DRAFT SHORELINES CRITICAL AREAS REPORT AND MITIGATION PLAN

I-90/SR 18 Interchange to Deep Creek – Widening and Interchange Improvements Project

King County, Washington

Work Order: XL5557
WIN: A09070F
PIN: 109070F

Prepared By
WSDOT Northwest Region
Environmental Services

August 2021, Revised January and June 2022

WSDOT

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Executive Summary

This plan documents project impacts and proposed mitigation as part of the Interstate 90 (I-90)/ State Route (SR) 18 Interchange to Deep Creek – Interchange Improvements and Widening Project (the project) located in King County, Washington. The revised plan also incorporates information to address critical areas and shorelines for King County review.

Washington State Department of Transportation (WSDOT) proposes to construct a Diverging Diamond Interchange (DDI) at the I-90/SR 18 interchange and widen SR 18 to four lanes from the interchange south to Deep Creek (approximately 2.5 miles). In addition, the project will correct fish passage barriers within the project limits and provide stormwater treatment, including retrofit of some existing pavement on SR 18. The project is scheduled to begin construction in the spring of 2022 and end in the fall of 2024. Measures were taken to avoid and minimize impacts to wetlands, streams, and buffers throughout the project area to the maximum extent practicable.

This plan addresses the mitigation and restoration proposed for unavoidable impacts to wetlands, streams, and buffers in the project area (Table 1). The project will result in unavoidable impacts to 25 wetlands and/or their buffers ranging from Category I to Category III. Additionally, there are unavoidable impacts to 19 streams and/or their buffers throughout the project area.

The mitigation approach for the project includes a combination of purchasing credits at a wetland mitigation bank, on-site restoration, and correction of the King County SE 104th Street fish passage barrier and associated stream restoration. The proposed compensatory mitigation strategy for wetlands is to purchase credits at a mitigation bank in the same watershed, either the Snohomish Basin Mitigation Bank (SBMB) or Skykomish Habitat Mitigation Bank (SHMB). Compensatory mitigation is not proposed for work associated with the fish passage work as part of this project. These impacts are discussed in the plan, but additional compensation is not proposed due to the net benefit to aquatic habitat as a result of the work. The mitigation approach for the remaining project stream impacts includes partnering with King County to correct a County-owned fish passage barrier immediately adjacent to the project impacts as part of a separate project. The mitigation strategy for this project supports the larger watershed restoration goals and was developed in collaboration with federal, state, and tribal partners.

Table 1. Summary of project impacts and compensatory mitigation

Region	Northwest Region
Contract Name and Number	XL5557, WIN A09070F
Township/Range/Section	T23N, R7E, S2, S3, S10, S11, and S15
Permanent Wetland Impact	0.793 acres, 0.147 acres (fish)
Indirect Wetland Impact	1.572 acres
Long-term Temporary Wetland Impact	0.328 acres, 0.117 acres (fish)
Short-term Temporary Wetland Impact	0.014 acres
Wetland to Stream Conversion	0.048 acres, 0.021 acres (fish)
Permanent Wetland Buffer Impact	12.552 acres
Temporary Wetland Buffer Impact	3.055 acres
Vegetation Conversion Impact	0.359 acres
Wetland Buffer to Stream Conversion	0.289 acres, 0.118 acres (fish)
Permanent Stream Impact	0.433 acres, 0.288 acres (fish); Total 0.721 acres
Indirect Stream Impact	0.034 acres
Temporary Stream Impact	0.512 acres
Permanent Stream Buffer Impact	5.509 acres
Stream Buffer Conversion	0.034 acres
Stream Buffer to Stream Conversion	0.064 acres, 0.349 acres (fish);Total 0.413 acres
Temporary Stream Buffer Impact	0.816 acres
Compensatory Mitigation Location(s)	SBMB or SHMB (WRIA 7), on-site temporary impact restoration, on-site stream buffer creation, and King County SE 104th St fish passage barrier correction/stream rehabilitation (see Figures 3 and 4)
Credits to be Purchased at SBMB or SHMB	2.867 (wetland impacts), 3.68 (wetland and stream buffer impacts)
On-site Restoration of Temporary Impacts	0.511 acres wetland, 0.512 acres stream, 3.87 acres wetland and stream buffer
On-site Stream Buffer Creation	0.457 acres
King County SE 104th Street Stream Rehabilitation and Accessible Habitat	Approx. 500 LF rehabilitation, 1,720 LF of accessible habitat

SBMB = Snohomish Basin Mitigation Bank
SHMB = Skykomish Habitat Mitigation Bank
LF = Linear Feet
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.

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Acronyms and Abbreviations

Ecology	Washington State Department of Ecology
HRM	Highway Runoff Manual
LWD	large woody debris
MP	milepost
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub-shrub
SR	state route
UGA	Urban Growth Area
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WSDOT	Washington State Department of Transportation
WRIA	water resource inventory area

1. Proposed Project

1.1. Introduction

The Washington State Department of Transportation (WSDOT) proposes to rebuild the existing Interstate 90 (I-90)/State Route (SR) 18 Interchange and widen SR 18 to Deep Creek to provide additional capacity at the interchange and along SR 18 to Deep Creek, improve safety, and reduce existing congestion. The purpose of this plan is to support environmental documentation and permit applications, and to meet local, state, and federal requirements for mitigation for the I-90/SR 18 Interchange to Deep Creek Widening and Interchange Improvements Project (project).This plan is anticipated to support the follow permits, at minimum:

- Army Corps of Engineers (USACE) Section 404 Permit
- Washington State Department of Ecology (Ecology) Section 401 Letter of Verification
- King County Critical Areas Compliance

This plan provides a project overview, an assessment of impacts to wetlands, streams, and their associated buffers, and a summary of compensatory mitigation for unavoidable permanent and long-term temporary impacts to those resources. The following documents and guidelines were used in preparation of this report:

- Wetland and Stream Assessment Report
- Wetland and Buffer Impacts Memorandum and Stream Impacts Memorandum
- WSDOT Wetland Mitigation Guidance (WSDOT 2007)
- Wetlands in Washington State, Volume 1 (Sheldon et al. 2005)
- Wetlands in Washington State, Volume 2 (Granger et al. 2005)
- Wetland Mitigation in Washington State, Part 1 (Ecology et al. 2021)
- Wetland Mitigation in Washington State, Part 2 (Ecology et al. 2006)

The project will be constructed using the design-build method of project delivery, in which WSDOT executes a single contract with one entity for design and construction services to provide a finished product. With design-build projects, contractors have the flexibility to offer innovative and cost-effective alternatives to deliver the project, improve project performance, and reduce project effects. Some design modifications that the contractor may propose could affect the impacts and corresponding mitigation discussed in this report. The approach outlined in this report will be refined and finalized by the design-build contractor prior to construction.

1.2. Project Location

The I-90/SR 18 interchange is located about 300 feet south of the City of Snoqualmie, with North Bend to the east and Issaquah to the west (Figure 1). The project is located in WRIA 7 Snohomish, township 23 north, range 7 east, and sections 2, 3, 10, 11, and 15. The project is located the Upper Snoqualmie River watershed. The interchange portion of the project extends approximately from I-90 mileposts (MP) 24.8 to 27.49 and the SR 18 widening portion of the project from SR 18 MPs 25.41 to 27.91 (Figure 2). The project is outside of the Urban Growth Area (UGA) in King County, Washington with portions of the project occurring on U.S. Forest

Service (USFS) land in the Mount Baker-Snoqualmie National Forest, King County property, Washington State Department of Natural Resources (WDNR) parcels, WSDOT right of way, and private property.

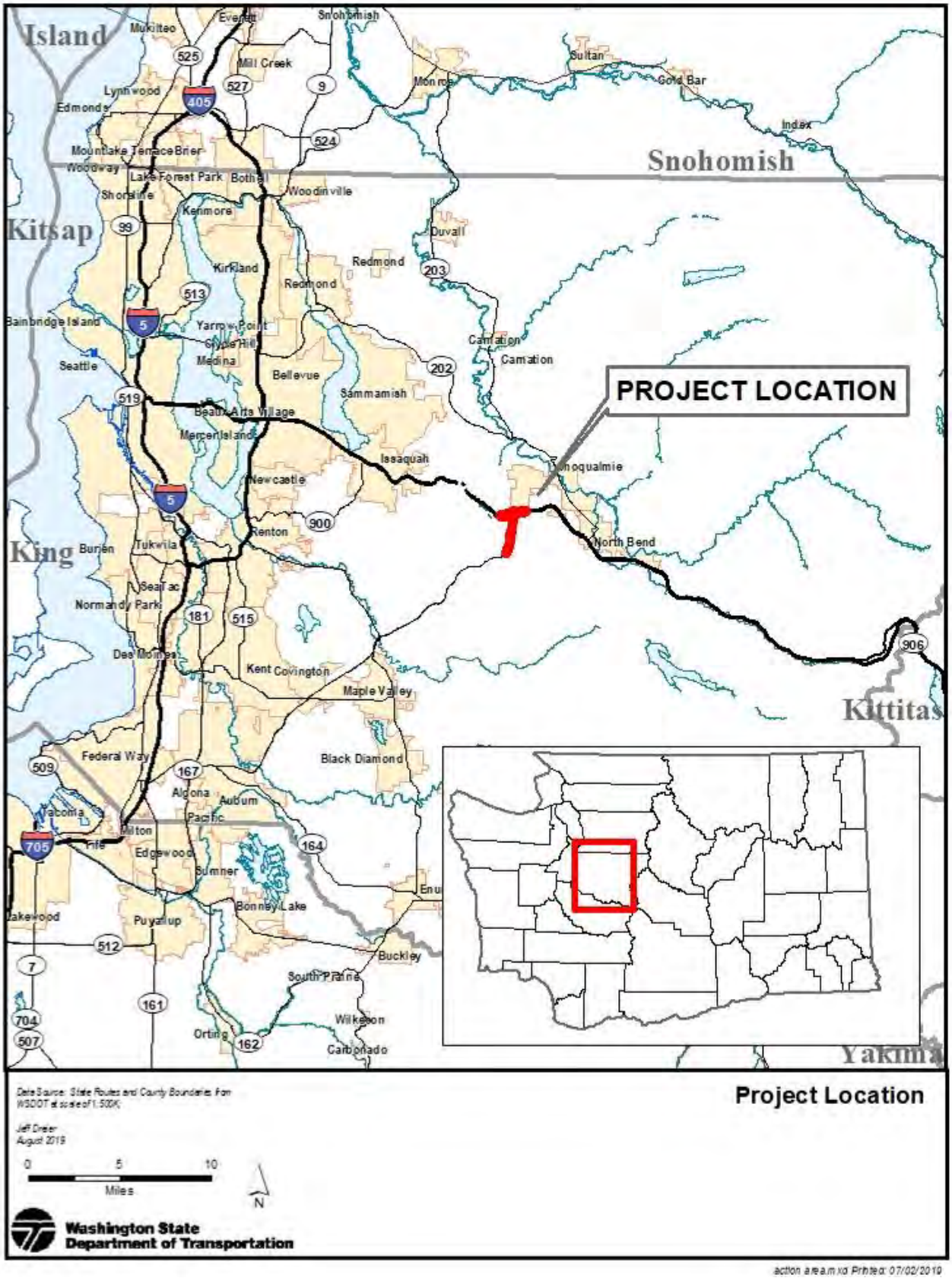


Figure 1. Project Vicinity Map.

