffers or stream buffers, whichever requirements are more stringent.

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