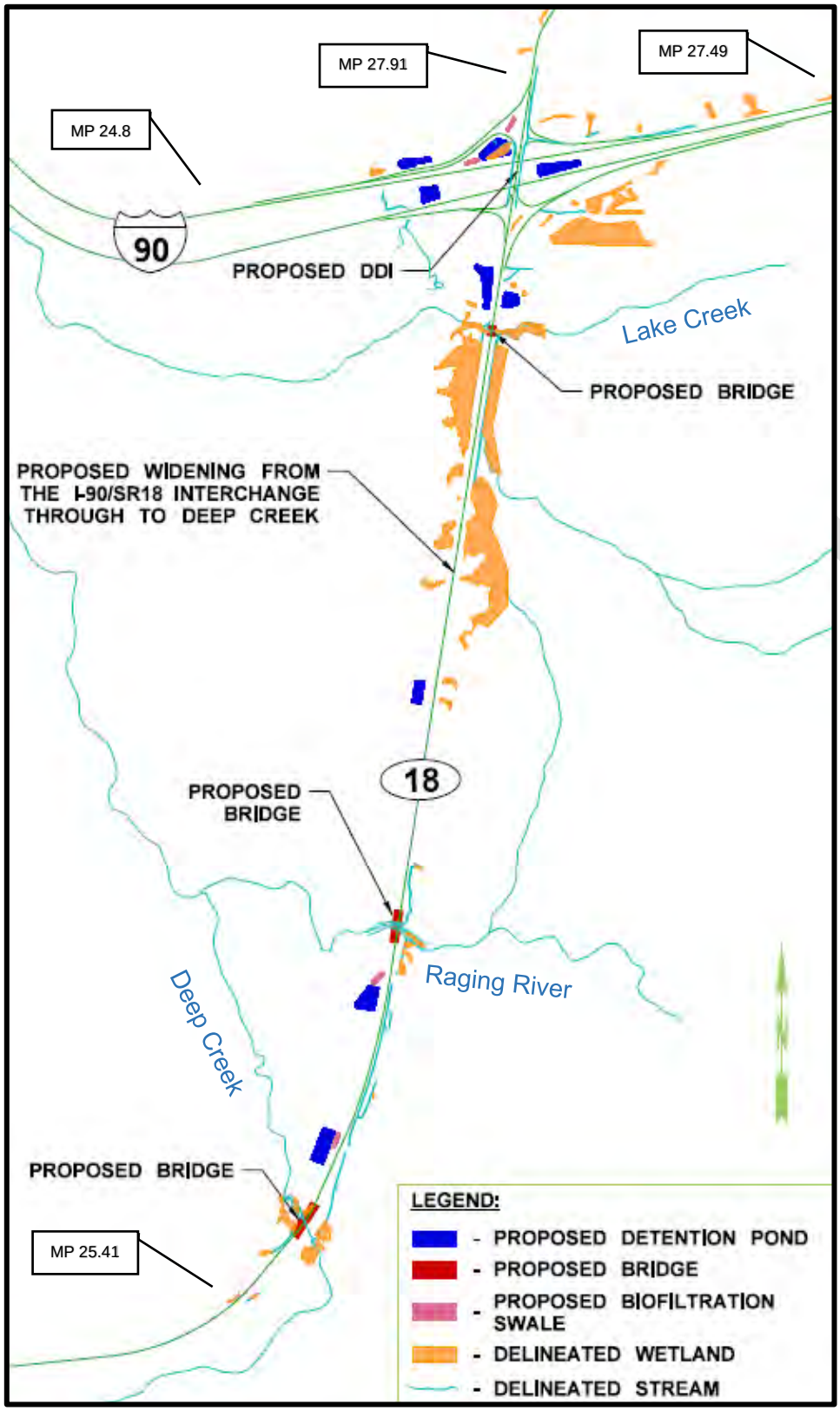


Figure 2. Project Corridor Map.

1.3. Project Purpose and Description

The project will construct a diverging diamond interchange at the I-90/SR 18 interchange and will widen SR 18 to four lanes from the interchange to just south of Deep Creek (Figure 2). The project improvements will provide additional capacity at the interchange and along SR 18 to Deep Creek, improve safety, and reduce existing congestion. The project is to begin construction in the spring of 2022 and end in the fall of 2024.

The project is broken into two major components, one is the I-90/SR 18 Interchange and the other is the SR 18 widening to Deep Creek. Major project components and their subcomponents are discussed in the following subsections.

1.3.1. I-90/SR 18 Interchange Diverging Diamond Interchange

A 4-lane diverging diamond interchange will replace the existing diamond interchange at I-90 and SR 18. Major work elements between SE 99th Street and SE 104th Street include roadway, pavement, drainage, signalization, illumination, intelligent transportation system (ITS) devices, signing, striping and landscaping. A new stream will be constructed along the east side of the roadway along with new fish passable culverts under the westbound-off and eastbound-on ramps. A new pedestrian accessible route will be constructed along the west side of the roadway that will connect between the westbound-on and eastbound-off ramps. The pedestrian route will be forward compatible with future planned regional trails by Mountains to Sound Greenway, WDNR, and the City of Snoqualmie.

1.3.2. SR 18 Widening to Deep Creek

SR 18 will be widened from three existing lanes to a total of four lanes from the new interchange to just south of Deep Creek. The existing twin circular concrete culverts at Lake Creek will be replaced with a new four-lane bridge. A new two-lane bridge will be constructed for the southbound direction across the Raging River. The existing Raging River Bridge will be converted for use by two northbound lanes. A new four lane bridge will replace the existing Deep Creek culvert. Other major construction activities include roadway, pavement, drainage, signing, striping, and landscaping.

Lake Creek Bridge and In-water Work

WSDOT proposes to replace two partial fish barrier culverts in this vicinity with a fish passable structure that will span a minimum of 44 feet. Either a precast concrete buried structure or a single span pre-stressed concrete bridge will be required to span the stream.

Raging River Bridge and In-water Work

At the crossing of the Raging River, a new two-lane bridge will be constructed for the two new southbound lanes and the existing bridge will be converted for use by two northbound lanes. The existing bridge is an approximately 300-foot long, 3-span reinforced concrete box girder bridge supported by reinforced concrete columns and drilled shafts. No structural alteration of the existing bridge is anticipated for the project.

The new bridge will be constructed adjacent to the existing structure and will be 38 feet wide to accommodate two travel lanes and shoulders. The total area of the bridge deck will be approximately 11,400 square feet. The bridge will span the Raging River with no piers below the ordinary high water mark (OHWM).

Temporary work trestles will be constructed from both ends of the embankments and may cross the river; however, no foundations will be within the OHWM. Therefore, in-water work is not anticipated for the temporary and permanent structures.

Deep Creek Bridge and In-water Work

Deep Creek currently flows under SR 18 in a 12-feet-wide, 260-feet-long corrugated steel culvert. The culvert, identified by WDFW as site 07.0396, is listed as fish passage barrier due to slope. The existing culvert will be replaced by a new three-span pre-stressed concrete girder bridge. The new bridge will be approximately 400 feet long (minimum hydraulic opening of 100 feet) and 79 feet wide to accommodate four travel lanes and shoulders. The two southbound lanes will be separated from the northbound lanes by a median barrier.

1.3.3. Stormwater Treatment

The project improvements at the I-90/SR 18 interchange and SR 18 widening section add impervious area within the project limits. SR 18 is a high stormwater retrofit priority, and this project will exceed the standards from the WSDOT Highway Runoff Manual (HRM). The drainage approach assumes that the existing TDA boundaries and main outfalls within the TDA will be maintained to the extent feasible.

1.3.4. Fish Passage

To comply with the US v. WA 2013 Federal Court Injunction, the project will address 14 fish passage barriers and will open over twelve miles of fish habitat. At Deep Creek (WDFW Site ID 07.0396 0.80), the existing culvert will be replaced with a structure with a minimum 100-foot hydraulic opening. By correcting the barrier, the WDFW barrier assessment shows a potential upstream habitat gain of 58,757 linear feet (11.1 miles). At Lake Creek (WDFW Site ID 990236), the proposed project would replace the two existing culverts with a minimum 44-foot span (hydraulic opening) structure to improve fish passage. WDFW reports 7,112 linear feet (1.4 miles) of habitat gain above the SR 18 Lake Creek culvert. The project also proposes to construct a series of modifications to an unnamed tributary to Lake Creek, referred to herein as Stream LC-G, by removing barriers and enhancing fish habitat throughout the project reach. Eleven fish passage barriers will be addressed by consolidating the stream into a daylighted channel between the I-90 westbound off-ramps and the I-90 eastbound on-ramp, including a portion beneath the I-90 eastbound and westbound bridges. This daylighted stream will cross the I-90 westbound off-ramp and I-90 eastbound on-ramp in two fish-passable crossings. The result will be a net reduction of road crossings from eleven existing barriers to two fish-passable crossings, as well as a minimum upstream habitat gain of 1,720 linear feet (0.33 miles) in the daylighted stream channel. The following barriers will be addressed as part of this project:

- Stream LC-E – WDFW Site IDs 934825, 934826, 934827, 934786, 934824
- Stream LC-G – WDFW Site IDs 934823, 934822, 934821, 934829, 934828, 934820
- Lake Creek – WDFW Site ID 990236
- Deep Creek – WDFW Site IDs 07.0396 0.80, 934689

1.4. Project Schedule

The Project is currently in the environmental review and preliminary engineering phase. Constructed is expected to occur between 2022 and 2025. As a design-build project, the

contractor will work with WSDOT to refine design, schedule, and update permits and mitigation needs.

1.5. Critical Areas Delineation and Rating Report

WSDOT has prepared a wetland and stream delineation for the entire project that addresses the resources present in the King County shoreline jurisdiction. The wetland and stream delineation report includes 2014 rating forms for all affected wetlands. Refer to the *Wetland and Stream Report* (WSDOT 2021a) for more details.

2. Wetland and Wetland Buffer Impact Assessment

This chapter includes an assessment of impacts to wetlands and functions related to the proposed project. Summaries of existing conditions for each wetland and buffer that will be impacted are provided in the Wetland Impacts Summaries (Section 2.4). Refer also to the *Wetland and Stream Assessment Report* (WSDOT 2021a) for more details about each wetland, including rating forms and field data forms.

2.1. Wetland Impacts

The project, as proposed, will result in multiple types of unavoidable impacts to 17 wetlands. WSDOT assessed potential impacts to wetlands using proposed project construction footprints, cut and fill lines, and cross-sections showing existing and proposed grades. WSDOT calculated the area of impact using construction footprints in computer-aided drafting software. Impact calculations were obtained from the design team in acres and square feet. Impacts are further categorized into two different impact types: impacts due to roadway or stormwater improvements and those related to fish passage barrier corrections. Methods for calculating impacts are discussed in each section below.

A conservative approach was taken to separate roadway/drainage impacts from fish passage impacts. When impacts may be resulting from roadway/drainage improvements, the impact was considered not related to fish passage and therefore compensatory mitigation will be proposed for that impact in this plan. Wetland impacts associated with fish passage barrier corrections provide a functional lift to the aquatic system. Due to the improvement of aquatic functions at these locations, additional compensatory mitigation is not proposed for these impacts.

Type of impact and wetland functions are described below and addressed for each wetland impact associated with roadway or drainage work in the following sections.

2.1.1. Permanent Wetland Impacts

The proposed project will result in unavoidable permanent impacts to 17 wetlands (Table 2). Permanent impacts are associated with filling or excavating wetlands and buffers for the proposed roadway and stormwater improvements. Permanent impact areas adjacent to cut and fill locations include an additional 5-foot width to allow for clearing and grubbing of vegetation at the base of all new infrastructure, and potential small changes in the project footprint. Although these areas can frequently be replanted with native shrubs and trees, they are considered a permanent impact because they will be considered part of the roadway or drainage infrastructure and will be managed as such in the future instead of protected critical areas.

2.1.2. Temporary Wetland Impacts

The proposed project will result in unavoidable temporary impacts to 16 wetlands (Table 2). Temporary impact areas are estimated based on 5-foot offset from the limits of permanent impact areas. Temporary impacts, which are predominantly associated with construction clearing and grubbing limits, consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and BMP installation. Temporarily impacted areas will be planted with native trees and shrubs and are expected to regain current wetland/buffer functions after restoration is complete.

For wetlands, temporary impacts are further segregated into short-term and long-term temporary impacts. Due to the existing habitat in the project area that contains mature coniferous forest, all temporary impacts to forested wetlands are considered a long-term temporary impact due to the temporal loss of trees. Short-term temporary impacts are limited to scrub-shrub and emergent wetlands, where the impacted areas are anticipated to regain impacted functions within 2 years.

2.1.3. Conversion to Stream Impacts

Several riparian wetlands and buffers that are located adjacent to Deep Creek and Lake Creek will be converted to stream channel as part of the stream design, which will include replacing culverts with bridges to make these crossings fish passable. In some cases, the wetland to stream conversions will not result in a loss of aquatic area, and in all cases, these impacts are anticipated to result in an overall functional lift in aquatic resources due to restoration of both fish passage and accommodation of more natural hydrologic processes.

2.1.4. Indirect Wetland Impacts

The proposed project will result in unavoidable indirect impacts to 8 wetlands (Table 2). Indirect wetland impacts will occur when (1) there will be a permanent buffer impact and trees cannot be replanted (such as where the roadway fill prism and clear zone will be expanded), and (2) buffer areas that have very mature trees (buffer areas that are located within the project's mapped marbled murrelet-suitable habitat zone) will be cleared. These buffer impacts are considered indirect wetland impacts because of the loss of shading, fringe wildlife habitat, and large woody debris input that they would otherwise provide to the wetlands. Indirect wetland impacts associated with roadway/clear zone expansion were calculated by taking the width of the permanent buffer impact where the clear zone will be extended into the tree line and applying that same width starting at the construction clearing/grading limits and extending it into the wetland, where applicable (past proposed permanent and temporary wetland impacts). Indirect wetland impacts associated with mature forested habitat were calculated based on best professional judgement.

2.1.5. Hydrologic Wetland Impacts

Proposed changes to stormwater runoff flow were analyzed to determine whether the stormwater design would impact wetlands. We assumed the following wetlands would not be impacted by stormwater design changes and were precluded from further hydroperiod analyses:

- Wetlands that will be entirely (permanently) impacted during construction by the project (Wetlands LC-02, LC-07, LC-23, DC-01, and DC-07)
- Wetlands that do not currently and will not receive stormwater runoff from the project (Wetlands LC-06, LC-08, LC-09, LC-14, LC-15, LC-18, LC-19, LC-25, LC-26, LC-27, RR-03, RR-04, RR-08, DC-04, DC-05, and DC-06)
- Wetlands that receive stormwater but have no proposed change in hydrology pre- and post-construction (Wetlands LC-16, LC-17, LC-21, and DC-08)
- Wetlands that receive stormwater but are greater than 1 acre in size (Wetlands LC-04 and LC-28) because these wetlands are groundwater-driven systems and are not likely to be affected by changes in stormwater runoff
- Wetlands that are slope wetlands (no slope wetlands have a reduction in hydrology input

proposed), and it is assumed that any additional stormwater will not be impounded (LC-05, LC-11, LC-12, LC-13, LC-14, LC-15)

- Wetlands that are entirely within the OHWM of project area streams (Wetlands RR-05 and DC-02) because these wetlands are primarily driven by overbank flooding
- Wetlands that showed an increase in stormwater input but drain to a larger wetland or stream because the increase in stormwater will be passed on to the larger wetland/stream and not detained in the smaller wetland (LC-01)

A wetland hydroperiod analysis was completed to analyze the changes in mean daily and mean monthly total discharge volumes for the remaining wetlands where there would be a potential change in stormwater input. Estimated stormwater input changes are not expected to measurably change the hydrology of project area wetlands. The hydroperiod analysis indicated that some wetlands would receive over 20 percent less stormwater than existing conditions and some wetlands would receive over 20 percent more stormwater than existing conditions. However, the data indicated that these conditions only would occur during the late summer/early fall when rainfall amounts are so small that a 0.01 cubic foot per second (cfs) change would result in a 20 percent difference or more. Since most wetland hydrology is received via a seasonally high groundwater table and/or during more heavy, sustained rainfall in late winter/early spring, the small, calculated changes in late summer/early fall are not anticipated to cause a change in wetland vegetation composition, hydric soil characteristics, or an observable change in wetland hydroperiods. Therefore, WSDOT has not identified any solely hydrologic wetland impacts resulting from the project activities, and no compensatory mitigation is proposed for this impact type.

Table 2. Wetland Size, Classification, and Area Impacted by the Proposed Project

Wetland Number	Ecology and Local Jurisdiction Rating[b]	Habitat Type Impacted (Cowardin)[a]	HGM[c]	Wetland Size (acres)	Wetland Impacts			
					Permanent	Temporary	Wetland to Stream Conversion	Indirect
LC-1	I	PFO/PSS	Depressional	0.79 AC	0.070 AC	0.057 AC	-	0.146 AC
LC-2	II	PSS/PEM	Depressional	0.015 AC	0.015 AC	-	-	-
LC-3	I	PFO/PSS	Depressional	0.39 AC	-	0.002 AC	-	0.129 AC
LC-4	I	PFO	Depressional/ Riverine/Slope	6.45 AC	0.023 AC	0.057 AC	0.011 AC	0.452 AC
LC-4 (Fish)	I	PFO	Depressional/ Riverine/Slope	6.45 AC	0.005 AC	0.005 AC	0.007 AC	-
LC-5	III	N/A	Slope	0.10 AC	-	-	-	-
LC-6	III	N/A	Depressional	>0.19 AC	-	-	-	-
LC-7	III	PEM	Slope	0.358 AC	0.358 AC	-	-	-
LC-8*	II				-	-	-	-
LC-9*	II				-	-	-	-
LC-11	III	PFO/PSS	Depressional	0.16 AC	-	-	-	0.028 AC
LC-12 (Fish)	II	PFO/PSS	Depressional/ Slope	0.23 AC	0 AC (12 SF)	0.005 AC	-	-
LC-13	III	PSS	Slope	0.04 AC	-	0.001 AC	-	-
LC-14	III	N/A	Slope	0.11 AC	-	-	-	-
LC-15	IV	N/A	Slope	0.05 AC	-	-	-	-
LC-16	III	N/A	Slope	0.14 AC	-	-	-	-
LC-17	III	N/A	Slope	0.22 AC	-	-	-	-
LC-18	III	N/A	Slope	0.11 AC	-	-	-	-
LC-19	II	N/A	Depressional	0.35 AC	-	-	-	-
LC-20	III	N/A	Slope	0.90 AC	-	-	-	-
LC-21	III	N/A	Depressional	0.03 AC	-	-	-	-
LC-22	II	N/A	Depressional	0.07 AC	-	-	-	-
LC-23	III	PSS/PEM	Slope	0.054 AC	0.054 AC	-	-	-
LC-24	I	N/A	Depressional/ Riverine	>26.5 AC	-	-	-	-
LC-25	III	PFO	Depressional	0.05 AC	-	-	-	0.033 AC
LC-26	III	PSS/PEM	Depressional	0.01 AC	-	-	-	0.005 AC

LC-27	II	PFO/PSS/PEM	Depressional	>7.20 AC	0.006 AC	0.031 AC	0.009 AC	0.369 AC
LC-27 (Fish)	II	PFO/PSS/PEM	Depressional	>7.20 AC	-	0.005 AC	0.012 AC	-
LC-28	I	PFO/PSS/PEM	Depressional	>9.24 AC	0.027 AC	0.088 AC	0.010 AC	0.315 AC
LC-29	II	PEM	Depressional	0.272 AC	0.004 AC	0.006 AC	-	0.023 AC
RR-2	II	N/A	Depressional	0.18 AC	-	-	-	-
RR-3	III	N/A	Depressional	0.07 AC	-	-	-	-
RR-4	III	N/A	Depressional/ Riverine/Slope	>0.12 AC	-	-	-	-
RR-5	II	N/A	Riverine	0.10 AC	-	-	-	-
RR-6	II	N/A	Slope	0.08 AC	-	-	-	-
RR-7	II	N/A	Depressional/ Riverine	0.32 AC	-	-	-	-
RR-8	III	PFO/PSS	Depressional	>0.14 AC	-	0.002 AC	-	-
DC-1	III	PFO/PSS	Slope	0.08 AC	0.040 AC	-	-	-
DC-1 (Fish)	III	PFO/PSS	Slope	0.08 AC	0.039 AC	-	0.001 AC	-
DC-2 (Fish)	II	PSS/PEM	Riverine	0.10 AC	0.004 AC	0.002 AC	-	-
DC-3	II	PFO/PSS	Depressional/ Riverine	0.46 AC	0.165 AC	0.090 AC	0.002 AC	0.071 AC
DC-4 (Fish)	III	PFO/PSS	Slope	0.64 AC	0.063 AC	0.064 AC	0.015 AC	-
DC-5 (Fish)	III	PFO/PSS	Slope	>0.61 AC	0.035 AC	0.039 AC	0.001 AC	-
DC-6	II	PSS	Depressional	0.08 AC	0.003 AC	0.006 AC	0 AC (19 SF)	-
DC-7	II	PSS/PEM	Riverine	0.029 AC	0.028 AC	-	0.001 AC	-
DC-8	II	N/A	Riverine	0.05 AC	-	-	-	-
	Total				**0.940 AC**	**0.459 AC**	**0.069 AC**	**1.572 AC**
	Total (fish)				**0.147 AC**	**0.119 AC**	**0.021 AC**	**-**
	Total (other)				**0.793 AC**	**0.340 AC**	**0.048 AC**	**1.572 AC**

[a]Cowardin, et al. (1979) or National Wetland Inventory (NWI) Class based on vegetation: PEM = Palustrine Emergent; PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested.
[b]Ecology rating according to Hruby (2014).
[C]Brinson 1993.
AC = acres
SF = square feet
*Ratings based on King County Critical Areas Map information. Wetlands were not delineated due to the inability to access the fenced private land. The buffer is assumed based on the listed rating.
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.
Grey highlight = Wetlands within King County Shoreline Jurisdiction

2.2. Wetland Buffer Impacts

The project will include unavoidable permanent and/or temporary impacts to the buffers of 34 wetlands.

2.2.1. Permanent Buffer Impacts

The proposed project will permanently impact 12.552 acres of existing wetland buffer (Table 3). Permanent impacts are associated with filling or excavating wetland buffers for the proposed roadway and stormwater improvements. Although these areas can frequently be replanted with native shrubs and trees, they are considered a permanent impact because they will be considered part of the roadway/drainage infrastructure in the future instead of protected critical areas.

2.2.2. Temporary Buffer Impacts

The proposed project will temporarily impact 3.055 acres of wetland buffer (Table 3). Temporary impacts, which are predominantly associated with construction clearing and grubbing limits, consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Buffer areas that include cut/fill associated with a stream realignment were considered temporary impacts since these areas will still be considered buffer and be restored with native vegetation after construction is complete.

2.2.3. Vegetation Conversion Impacts

The proposed project will have vegetation conversion impacts of 0.359 acres (Table 3). Vegetation conversion impacts are associated with the proposed permanent clear zone associated with roadway expansion. Vegetation conversion impacts occur when a forested vegetation community is permanently converted to a scrub-shrub community to maintain sight distances along the roadway. Buffer vegetation conversion areas will remain buffer, but their functions will be permanently impacted because trees cannot be established in the clear zone, in accordance with the WSDOT Roadside Policy Manual (WSDOT 2015).

2.2.4. Wetland Buffer to Stream Conversion

The proposed project will have 0.4 acres of wetland buffer to stream channel conversion impacts (Table 3). Wetland buffer to stream conversion impacts are areas where wetland buffers will be converted to stream channel as part of the stream design. These impacts will result in an overall functional lit to aquatic resources as stream processes and hydraulic functions will be restored.

Table 3. Wetland Buffer Size, Classification, and Area Impacted by the Proposed Project

Wetland Number	Ecology and Local Jurisdiction Rating[a]	Buffer Width (ft) [b]	Wetland Buffer Impacts			
			Permanent	Temporary	Vegetation Conversion	Wetland Buffer to Stream Conversion
LC-1	I	300	0.888 AC	0.131 AC	-	-
LC-2	II	150	-	-	-	-
LC-3	I	300	0.397 AC	0.088 AC	0.038 AC	-
LC-4	I	150	1.383 AC	0.334 AC	0.042 AC	0.034 AC
LC-4 (Fish)	I	150	0.036 AC	0.014 AC	-	0 AC (4 SF)
LC-5	III	150	0.412 AC	0.052 AC	-	-
LC-6	III	150	0.041 AC	0.041 AC	0.021 AC	-
LC-7	III	80	-	-	-	-
LC-8	II	300	-	-	-	-
LC-9	II	300	-	-	-	-
LC-11	III	150	0.922 AC	0.094 AC	-	0.002 AC
LC-12	II	150	0.196 AC	0.030 AC	-	0.002 AC
LC-12 (Fish)	II	150	0.120 AC	0.040 AC	-	0.047 AC
LC-13	III	150	0.288 AC	0.084 AC	-	0.064 AC
LC-14	III	150	-	-	-	-
LC-15	IV	50	-	-	-	-
LC-16	III	80	-	-	-	-
LC-17	III	80	-	-	-	-
LC-18	III	150	-	-	-	-
LC-19	II	150	-	-	-	-
LC-20	III	150	-	0.052 AC	-	-
LC-21	III	150	0.002 AC	0.034 AC	-	-
LC-22	II	150	0.348 AC	0.100 AC	-	-
LC-22 (Fish)	II	150	0.022 AC	0.029 AC	-	0.030 AC
LC-23	III	80	-	-	-	-
LC-24	I	300	-	-	-	-
LC-25	III	150	0.529 AC	0.081 AC	-	0.002 AC
LC-26	III	150	0.441 AC	0.052 AC	-	-
LC-27	II	300	0.695 AC	0.155 AC	0.013 AC	-
LC-27 (Fish)	II	300	0.042 AC	0.015 AC	-	-
LC-28	I	300	0.659 AC	0.480 AC	0.002 AC	0.108 AC
LC-29	II	150	0.411 AC	0.070 AC	-	-
RR-2	II	300	0.044 AC	0.009 AC	0.074 AC	-
RR-3	III	300	0.040 AC	0.010 AC	0.108 AC	-
RR-4	III	300	0.579 AC	0.113 AC	0.037 AC	-
RR-5	II	300	0.208 AC	0.015 AC	-	-
RR-6	II	300	0.494 AC	0.056 AC	-	-
RR-7	II	300	0.325 AC	0.069 AC	-	0.020 AC
RR-8	III	300	1.223 AC	0.152 AC	-	0.037 AC
DC-1	III	300	-	-	-	-

DC-2	II	300	0.726 AC	0.191 AC	0.025 AC	-
DC-2 (Fish)	II	300	0.122 AC	0.045 AC	-	0.002 AC
DC-3	II	300	0.427 AC	0.134 AC	-	0.013 AC
DC-4	III	300	-	-	-	-
DC-4 (Fish)	III	300	0.047 AC	0.005 AC	-	0.029 AC
DC-5 (Fish)	III	300	0.024 AC	0.016 AC	-	0.004 AC
DC-6	II	150	0.278 AC	0.081 AC	-	0.007 AC
DC-7	II	300	-	-	-	-
DC-8	II	300	0.184 AC	0.183 AC	-	-
	Total		**12.552 AC**	**3.055 AC**	**0.359 AC**	**0.400 AC**

[a]Hruby (2014).
[b]Wetland buffers according to King County wetlands ordinance (King County, 2021).
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.
Grey highlight = Wetlands within King County Shoreline Jurisdiction

2.3. Wetland Functions Impacted

Wetland functions for impacted wetlands were evaluated using the Ecology wetland rating form and rated as Category I, II, III, or IV (Hruby 2014). Category I is considered the highest functioning wetland, and Category IV is considered the lowest functioning wetland. To determine an accurate assessment of a wetland's functional values, functions were assessed based on the entire wetland system, when applicable, not just the delineated portion of wetland within the study area. A summary of proposed wetland and buffer impacts is shown in the project Joint Aquatic Resources Permit Application (JARPA) and provided in Tables 2 and 3.

2.4. Wetland Impact Summaries

The impacts to wetlands and associated functions that would result from the proposed project are summarized in the following sections. Wetland buffer distances are based on the local jurisdiction (King County) critical areas ordinance. Refer to the Wetland and Stream Assessment Report (WSDOT 2021a) for wetland summary tables for each wetland as noted below.

2.4.1. Wetland LC-01

Wetland LC-01 is a palustrine forested/scrub-shrub, depressional wetland located west of SR 18 (WSDOT 2021a, Table 2). Wetland LC-01 is rated as a Category I wetland and is required to have a 300-foot buffer.

Permanent Impacts

Permanent impacts will consist of filling several portions of Wetland LC-01 along SR 18 to expand the road prism and to extend an existing culvert. Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The permanent impact areas have a high potential to trap sediments and pollutants because they are densely vegetated, have organic soils and seasonal ponding, receive polluted stormwater runoff, and are located in the depressional topography of Wetland LC-01. The permanently impacted portion of the wetland will cease to provide water quality functions because this area will be converted to upland fill slope and no longer function as a wetland.

The proposed impact areas have a moderate to high potential to retain flood flows because they are within the depressional topography of Wetland LC-01, provide up to 3 feet of stormwater storage, and receive stormwater flows. The permanently impacted portion of the wetland will cease to provide flood control functions because this area will be converted to upland fill slope and will no longer have the potential to store flood water.

The proposed impact areas have moderate to high potential to provide habitat functions because they contain densely vegetated forest with special habitat features, and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope. Habitat corridors will not be impacted because the project impacts will occur on the edge of the wetland closest to SR 18.

Temporary Impacts

Temporary wetland impacts, which will occur within the construction clearing and grubbing limits, will consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Woody vegetation that may be cleared includes western red cedar (*Thuja plicata*), salmonberry (*Rubus spectabilis*), and red huckleberry (*Vaccinium parvifolium*). Temporarily impacted areas will be replanted. However, the impacts are considered long-term because forested vegetation will be removed.

The project will not permanently change the existing soils, topography, and drainage patterns in the temporarily impacted area. However, removal of vegetation in the temporarily impacted area will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted portion of the wetland will continue to provide the same level of flood control functions as it does now because this area will continue to receive stormwater and have the same flood storage volume as is does currently. The removal of vegetation in the temporarily impacted area can affect surface water velocities, which is important for erosion control and bank stabilization. However, Wetland LC-01 does not have a surface water connection with a stream and does not currently provide erosion control or bank stabilization functions.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Indirect Impacts

The project includes permanent buffer impacts and an expansion of the SR 18 clear zone. Although the permanent buffer impact areas are no longer considered wetland buffer, they will be replanted with trees where possible to minimize habitat impacts. Wetland LC-01 will have indirect wetland impacts due to a loss of mature forested buffer functions in the expanded clear zone where trees cannot be replanted.

Buffer Impacts

The SR 18 roadway expansion and associated fill placement will permanently impact the wetland buffer. Although considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed permanent clear zone. Therefore, permanently impacted buffer areas will provide some buffer functions. Temporary impacts will result from clearing in the buffer beyond the roadway expansion fill to allow access for construction equipment. These areas will be replanted with native trees and shrubs.

2.4.2. Wetland LC-02

Wetland LC-02 is a palustrine scrub-shrub/emergent, depressional wetland located west of SR 18(WSDOT 2021a, Table 3). Wetland LC-02 is rated as a Category II wetland and is required to have a 150-foot buffer.

Permanent Impacts

The project will permanently fill all but 26 square feet of Wetland LC-02. Therefore, this entire wetland is considered permanently impacted, as summarized in the table below and discussed in the following subsection.

Expansion of the existing road prism and extension of an existing culvert will permanently impact all of Wetland LC-02. Woody vegetation to be cleared includes red alder (*Alnus rubra*) and salmonberry.

The project will affect the ability of the entire wetland to provide key wetland functions. Wetland LC-02 has moderate to high potential to trap sediments because it has depressional topography, dense vegetation, seasonal ponding, and a constricted outlet (a culvert) and receives runoff from SR 18. Water quality functions will be eliminated by the project because all of Wetland LC-02 will be converted to upland fill slope.

Wetland LC-02 has moderate potential to provide flood control because it has a constricted outlet with up to 2 feet of stormwater storage and receives stormwater runoff. Wetland LC-02 drains to the headwaters of Stream LC-B, on the other side of SR 18. Therefore, flood attenuation provided by this wetland might decrease stream erosion. Hydrology functions will be eliminated by the project because all of Wetland LC-02 will be converted to upland fill slope.

Wetland LC-02 has site characteristics that provide low habitat potential because it has only a couple vegetation classes, few water regimes, and low habitat interspersion. However, Wetland LC-02 has high landscape potential to provide habitat because it is connected to large upland forested corridors and other wetlands. Habitat functions will be eliminated by the project because all of Wetland LC-02 will be converted to upland fill slope.

2.4.3. Wetland LC-03

Wetland LC-03 is a palustrine forested/scrub-shrub, depressional wetland located west of SR 18 (WSDOT 2021a, Table 4). Wetland LC-03 is rated as a Category I wetland and is required to have a 300-foot buffer.

Temporary Impacts

The project will temporarily impact a small amount of the eastern edge of Wetland LC-03. Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of a small amount of vegetation removal to allow for equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that may be cleared includes western red cedar, salmonberry, and devil's club (*Oplopanax horridus*).

The project will not permanently change the existing soils, topography, and drainage patterns in temporary impact areas. However, removal of vegetation in the temporarily impacted area will reduce the potential to trap and filter sediment and pollutants. Therefore, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than it currently provides, until restoration is complete.

The temporarily impacted portion of the wetland will continue to provide the same level of flood control functions as it does now because this area will continue to receive stormwater and have the same flood storage volume as is does currently. The removal of vegetation in the

temporarily impacted area can affect surface water velocities, which is important for erosion control and bank stabilization. However, Wetland LC-03 is a closed system without any surface water connection with a stream and does not currently provide erosion control or bank stabilization functions.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Indirect Impacts

The project includes permanent buffer impacts and an expansion of the SR 18 clear zone. Although the permanent buffer impact areas are no longer considered wetland buffer, they will be replanted with trees where possible to minimize habitat impacts. Indirect wetland impacts will occur to Wetland LC-03 due to a loss of mature forested buffer functions in the expanded clear zone, where trees cannot be replanted.

Buffer Impacts

Fill placement from the SR 18 roadway expansion will permanently impact the wetland buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed permanent clear zone. Therefore, permanently impacted buffer will provide some reduced buffer functions, even though it will no longer be considered buffer.

Clearing in the buffer will occur beyond the roadway expansion fill to allow access for construction equipment and will result in temporary impacts. This area will be replanted with native vegetation.

Because the permanent clear zone associated with the roadway will be expanded, not all of the cleared buffer areas will be replanted with trees. Rather, buffer within the permanent clear zone will be planted with native shrubs and will be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

2.4.4. Wetland LC-04

Wetland LC-04 is a palustrine forested, depressional/riverine wetland located west of SR 18 (WSDOT 2021a, Table 5). Wetland LC-04 is rated as a Category I wetland and is required to have a 150-foot buffer.

Permanent Impacts

The project will impact the eastern edge of Wetland LC-04. Permanent impacts will include grading associated with replacement of the existing culvert at Lake Creek with a fish passable bridge and filling a small portion of the wetland to expand the road prism. Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions.

The proposed impact areas have a moderate to high potential to trap sediments and pollutants because they are densely vegetated, have seasonal ponding, and receive stormwater runoff from SR 18 as well as overbank flooding from a tributary to Lake Creek (Stream LC-C). The permanently impacted portion of the wetland will cease to provide water quality functions because this area will be converted to upland fill slope and no longer function as a wetland.

The proposed impact areas have low to moderate potential to retain flood flows and reduce erosion because they receive runoff from SR 18 and overflows from a tributary to Lake Creek (Stream LC-C) and are densely vegetated. However, the wetland provides minimal flood storage because water is conveyed out of the wetland by a permanently flowing surface outlet, which reduces the amount of time the water is stored in the wetland. The permanently impacted portion of the wetland will cease to provide flood and erosion control functions because this area will be converted to upland fill slope and no longer have the potential to store or attenuate flood water.

The proposed impact areas have a moderate to high potential to provide habitat functions because they contain densely vegetated, multi-strata forest; multiple water regimes; moderate habitat interspersion; and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope. Habitat corridors will not be impacted because the project will be built on the edge of the wetland closest to SR 18.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that might be cleared includes red alder, black cottonwood (*Populus balsamifera*), cascara buckthorn (*Frangula purshiana*), vine maple (*Acer circinatum*), salmonberry, and Pacific ninebark (*Physocarpus capitatus*).

The temporarily impacted area will continue to provide some flood control functions because it will continue to receive stormwater and overbank flows. The removal of vegetation will reduce the potential for this area to slow surface water flows, which is important for erosion control and bank stabilization. Therefore, until restoration is complete, the temporarily impacted area will continue to provide some hydrology functions but at a lower level than currently provided.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland. Wetland LC-04 will still contain a significant stand of mature forest. The proposed impacts will not remove mature trees or adversely impact mature forested habitat.

Wetland to Stream Conversion Impacts

A portion of Wetland LC-04 is located below the OHWM of Lake Creek. A part of the in-stream wetland will be converted to stream channel during the replacement of the existing culverts under SR 18 with a bridge. This will be an overall improvement in aquatic habitat because the existing culverts are considered a fish barrier and the proposed new crossing will restore natural hydraulic and stream processes.

Indirect Impacts

The project includes permanent buffer impacts and an expansion of the SR 18 clear zone. Although the permanent buffer impact areas will no longer be considered wetland buffer, they will be replanted with trees where possible to minimize habitat impacts. Wetland LC-04 will have indirect wetland impacts due to a loss of mature forested buffer functions in the expanded clear zone, where trees cannot be replanted.

Buffer Impacts

The project roadway expansion will permanently impact the wetland buffer due fill placement. Although considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed permanent clear zone. Therefore, it will provide some buffer functions, even though it will no longer be classified as buffer.

Clearing in the wetland buffer will occur beyond the roadway expansion fill to allow access for construction equipment. Outside of the proposed permanent clear zone, cleared buffer will be replanted with native trees and shrubs and be considered a temporary impact.

Because the permanent clear zone associated with the roadway will also be expanded, not all of the cleared wetland buffer areas will be replanted with trees. Rather, buffer within the permanent clear zone will be planted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent buffer conversion impact.

The Lake Creek stream channel will be reconstructed as part of the replacement of the existing culverts under SR 18 with a bridge. A small portion of the wetland buffer will be converted into stream channel as part of this effort to restore a fish passage barrier.

2.4.5. Wetland LC-05

Wetland LC-05 is a palustrine scrub-shrub/emergent, slope wetland located southwest of the SR 18/I-90 interchange and south of the WSDOT maintenance yard (WSDOT 2021a, Table 6). Wetland LC-05 is rated as a Category III wetland and is required to have a 150-foot buffer.

Buffer Impacts

The project roadway expansion will permanently impact wetland buffer due fill placement. Although considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed permanent clear zone. Therefore, it will provide some buffer functions, even though it will no longer be classified as buffer.

Temporary buffer impacts are anticipated during project construction. Buffer vegetation that will be impacted is limited to pasture grasses and invasive species. Temporary impact areas will be replanted with native trees and shrubs.

2.4.6. Wetland LC-06

Wetland LC-06 is a palustrine forested/scrub-shrub, depressional wetland located northwest of the SR 18/I-90 interchange (WSDOT 2021a, Table 7). Wetland LC-06 is rated as a Category III wetland and is required to have a 150-foot buffer.

Buffer Impacts

Grading, which will occur in the buffer of Wetland LC-06 for the construction of new stormwater facilities is considered a permanent impact because this area will be considered part of the roadway/drainage infrastructure in the future instead of protected critical areas. Although considered a permanent impact, the buffer will be planted with native shrubs and, therefore, will still provide some buffer functions when the vegetation has established.

Temporary buffer impacts are anticipated during construction of a stormwater pipe and outfall. Temporary impact areas will be replanted with native trees and shrubs.

A stormwater pipe will be installed, and trees will not be planted over the stormwater pipe. The area disturbed during the installation of the stormwater pipe and outfall will be replanted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

2.4.7. Wetland LC-07

Wetland LC-07 is a palustrine emergent, slope wetland located northwest of the I-90 overpass and south of the westbound on-ramp (WSDOT 2021a, Table 8). Wetland LC-07 is rated as a Category III wetland and is required to have an 80-foot buffer.

Permanent Impacts

The project will permanently impact all of Wetland LC-07, which is located on an artificial fill slope between the I-90 westbound lanes and on-ramp. Construction of the new I-90/SR 18 interchange, including new stormwater facilities, will permanently impact all of Wetland LC-07. Woody vegetation that will be cleared is limited to sparse hardhack (*Spiraea douglasii*).

Permanent impacts will affect the ability of the entire wetland to provide key wetland functions. Wetland LC-07 has moderate potential to trap sediments and pollutants because it has a slope greater than 5 percent, has over 90 percent cover of uncut herbaceous vegetation, and receives runoff from I-90. Water quality functions will be eliminated by the project because all of this wetland will be converted to other uses.

Wetland LC-07 has low to moderate potential to provide erosion control functions because it does not contain sufficient rigid vegetation to attenuate flood flows but does receive excessive stormwater runoff. Water quality functions will be eliminated by the project because all of Wetland LC-07 will be converted to other uses.

Wetland LC-07 has low potential to provide habitat functions because it of its low plant diversity, lack of habitat features, and lack of connection to other habitats. Wetland habitat functions will be eliminated by the project because all of this wetland will be converted to other uses.

2.4.8. Wetland LC-11

Wetland LC-11 is a palustrine forested/scrub-shrub, depressional wetland located northeast of the SR 18/I-90 interchange (WSDOT 2021a, Table 9). Wetland LC-11 is rated as a Category III wetland and is required to have a 150-foot buffer.

Indirect Impacts

The project includes permanent buffer impacts, realignment of a drainage ditch, and an expansion of the I-90/SR 18 interchange clear zone. Although the permanent buffer impact areas are no longer considered wetland buffer, they will be replanted with trees where possible to minimize habitat impacts. Wetland LC-11 will have indirect wetland impacts in the following mature forested buffer areas where trees cannot be replanted: the realigned drainage ditch area and the expanded clear zone.

Buffer Impacts

The realignment of the westbound I-90 off-ramp, Stream LC-F, and a drainage ditch will have permanent wetland buffer impacts. The buffer impact areas include a mature forested vegetation community.

Clearing in the Wetland LC-11 buffer will occur beyond the roadway expansion fill to allow access for construction equipment, and in a strip of land where a fence will be placed at the edge of the right-of-way. The cleared buffer, which will be replanted with native trees and shrubs, is considered a temporary impact.

2.4.9. Wetland LC-12

Wetland LC-12 is a palustrine forested/scrub-shrub, depressional/slope wetland located northeast of the SR 18/I-90 interchange (WSDOT 2021a, Table 10). Wetland LC-12 is rated as a Category II wetland and is required to have a 150-foot buffer.

Permanent Impacts

The project will impact the southern tip of Wetland LC-12, above the existing westbound I-90 off-ramp. A very small area of Wetland LC-12 will be permanently impacted by grading work associated with daylighting Stream LC-G in association with fish passage improvements.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact areas have a moderate potential to trap sediments and pollutants because they are densely vegetated, seasonally ponded, and located in the closed depressional topography of Wetland LC-12. The permanently impacted portion of the wetland is on the upper slope of the depressional bowl. Grading activities will lay back the upper slope, which will cause this area to drain away from the wetland. The permanently impacted portion of Wetland LC-12 will stop providing water quality functions because it will be removed from the closed depressional topography.

The proposed impact areas have moderate to high potential to retain flood flows because they receive runoff from upland forest slopes above the wetland during and after storms and provide flood storage within the closed depressional topography of Wetland LC-12. The permanently impacted portion will cease to provide flood control functions because this area will be removed from the closed depressional topography of Wetland LC-12.

The proposed impact areas have moderate potential to provide habitat functions because these areas contain multi-strata forested vegetation, multiple water regimes, and connections to mature forested upland and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat functions because this area will be converted to upland. Habitat corridors will not be impacted because the project will be built on the edge of the wetland closest to SR 18.

Temporary Impacts

Most impacts to Wetland LC-12 will be temporary. Temporary impacts will occur within the construction clearing and grubbing limits and will consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long term and temporary because forested vegetation will be removed. Woody vegetation that may be cleared includes red alder, black cottonwood, salmonberry, vine maple, and cascara buckthorn.

The project will not permanently change the existing soils, topography, or drainage patterns in the temporarily impacted area. However, removal of vegetation will reduce the potential to trap and filter sediment and pollutants. Therefore, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than currently provided, until restoration is complete.

The temporarily impacted portion of the wetland will continue to provide some flood control functions because this area will continue to receive runoff and provide flood storage. Therefore, this area will continue to provide some hydrology functions but at a lower level than currently provided, until restoration is complete.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Buffer Impacts

The realignment of the westbound I-90 off-ramp and associated fill placement will permanently impact the wetland buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed clear zone. This will provide some buffer functions, even though it will no longer be classified as buffer.

Clearing in the wetland buffer will occur beyond the roadway expansion fill to allow access for construction equipment. These cleared areas will be replanted with native trees and shrubs and is therefore considered to be a temporary buffer impact.

A portion of the wetland buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.10. Wetland LC-13

Wetland LC-13 is a palustrine scrub-shrub, slope wetland located northeast of the SR 18/I-90 interchange, north of the westbound I-90 off-ramp (WSDOT 2021a, Table 11). Wetland LC-13 is rated as a Category III wetland and is required to have a 150-foot buffer.

Temporary Impacts

The project will temporarily impact a small portion of the southern edge of Wetland LC-13. Temporary wetland impacts within the clearing and grubbing limits will consist of a small amount of vegetation removal to allow for equipment access. This area will be restored and replanted with a mixture of native trees and shrubs.

The project will not permanently change the existing soils, topography, and drainage patterns in temporarily impacted areas. However, removal of vegetation in the temporarily impacted areas will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted area will continue to provide some flood control functions because it will continue to receive stormwater. The removal of vegetation will reduce the potential for slowing of surface water flows, which is important for erosion control. Therefore, until restoration is complete, the temporarily impacted area will continue to provide some hydrology functions but at a lower level than currently provided.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Buffer Impacts

The realignment of the westbound I-90 off-ramp and associated fill placement will permanently impact the wetland buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed clear zone. This will provide some buffer functions, even though it will no longer be classified as buffer.

Clearing in the wetland buffer will occur beyond the roadway expansion fill to allow access for construction equipment. These cleared areas, which will be replanted with native trees, are considered to be a temporary buffer impact.

A portion of the wetland buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.11. Wetland LC-20

Wetland LC-20 is a palustrine forested/scrub-shrub, slope wetland located southeast of the SR 18/I-90 interchange, between SE 104th Street and the eastbound I-90 on-ramp (WSDOT 2021a, Table 18). Wetland LC-20 is rated as a Category III wetland and is required to have a 150-foot buffer.

Buffer Impacts

Clearing in the wetland buffer will occur to allow access for construction equipment and to install media filter drains in the fill embankment of the eastbound I-90 on-ramp. Impacted buffer outside of the clear zone is considered a temporary buffer impact and will be replanted with native trees and shrubs. Areas within the clear zone will be planted with native shrubs. Because the clear zone did not change in this location, no vegetation conversion impacts will occur.

2.4.12. Wetland LC-21

Wetland LC-21 is a palustrine forested/scrub-shrub, depressional wetland located southwest of the SR 18/I-90 interchange, between SE 104th Street and the eastbound I-90 on-ramp (WSDOT 2021a, Table 19). Wetland LC-21 is rated as a Category III wetland and is required to have a 150-foot buffer.

Buffer Impacts

The project's roadway expansion and associated fill placement will permanently impact wetland buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed clear zone and will, therefore, provide some buffer functions.

Clearing in the wetland buffer will occur to allow access for construction equipment and to install media filter drains in the fill embankment of the eastbound I-90 on-ramp. Impacted buffer outside of the clear zone, which will be replanted with native trees and shrubs, is considered a temporary buffer impact. Areas within the clear zone will be planted with native shrubs. Because the clear zone did not change in this location, no vegetation conversion impacts will occur.

2.4.13. Wetland LC-22

Wetland LC-22 is a palustrine forested/scrub-shrub, depressional wetland located southwest of the SR 18/I-90 interchange, between SE 104th Street and the eastbound I-90 on-ramp. Wetland LC-22 is rated as a Category II wetland and is required to have a 150-foot buffer (WSDOT 2021a, Table 20).

Buffer Impacts

The project will permanently impact wetland buffer due to roadway expansion and associated fill placement, installation of media filter drains, and the reconstruction of the Stream LC-G channel. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and media filter drain location, and with native shrubs within the proposed clear zone. This area will, therefore, provide some buffer functions, even though it will no longer be classified as buffer.

Clearing in the Wetland LC-22 buffer will occur beyond the roadway expansion fill to allow access for construction equipment. Outside of the proposed permanent clear zone, cleared buffer, which will be replanted with native trees and shrubs, is considered a temporary buffer impact.

A portion of the Wetland LC-22 buffer will be converted to stream channel resulting in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.14. Wetland LC-23

Wetland LC-23 is a palustrine scrub-shrub/emergent, slope wetland located on an artificial fill slope between the on-ramp lanes to eastbound I-90 (WSDOT 2021a, Table 21). Wetland LC-23 is rated as a Category III wetland and is required to have an 80-foot buffer.

Permanent Impacts

Construction of the new I-90/SR 18 interchange will permanently impact all of Wetland LC-23. Woody vegetation that will be cleared includes hardhack and red alder saplings. This will affect the wetland's ability to provide key wetland functions. Wetland LC-23 has moderate potential to trap sediments and pollutants because it has a slope of less than 2 percent, over 90 percent cover of uncut herbaceous vegetation, and receives runoff from I-90 on- and off-ramps. Water quality functions will be eliminated by the project because all of Wetland LC-23 will be converted to other uses.

Wetland LC-23 has low to moderate potential to provide erosion control functions because it does not contain sufficient rigid vegetation to attenuate flood flows but does receive excessive stormwater runoff. Erosion control functions will be eliminated by the project because all of Wetland LC-23 will be converted to other uses.

Wetland LC-23 has low potential to provide habitat functions because it of its low plant diversity, lack of habitat features, and lack of connection to other habitats. Wetland habitat functions will be eliminated by the project because all of Wetland LC-23 will be converted to other uses.

2.4.15. Wetland LC-25

Wetlands LC-25 is a palustrine forested/scrub-shrub, depressional wetland located east of SR 18 between the SR 18/I-90 interchange and SE 104th Street (WSDOT 2021a, Table 23). Wetland LC-25 is rated as a Category III wetland and is required to have a 150-foot buffer.

Indirect Impacts

The project will result in indirect wetland impacts on Wetland LC-25 due to the loss of forested buffer functions associated with a proposed stormwater detention pond.

Buffer Impacts

Buffer associated with Wetland LC-25 will be permanently impacted by the construction of stormwater drainage ditches and a proposed detention pond. Although considered a permanent impact, some of these areas will be planted with native trees and shrubs and will provide some buffer functions. The stormwater drainage ditches, and detention pond will require that a portion of the wetland buffers cannot be replanted with trees.

Clearing in the wetland buffer will occur beyond the proposed stormwater facilities to allow access for construction equipment. These areas will be replanted with native trees and shrubs and this is therefore considered to be a temporary buffer impact.

A portion of the wetland buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.16. Wetland LC-26

Wetland LC-26 is a palustrine scrub-shrub/emergent, depressional wetlands located west of SR 18 between the SR 18/I-90 interchange and SE 104th Street (WSDOT 2021a, Table 24). The wetland is rated as a Category III wetland and is required to have a 150-foot buffer.

Indirect Impacts

The project will result in indirect wetland impacts on Wetland LC-26 due to the loss of forested buffer functions associated with a proposed stormwater detention pond.

Buffer Impacts

Buffer associated with Wetland LC-26 will be permanently impacted by the construction of a stormwater detention pond. The stormwater detention pond will require that most of the buffer cannot be replanted with trees.

Clearing in the wetland buffer will occur beyond the proposed stormwater pond to allow access for construction equipment. These areas will be replanted with native trees and shrubs and this is therefore considered to be a temporary buffer impact.

2.4.17. Wetland LC-27

Wetland LC-27 is a palustrine forested/scrub-shrub/emergent, depressional wetland that is located southeast of the SR 18/I-90 interchange and to the south of Lake Creek (WSDOT 2021a, Table 25). Wetland LC-27 is rated as a Category II wetland and is required to have a 300-foot buffer.

Permanent Impacts

Cut and fill associated with the stream realignment of Stream LC-B for installation of media filter drains will occur in a small portion of Wetland LC-27. Impacts to Wetland LC-27 will occur where a portion of the wetland that abuts the stream will be regraded to construct a new channel. Permanent impacts to Wetland LC-27 will consist of primarily lowering the ground surface by 1 to 2 feet, but some areas will be raised 1 to 2 feet. A hydraulic analysis has not been conducted to determine the hydroperiod in wetland areas that will be lowered after the stream channel has

been regraded. Wetland LC-27 is a large wetland supported by high groundwater. The project will not impact groundwater and will permanently impact only a very small portion (less than 0.1%) of the entire wetland. Therefore, the project is not anticipated to decrease wetland hydrology.

Where permanent impacts will occur, the project will affect the ability of those area to provide key wetland functions. The proposed impact areas have a moderate potential to trap sediment and pollutants because it has surface depressions, seasonal ponding, and dense vegetation. The portion of wetland that will be filled and converted to stream channel will no longer function as wetland and cease to provide water quality functions. The proposed impact areas have low to moderate potential to retain flood flows and reduce erosion because although the wetland is densely vegetated and has ponding with a depth of 2 feet to 3 feet, the wetland provides minimal flood storage capacity. This is because water is conveyed out of the wetland by an intermittently flowing or permanently flowing outlet, and the wetland does not store water for extended periods of time. The permanently impacted portion of the wetland converted to stream channel will cease to provide erosion control functions. The permanently impacted portion of the wetland converted to floodplain will likely provide greater flood and erosion control functions than it does currently because this area will be designed to provide more flood storage and flow attenuation.

The proposed impact areas have high potential to provide habitat functions because they are vegetated with woody vegetation and have multiple water regimes, moderate habitat interspersion, large woody debris, snags, and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland converted to stream channel will cease to provide wetland habitat functions because this area will be converted to stream. The permanently impacted portion of the wetland that are regraded and converted to stream channel might continue to provide wetland habitat functions or functions similar to wetland habitat because this area will be revegetated with plant communities similar to what is currently in-place and will continue to have multiple water regimes (including stream and riparian habitat), special habitat features like large woody debris, and moderate habitat interspersion. After site restoration, habitat corridors will not be adversely affected by the project because the wetland/stream connection will be re-established.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow for equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed which will take longer than 2 years to reestablish. Woody vegetation that might be cleared includes western red cedar, black cottonwood, red alder, salmonberry, vine maple, twinberry honeysuckle (*Lonicera involucrata*), and willows (*Salix* spp).

The project will not permanently change the existing soils, topography, or drainage patterns in the temporarily impacted area. However, removal of vegetation in these areas will reduce the potential of Wetland LC-27 to trap and filter sediment and pollutants. Therefore, the temporarily impacted portion of the wetland will continue to provide some water quality functions, but at a lower level than currently provided, until restoration is complete.

The removal of vegetation in these areas will reduce the potential for slowing of surface water flows, which is important for erosion control and bank stabilization. Therefore, the temporarily impacted portion of the wetland will continue to provide some hydrology functions but at a lower level than they currently provide, until restoration is complete.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

Stream LC-B will be realigned, and a portion of Wetland LC-27 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Indirect Impacts

The project will result in indirect wetland impacts on Wetland LC-27 due to the loss of forested buffer functions associated with roadway widening.

Buffer Impacts

The project will permanently impact the wetland buffer due to the construction of drainage ditches and associated realignment of Stream LC-B. Although considered a permanent impact, some of these areas will be planted with native trees and shrubs and provide some buffer functions. The stormwater drainage ditches will require that a portion of the wetland buffers cannot be replanted with trees.

Clearing in the wetland buffer will also occur beyond the proposed drainage ditches and stream realignment to allow access for construction equipment. This area will be replanted with native trees and shrubs and, therefore, this clearing is considered to be a temporary buffer impact.

The Stream LC-B channel will be realigned to ensure that stormwater is treated prior to entering the stream. To accomplish this, a portion of the Wetland LC-27 buffer will be converted into stream channel.

2.4.18. Wetland LC-28

Wetland LC-28 is a palustrine forested/scrub-shrub/emergent, depressional wetland located southeast of the SR 18/I-90 interchange (WSDOT 2021a, Table 26). Wetland LC-28 is rated as a Category I wetland and is required to have a 300-foot buffer.

Permanent Impacts

Cut and fill associated with the stream realignment and culvert extensions will occur in a small portion of the western edge of Wetland LC-28. Impacts to Wetland LC-28 will occur where a portion of the wetland that abuts the stream will be regraded to construct a new channel. Permanent impacts to Wetland LC-28 will consist of primarily lowering the ground surface by 1 to 2 feet, but some areas will be raised 1 to 2 feet. A hydraulic analysis has not been conducted to determine the hydroperiod in wetland areas that will be lowered after the stream channel has been regraded. Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact areas have a moderate potential to trap sediments and pollutants because they are densely vegetated, are within the topographical depression of Wetland LC-28, have seasonal ponding, and receive stormwater

runoff from SR 18. The portion of wetland that will be filled and converted to stream channel will no longer function as wetland and cease to provide water quality functions.

The proposed impact areas are currently functioning to reduce flooding at a level less than the wetland as a whole. The proposed impact areas have moderate potential to retain flood flows and reduce erosion because although they are densely vegetated, receive runoff from SR 18 and flood flows from a tributary to Lake Creek (Stream LC-B), they provide minimal flood storage capacity. This is because water is conveyed out of the wetland by an intermittently flowing or permanently flowing outlet, and the wetland does not store water for extended periods of time. The permanently impacted portion of the wetland converted to stream channel will cease to provide erosion control functions. The permanently impacted portion of the wetland converted to floodplain will likely provide greater flood and erosion control functions that it does currently because this area will be designed to provide more flood storage and flow attenuation.

The proposed impact areas are currently providing a level of habitat function less than the wetland as a whole. The proposed impact areas have moderate potential to provide habitat functions because these areas contain forested and scrub-shrub vegetation, multiple water regimes, and connections to mature forested upland and other wetlands, but less habitat types and interspersion than the wetland as a whole. The permanently impacted portion of the wetland that are regraded and converted to stream channel might continue to provide wetland habitat functions or functions similar to wetland habitat because this area will be revegetated with vegetation communities similar to what is currently in place and will continue to have multiple water regimes (including stream and riparian habitat), special habitat features like large woody debris, and moderate habitat interspersion. Habitat corridors will not be adversely affected by the project, because the project will be built on the edge of the wetland closest to SR 18.

Temporary Impacts

Temporary wetland impacts to Wetland LC-28 will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow for equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that may be cleared includes western red cedar, red alder, black cottonwood, cascara buckthorn, salmonberry, Pacific ninebark, hardhack, and trailing blackberry.

The project will not permanently change the existing soils, topography, or drainage patterns in the temporarily impacted area. However, removal of vegetation in these areas will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than currently provided.

The temporarily impacted portion of the wetland will continue to provide some flood control functions because these areas will continue to receive stormwater and overbank flows. The removal of vegetation in these areas will reduce the potential for slowing of surface water flows, which is important for erosion control and bank stabilization. Therefore, until restoration is complete, the temporarily impacted portion of the wetland will continue to provide some hydrology functions but at a lower level than they currently provide.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

A portion of Wetland LC-28 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Indirect Impacts

The project will result in indirect wetland impacts on Wetland LC-28 due to the loss of forested buffer functions associated with roadway widening.

Buffer Impacts

The project will permanently impact the wetland buffer due to the construction of drainage ditches, culvert extensions and associated realignment of Stream LC-B. Although considered a permanent impact, some of these areas will be planted with native trees and shrubs and therefore provide some buffer functions. The stormwater drainage ditches will require that a portion of the wetland buffers cannot be replanted with trees.

Clearing in the wetland buffer will also occur beyond the proposed drainage ditches, culvert extensions, and stream realignment to allow access for construction equipment. This area will be replanted with native trees and shrubs and, therefore, is considered to be a temporary buffer impact.

Because the permanent clear zone associated with the roadway will also be expanded, not all of the cleared buffer areas will be replanted with trees. Rather, wetland buffer within the permanent clear zone will be planted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

The Stream LC-B channel will be realigned to ensure that stormwater is treated prior to entering the stream. To accomplish this, a portion of the wetland buffer will be converted into stream channel

2.4.19. Wetland LC-29

Wetland LC-29 is a palustrine scrub-shrub/emergent, depressional wetland located southeast of the SR 18/I-90 interchange (WSDOT 2021a, Table 27). Wetland LC-29 is rated as a Category II wetland and is required to have a 150-foot buffer.

Permanent Impacts

The project will impact the eastern tip of Wetland LC-29. Permanent impacts will consist of filling a small portion of the wetland to expand the road prism. Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact area has a moderate potential to trap sediments and pollutants because it is densely vegetated, receives stormwater runoff, and is located in the closed depressional topography of Wetland LC-29. The permanently impacted portion of the wetland will cease to provide water quality functions because this area will be converted to upland fill slope and no longer function as a wetland.

The proposed impact area has moderate potential to retain flood flows because it is within the closed depressional topography of Wetland LC-29 and receives stormwater runoff. The permanently impacted portion of the wetland will cease to provide flood control functions because this area will be converted to upland fill slope and will no longer have the potential to store flood water.

The proposed impact area has moderate potential to provide habitat functions because it contains densely vegetated forest with low habitat interspersion and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope. Habitat corridors will not be impacted because the project will occur on the edge of the wetland closest to SR 18.

Temporary Impacts

Temporary wetland impacts to Wetland LC-29 will occur within the construction clearing and grubbing limits and will consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporary impacts will be restored after construction. Temporarily impacted areas include emergent vegetation and the area is expected to regain impacted functions within 2 years, so the impacts are considered to be short-term temporary impacts.

The project will not permanently change the existing soils, topography, and drainage patterns in the temporarily impacted area. However, removal of vegetation in the temporarily impacted area will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of the wetland will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted portion of the wetland will continue to provide the same level of flood control functions as it does now because this area will continue to receive stormwater and have the same flood storage volume as is does currently. The removal of vegetation in the temporarily impacted area could affect surface water velocities, which are important for erosion control and bank stabilization. However, Wetland LC-29 is a closed system without any surface water connection with a stream and does not currently provide erosion control or bank stabilization functions.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Indirect Impacts

The project will include permanent buffer impacts and a minor expansion of the SR 18 clear zone. Although the permanent buffer impact areas will no longer be considered wetland buffer, they will be replanted with trees where possible to minimize habitat impacts. Wetland LC-29 will have indirect wetland impacts from a loss of mature forested buffer functions in the expanded clear zone, where trees cannot be replanted.

Buffer Impacts

The SR 18 roadway expansion (including a chain-up area on the roadway shoulder and a culvert extension) will permanently impact the buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the

proposed permanent clear zone and with native shrubs within the proposed clear zone and will, therefore, provide some buffer functions.

Clearing in the Wetland LC-29 buffer will occur beyond the roadway expansion fill to allow access for construction equipment. These areas will be replanted with native trees and shrubs and this is therefore considered to be a temporary buffer impact.

2.4.20. Wetland RR-02

Wetland RR-02 is a palustrine forested/scrub-shrub, depressional wetland located east of SR 18, between Raging River and Lake Creek (WSDOT 2021a, Table 28). Wetland RR-02 is rated as a Category II wetland and is required to have a 300-foot buffer.

Buffer Impacts

The SR 18 roadway expansion and associated fill will permanently impact the wetland buffer. Although fill placement is considered a permanent impact, the fill prism will be planted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed clear zone and will, therefore, provide some buffer functions.

The project will temporarily impact the buffer of Wetland RR-02 to allow access for construction equipment. Most of the clearing will occur in pasture grass- and salmonberry-dominated buffer in the maintained clear zone. This area will be replanted with native shrubs after construction is complete.

Because the permanent clear zone associated with the roadway will also be expanded, not all of the cleared buffer areas will be replanted with trees. Rather, wetland buffer within the permanent clear zone will be planted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

2.4.21. Wetland RR-03

Wetland RR-03 is a palustrine forested/scrub-shrub, depressional wetland located east of SR 18, between Raging River and Deep Creek (WSDOT 2021a, Table 29). Wetland RR-03 is rated as a Category III wetland and is required to have a 300-foot buffer.

Buffer Impacts

The project will result in permanent impacts to wetland buffer from proposed stormwater treatment applications and installing a new catch basin east of SR 18. Most of the clearing will occur in pasture grass- and salmonberry-dominated buffer in the maintained clear zone. Although considered a permanent impact, the fill prism will be planted with native trees and shrubs, where allowed, and will provide some buffer functions.

Clearing in the wetland buffer will occur beyond the proposed stormwater facilities to allow access for construction equipment. Temporary impact areas will be replanted with native trees and shrubs.

Because the permanent clear zone associated with the roadway will also be expanded, not all of the cleared buffer areas will be replanted with trees. Rather, wetland buffer within the permanent clear zone will be planted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

2.4.22. Wetland RR-04

Wetland RR-04 is a palustrine forested wetland located east of SR 18, between Raging River and Deep Creek (WSDOT 2021a, Table 30). The wetland receives overbank flooding from Stream RR-B and contains depressional, riverine, and slope wetland components. Wetland RR-04 is rated as a Category III wetland and is required to have a 300-foot buffer.

Buffer Impacts

The project will permanently impact buffer associated with Wetland RR-04 due to proposed stormwater treatment applications east of SR 18.

Clearing in the wetland buffer will also occur beyond the proposed stormwater facilities to allow access for construction equipment. Buffer vegetation that will be impacted is very close to the existing roadway and likely limited to pasture grasses/invasive species. Temporary impact areas will be replanted with native trees and shrubs.

Because the permanent clear zone associated with the roadway will also be expanded, not all of the cleared buffer areas will be replanted with trees. Rather, wetland buffer within the permanent clear zone will be planted with native shrubs and be permanently converted from a forested buffer to a scrub-shrub buffer, which is considered a permanent vegetation conversion impact.

2.4.23. Wetland RR-05

Wetland RR-05 is a palustrine scrub-shrub wetland located on a gravel bar below within the Raging River (WSDOT 2021a, Table 31). The wetland is a riverine wetland and rated as a Category II wetland and is required to have a 180-foot buffer.

Buffer Impacts

The project will permanently impact Wetland RR-05 buffer due to roadway expansion.

Temporary buffer impacts are anticipated during construction. The temporary impact areas will be replanted with native trees and shrubs.

2.4.24. Wetland RR-06

Wetland RR-06 is a palustrine forested and scrub-shrub wetland located on a slope east of SR 18 and south of the Raging River (WSDOT 2021a, Table 32). Hydrology is supported by precipitation and runoff from SR 18. Wetland RR-06 is rated as a Category II wetland and is required to have a 210-foot buffer.

Buffer Impacts

The project will permanently impact Wetland RR-06 buffer due to roadway expansion.

Temporary buffer impacts are also anticipated during construction. The temporary impact areas will be replanted with native trees and shrubs.

2.4.25. Wetland RR-07

Wetland RR-07 is a palustrine forested/scrub-shrub, depressional/riverine wetland located south of Raging River and east of SR 18 (WSDOT 2021a, Table 33). Wetland RR-07 is rated as a Category II wetland and is required to have a 300-foot buffer.

Buffer Impacts

The project will permanently impact the wetland buffer as a result of construction equipment access associated with roadway regrading. This will result in a permanent loss of forested buffer. Although considered a permanent impact, some of these areas will be planted with native trees and shrubs. The portion that will be converted to stream cannot be replanted with trees.

Temporary wetland buffer impacts are also anticipated during construction. The temporary impact areas will be replanted with native trees and shrubs.

A portion of the Wetland RR-07 buffer will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat.

2.4.26. Wetland RR-08

Wetland RR-08 is a palustrine forested/scrub-shrub, depressional wetland located north of Deep Creek and east of SR 18 (WSDOT 2021a, Table 34). Wetland RR-08 is rated as a Category III wetland and is required to have a 300-foot buffer.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporary impacts will be restored after construction. Temporarily impacted areas include scrub-shrub vegetation and forested vegetation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term because forested vegetation will be removed. The project will not permanently change the existing soils, topography, and drainage patterns in the temporarily impacted area. However, removal of vegetation in this area will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of Wetland RR-08 will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted portion of the wetland will continue to provide the same level of flood control functions as it does now because this area will continue to have the same flood storage volume as it does currently. The removal of vegetation in the temporarily impacted area could affect surface water velocities, which is important for erosion control and bank stabilization.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Buffer Impacts

The project will permanently impact a band of wetland buffer due to proposed stormwater treatment applications east of SR 18.

Temporary wetland buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the wetland buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.27. Wetland DC-01

Wetland DC-01 is a palustrine forested/scrub-shrub, slope wetland located on a slope above the right bank of Deep Creek, downstream of the existing culvert outfall and west of SR 18 (WSDOT 2021a, Table 35). Wetland DC-01 is rated as a Category III wetland and is required to have a 300-foot buffer.

Permanent Impacts

The project proposes to replace the culvert with a bridge over Deep Creek. The bridge approaches will require placing embankment fill on the existing slopes, including in Wetland DC-01. A portion of the wetland will be filled to create the Deep Creek floodplain bench. The remainder of the wetland will be converted to stream channel. Woody vegetation that will be cleared includes western red cedar, red alder, and salmonberry.

Project impacts will affect the wetland's ability to provide key wetland functions. Wetland DC-01 has low potential to trap sediments and pollutants because of its slope (2 to 5 percent) and minimal amount of dense vegetation that can filter pollutants. The permanently impacted portion of the wetland will cease to provide water quality functions because it will be converted to an upland fill slope and no longer function as a wetland.

Wetland DC-01 has low to moderate potential to provide flood and erosion control functions because it contains sufficient rigid vegetation to attenuate flood flows but does not receive excessive stormwater runoff. The permanently impacted portion of the wetland will cease to provide flood and erosion control functions because this area will be converted to upland fill slope and no longer have the potential to store or attenuate flood water.

Wetland DC-01 has moderate potential to provide habitat functions because it contains multiple vegetation classes and water regimes, moderate habitat interspersion, special habitat features (e.g. large woody debris), and connections to mature forested upland, streams, and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope.

Wetland to Stream Conversion Impacts

Deep Creek will be realigned, and a small portion of the wetland will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.28. Wetland DC-02

Wetland DC-02 is a palustrine emergent/scrub-shrub, riverine wetland located west of SR 18 along the left and right banks of Deep Creek (WSDOT 2021a, Table 36). Wetland DC-02 is rated as a Category II wetland and is required to have a 255-foot buffer.

Permanent Impacts

Impacts to Wetland DC-02 will occur where a portion of the wetland that abuts the stream will be regraded to construct a new channel and floodplain bench. Permanent impacts to Wetland DC-02 will consist of primarily lowering the ground surface by 1 to 2 feet, but some areas will be raised 1 to 2 feet. A hydraulic analysis has not been conducted to determine the hydroperiod in wetland areas that will be lowered after the stream channel has been regraded.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. Wetland DC-02 has moderate potential to trap sediments and pollutants because most of the wetland has densely established trees and shrubs, but depressions cover less than half of the wetland. The permanently impacted portion of the wetland may continue to provide some water quality functions because this area will have a vegetated, gradual slope that could trap sediments.

Wetland DC-02 has moderate potential to provide flood and erosion control functions because tree and shrub cover is fairly high but the low ratio of wetland to stream width limits overbank storage potential. The permanently impacted portion of the wetland will likely provide greater flood and erosion control functions that it does currently because this area will be designed to provide more flood storage and flow attenuation.

Wetland DC-02 has moderate potential to provide habitat functions because it contains multiple vegetation classes and water regimes, low habitat interspersion and special habitat features including large downed woods, snags, overhanging vegetation, signs of beaver use and low invasive plant cover. In addition, wetland DC-02 is part of a vegetated corridor connecting to other wetlands and relatively undisturbed uplands. The permanently impacted portion of the wetland may continue to provide wetland habitat functions or functions similar to wetland habitat because this area will be revegetated with communities similar to what is currently in-place and will continue to have multiple water regimes (including stream and riparian habitat), special habitat features like large woody debris, and moderate habitat interspersion. Habitat corridors will not be adversely affected by the project, after site restoration, because the wetland/stream connection will be re-established. Habitat corridors might be increased by replacement of the Deep Creek culvert with a bridge.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporary impacts will be restored after construction. Temporarily impacted areas include scrub-shrub vegetation and impacted functions are expected to be restored within 2 years, so the impacts are considered to be short-term temporary.

The project will not permanently change the existing soils, topography, and drainage patterns in the temporarily impacted area. However, removal of vegetation in this area will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of Wetland DC-02 will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted portion of the wetland will continue to provide the same level of flood control functions as it does now because this area will continue to have the same flood storage volume as it does currently. The removal of vegetation in the temporarily impacted area could affect surface water velocities, which is important for erosion control and bank stabilization.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Buffer Impacts

The buffer of Wetland DC-02 will be permanently impacted by both fish passage improvements and stormwater facilities. Part of the buffer will be permanently impacted by the approaches for the new bridge over Deep Creek and part of the buffer will be permanently impacted by construction of stormwater facilities within the wetland buffer. Permanent impacts will include permanent loss of forested buffer.

Temporary wetland buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the wetland buffer that is currently forested will be permanently converted to scrub-shrub vegetation. A narrow band of buffer adjacent to the stormwater facility will be restored but unable to support trees. This area will be replanted with shrubs and converted from forested habitat to scrub-shrub habitat.

A portion of the wetland buffer will be converted to stream habitat to accommodate the realignment of Deep Creek, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.29. Wetland DC-03

Wetland DC-03 is a palustrine forested/scrub-shrub, depressional/riverine wetland located west of SR 18 and south of Deep Creek (WSDOT 2021a, Table 37). Wetland DC-03 is rated as a Category II wetland and is required to have a 300-foot buffer.

Permanent Impacts

The project proposes to replace the existing culvert at Deep Creek with a bridge. The new bridge embankment will impact the eastern portion of Wetland DC-03 that is adjacent to the existing SR 18 roadway embankment. Permanent impacts will consist of filling part of the wetland to build the approaches for a proposed bridge over Deep Creek.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed permanently impacted areas of Wetland DC-03 have a moderate potential to trap sediments and pollutants because they are densely vegetated and located in the depressional topography of the wetland. This permanently impacted portion of the wetland will cease to provide water quality functions because it will be converted to upland fill slope and no longer function as a wetland.

The proposed impact areas have low to moderate potential to retain flood flows and reduce erosion because they receive flows from Stream DC-B and Stream DC-C, are densely vegetated, and are located in the depressional topography of Wetland DC-03. The permanently impacted portion of the wetland will cease to provide flood and erosion control functions because this area will be converted to upland fill slope and no longer have the potential to store or attenuate flood water.

The proposed impact areas have moderate potential to provide habitat functions because they contain densely vegetated forest and scrub-shrub communities with low habitat interspersion and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope. Habitat corridors will not be broken because the project will be

built on the side of the wetland closest to SR 18 and the remaining wetland will remain connected to forested uplands and other wetlands.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that might be cleared includes western red cedar, red alder, salmonberry, stink currant (*Ribes bracteosum*), vine maple, and devil's club.

The project will not permanently change the existing topography in the temporarily impacted area. However, removal of vegetation in the temporarily impacted area will reduce the potential of Wetland DC-03 to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of this wetland will continue to provide some water quality functions but at a lower level than it currently provides.

The project will not permanently change the existing topography in the temporarily impacted area. Stream DC-C may be temporarily placed into a stream bypass, and it is not known at this time whether this stream will still discharge into Wetland DC-03 during construction. The temporarily impacted portion of the wetland will continue to provide some flood control functions because this area will continue to receive flood flows from Stream DC-B and potentially from Stream DC-C. The removal of vegetation will reduce the potential for slowing of surface water flows, which is important for erosion control and bank stabilization. Therefore, until restoration is complete, the temporarily impacted portion of this wetland will continue to provide some hydrology functions but at a lower level than currently provided.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

A portion of Wetland DC-03 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Indirect Impacts

The clearing of very mature coniferous trees, and associated significant temporal loss, is anticipated to have some indirect impact to Wetland DC-03.

Buffer Impacts

Wetland DC-03 has limited buffer adjacent to SR 18. The buffer to the south of the wetland is dominated by mature western hemlock and Douglas-fir and has been mapped as suitable marbled murrelet habitat. The project will permanently impact this southern buffer to realign Stream DC-C, which is needed for the SR 18 roadway expansion/realignment and bridge

Temporary wetland buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the wetland buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.30. Wetland DC-04

Wetland DC-04 is a palustrine forested/scrub-shrub, slope wetland located east of SR 18 and south of Deep Creek (WSDOT 2021a, Table 38). Wetland DC-04 is rated as a Category III wetland and is required to have a 300-foot buffer.

Permanent Impacts

The project will impact the western tip of Wetland DC-04, near where Deep Creek enters a culvert below SR 18. The project proposes to replace the existing culvert with a bridge over Deep Creek. A new stream channel and floodplain will be constructed below the bridge and tie into the existing stream on both sides of SR 18. Impacts to Wetland DC-04 will occur where a portion of the wetland that abuts the stream will be regraded to construct a new channel and floodplain bench. Permanent impacts to Wetland DC-04 will consist of primarily lowering the ground surface by 1 to 2 feet, but some areas will be raised 1 to 2 feet. A hydraulic analysis has not been conducted to determine the hydroperiod in wetland areas that will be lowered after the stream channel has been regraded.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact areas have a low potential to trap sediments and pollutants because they are on a relatively steep slope (greater than 5 percent) and have less than 90 percent cover of dense vegetation. The permanently impacted portion of the wetland will be converted to stream and floodplain. The portion converted to stream channel will cease to provide water quality functions. The portion converted to floodplain may continue to provide some water quality functions because this area will have a vegetated, gradual slope that could trap sediment.

The proposed impact areas have low potential to retain flood flows and reduce erosion because they are on a slope and have less than 90 percent cover of rigid vegetation. The permanently impacted portion of the wetland converted to stream channel will cease to provide erosion control functions. The permanently impacted portion of the wetland converted to floodplain will likely provide greater flood and erosion control functions that it does currently because this area will be designed to provide more flood storage and flow attenuation.

The proposed impact areas have a moderate to high potential to provide habitat functions because they are vegetated with woody vegetation and have multiple water regimes, moderate habitat interspersion, large woody debris, snags, low-invasive cover, and connections to mature forested upland corridor and other wetlands. The permanently impacted portion of the wetland converted to stream channel will cease to provide wetland habitat functions because this area will be converted to stream. The permanently impacted portion of the wetland converted to floodplain may continue to provide wetland habitat functions or functions similar to wetland habitat because this area will be revegetated with communities similar to what is currently in-place and will continue to have multiple water regimes (including stream and riparian habitat), special habitat features like large woody debris, and moderate habitat interspersion. Habitat corridors will not be adversely affected by the project, after site restoration, because the wetland/stream connection will be re-established. Habitat corridors might be increased by replacement of the Deep Creek culvert with a bridge.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and will consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that might be cleared includes western red cedar, red alder, black cottonwood, Sitka spruce, salmonberry, red osier dogwood (*Cornus alba*), stink currant, devil's club, and Himalayan blackberry (*Rubus armeniacus*).

The removal of vegetation will eliminate the potential of Wetland DC-04 to trap and filter sediment and pollutants. Therefore, the temporarily impacted portion of this wetland will cease to provide water quality functions until restoration is complete.

The removal of vegetation will also eliminate the potential to slow down surface flows. Therefore, the temporarily impacted portion of this wetland will cease to provide hydrology functions until restoration is complete.

The temporarily impacted area will be cleared of vegetation and disturbed by construction activities which will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

A portion of Wetland DC-04 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Buffer Impacts

The project will permanently impact wetland buffer to create the new bridge Deep Creek stream channel alignment.

Temporary wetland buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the wetland buffer will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.31. Wetland DC-05

Wetland DC-05 is a palustrine forested/scrub-shrub, slope wetland located east of SR 18 and north of Deep Creek (WSDOT 2021a, Table 39). Wetland DC-05 is rated as a Category III wetland and is required to have a 300-foot buffer.

Permanent Impacts

The project will impact the western edge of Wetland DC-05, near where Deep Creek enters a culvert below SR 18. Wetland DC-05 is located on a slope above the right bank of Deep Creek and, like Wetland DC-04, will be impacted by the construction of a bridge over Deep Creek and associated stream channel reconstruction. Impacts to Wetland DC-05 will occur where a portion of the wetland that abuts Deep Creek will be regraded to construct a new floodplain bench. Permanent impacts to Wetland DC-05 will consist of primarily lowering the ground surface by 1 to 2 feet, but some areas might be raised by about one foot.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact areas are currently functioning to improve water quality at a level greater than the wetland as a whole. The proposed impact areas have a moderate potential to trap sediments and pollutants because although they are on a relatively steep slope (greater than 5 percent), they have greater than 90 percent cover of dense vegetation and receive runoff from SR 18. The permanently impacted portion of the wetland will be converted to floodplain and might continue to provide some water quality functions because this area will have a vegetated, gradual slope that has the potential to trap sediment.

The proposed impact areas are currently functioning to reduce flooding and erosion at a level greater than the wetland as a whole. The proposed impact areas have moderate potential to reduce erosion because they have greater than 90 percent cover of rigid vegetation. The permanently impacted area will likely provide greater flood and erosion control functions that it does currently because this area will be converted to floodplain and designed to provide more flood storage and flow attenuation.

The proposed impact areas are currently providing a level of habitat functions less than the wetland as a whole. The proposed impact areas are densely vegetated with one vegetation class (scrub-shrub), have one hydric regime (seasonally flooded) as well as stream influence, have low habitat interspersion, and have connections to mature forested upland corridor and other wetlands. The permanently impacted portion of Wetland DC-05 might continue to provide wetland habitat functions or functions similar to wetland habitat because this area will be converted to floodplain and revegetated with vegetation communities similar to what is currently in-place and will continue to have riparian habitat and special habitat features like large woody debris. Habitat corridors will not be adversely affected by the project because the wetland/stream connection will be re-established after site restoration. Habitat corridors might be increased by replacement of the Deep Creek culvert with a bridge.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and will consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas will be replanted. However, the impacts are considered long-term temporary impacts because forested vegetation will be removed. Woody vegetation that might be cleared includes western red cedar and salmonberry.

The removal of vegetation will eliminate the potential to trap and filter sediment and pollutants. Therefore, the temporarily impacted portion of Wetland DC-05 will cease to provide water quality functions until restoration is complete.

Removal of vegetation will also eliminate the potential to slow down surface flows. Therefore, the temporarily impacted portion of this wetland will cease to provide hydrology functions until restoration is complete.

The temporarily impacted area will be cleared of vegetation and disturbed by construction activities, which will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

A portion of Wetland DC-05 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Buffer Impacts

Wetland DC-05 has limited buffer adjacent to SR 18. Vegetation is dominated by salmonberry and stink currant. The project will permanently impact the wetland buffer to create the new Deep Creek stream channel alignment.

Temporary buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the buffer will be converted to stream channel, which will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.32. Wetland DC-06

Wetland DC-06 is a palustrine scrub-shrub, depressional wetland located west of SR 18 and is the headwaters to Stream DC-C (WSDOT 2021a, Table 40). Wetland DC-06 is rated as a Category II wetland and is required to have a 150-foot buffer.

Permanent Impacts

The project will impact the eastern tip of Wetland DC-06, where the wetland outlets to Stream DC-C. Permanent impacts will consist of filling a portion of the wetland to expand the road prism as SR 18 approaches the proposed bridge to span Deep Creek. Stream DC-C will be realigned to the west and continue its flow pattern.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. The proposed impact areas have a moderate to high potential to trap sediments and pollutants because they are in a densely vegetated depression that receives polluted stormwater runoff, but an unconstricted outlet provides minimum seasonal ponding. The permanently impacted portion of the wetland will cease to provide water quality functions because this area will be converted to upland fill slope and no longer function as a wetland.

The proposed impact areas have a low to moderate potential to reduce flooding and erosion because they receive excess stormwater runoff from SR 18 but have an unconstricted outlet that does not retain flood flows. The permanently impacted portion of the wetland will cease to provide hydrologic functions because this area will be converted to upland fill slope and no longer have the potential to attenuate flood waters. The removal of vegetation in the temporarily impacted area can affect surface water velocities, which is important for erosion control and bank stabilization.

The proposed impact areas have low potential to provide habitat functions because they have minimum vegetation and habitat diversity. However, Wetland DC-06 has high landscape potential to provide habitat because it is connected to large upland forested corridors and other wetlands. The permanently impacted portion of the wetland will cease to provide wetland habitat because this area will be converted to upland fill slope. Habitat corridors will not be impacted because the project impacts will occur on the edge of the wetland closest to SR 18.

Temporary Impacts

Temporary wetland impacts will occur within the construction clearing and grubbing limits and consist of vegetation removal to allow equipment access and surface disturbance from equipment operation and silt fence installation. Temporarily impacted areas include scrub-shrub vegetation that will regain impacted functions within 2 years of proposed impacts, so the impacts are considered to be short-term temporary impacts. Woody vegetation that may be cleared includes red alder, vine maple, and salmonberry.

The project will not permanently change the existing soils or topography in the temporarily impacted area. However, removal of vegetation in the temporarily impacted area will reduce the potential to trap and filter sediment and pollutants. Therefore, until restoration is complete, the temporarily impacted portion of Wetland DC-06 will continue to provide some water quality functions but at a lower level than it currently provides.

The temporarily impacted portion of this wetland will continue to provide some flood control functions because this area will continue to receive excess stormwater. However, the removal of vegetation will reduce the potential for slowing of surface water flows, which is important for erosion control and bank stabilization. Therefore, until restoration is complete, the temporarily impacted portion of Wetland DC-06 will continue to provide some hydrology functions but at a lower level than it currently provides.

Vegetation removal and construction activities will eliminate habitat functions until restoration is complete. Proposed impacts will not reduce habitat complexity or interspersion of the remaining wetland.

Wetland to Stream Conversion Impacts

A portion of Wetland DC-06 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

Buffer Impacts

The project will permanently impact the wetland buffer due to the roadway expansion and associated realignment of Stream DC-C.

Temporary wetland buffer impacts are also anticipated during construction. Temporary impact areas will be replanted with native trees and shrubs.

A portion of the wetland buffer will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.33. Wetland DC-07

Wetland DC-07 is a palustrine scrub-shrub/emergent, riverine wetland located west of SR 18 and associated with Stream DC-F (WSDOT 2021a, Table 41). Wetland DC-07 is rated as a Category II wetland and is required to have a 300-foot buffer.

Permanent Impacts

Expansion of the existing road prism will permanently fill most of Wetland DC-07. Woody vegetation that will be cleared includes western red cedar and red alder.

Where permanent impacts will occur, the project will affect the ability of those areas to provide key wetland functions. Wetland DC-07 has moderate potential to trap sediments and pollutants because it has surface depressions that can trap sediment, trees and shrubs cover more than one third but less than two thirds of the wetland, and the wetland receives runoff from I-90. Water quality functions will be eliminated by the project because almost all of Wetland DC-07 will be converted to upland fill slope.

Wetland DC-07 has moderate potential to reduce flooding and erosion because contains sufficient rigid vegetation to attenuate flood flows and received overbank flooding and stormwater runoff from SR 18. Hydrologic functions will be eliminated by the project because almost all of Wetland DC-07 will be converted to upland fill slope.

Wetland DC-07 has moderate potential to provide habitat functions because it contains several vegetation classes, water regimes, and special habitat features. Wetland DC-07 has high landscape potential to provide habitat because it is connected to large upland forested corridors and other wetlands. Wetland habitat functions will be eliminated by the project because almost all of Wetland DC-07 will be converted to upland fill slope.

Wetland to Stream Conversion Impacts

A portion of Wetland DC-06 will be converted to stream channel. This will not result in a loss of aquatic area and will result in an overall functional lift of aquatic habitat due to restoration of natural hydraulic and stream processes.

2.4.34. Wetland DC-08

Wetland DC-08 is a palustrine scrub-shrub/emergent, riverine wetland located south of Deep Creek and east of SR 18 (WSDOT 2021a, Table 42). Wetland DC-08 is rated as a Category III wetland and is required to have a 300-foot buffer.

Buffer Impacts

The project will permanently impact the buffer of Wetland DC-08 due to proposed regrading of the SR 18 roadway as it is realigned toward the bridge over Deep Creek.

Temporary wetland buffer impacts are also anticipated during construction for equipment access. Based on the mapped tree line, buffer vegetation to be impacted is limited to pasture grasses and invasive species. Temporary impact areas will be replanted with native trees and shrubs outside of the proposed permanent clear zone and with native shrubs within the proposed permanent clear zone.

3. Stream and Stream Buffer Impact Assessment

This chapter includes an assessment of impacts to streams and functions related to the proposed project. Summaries of existing conditions for each stream and buffer that will be impacted are provided in the Stream Impacts Summaries (Section 3.4). Refer also to the *Wetland and Stream Assessment Report* (WSDOT 2021a) for more details about each stream.

3.1. Stream Impacts

The project includes unavoidable permanent and temporary impacts to 15 streams. A summary of proposed stream and buffer impacts is shown in the project Joint Aquatic Resources Permit Application (JARPA) and provided in Tables 4 and 5.

Stream impacts have been categorized as either resulting from fish passage barrier correction work or resulting from other work (roadway and stormwater improvements) that is not associated with fish passage. This distinction is made because impacts associated with fish passage work will provide a net functional benefit to the stream and additional compensatory mitigation will not be proposed for these impacts.

The project's impact on stream functions is discussed below by stream. Streams with fish passage barrier corrections proposed (Lake Creek, Stream LC-G, and Deep Creek) will have more extensive work and greater stream benefits and are discussed with more detail.

All in-water work will occur during approved project in-water work windows.

3.1.1. Permanent Stream Impacts

The proposed project will permanently impact 0.721 acres of stream channel (Table 4). Permanent stream impacts are associated with filling or relocating the stream as part of fish passage barrier corrections, roadway improvements, or stormwater improvements.

3.1.2. Indirect Stream Impacts

Indirect stream impacts occur when roadway widening is happening where there is a fish passage barrier correction at Lake Creek and Deep Creek (Table 4). The comparison is between if the fish passage barrier correction was being completed as a standalone fish passage project versus in combination with the larger improvement and widening project.

3.1.3. Temporary Stream Impacts

The proposed project will temporarily impact 0.512 acres of stream channel (Table 4). Temporary stream impacts occur when a stream is temporarily filled as part of a temporary stream diversion, or as part of clearing and grubbing within project work limits.

Temporary stream impacts are also associated with temporary stream diversions that may be needed if water is flowing at the time of construction. The need for a stream diversion would depend on final design and construction sequencing.

Temporarily impacted streams will be restored following construction.

Table 4. Stream Area Impacts and Compensatory Mitigation Proposed

Stream Name	Stream Type	Permanent Impacts (acre)	Compensatory Mitigation	Indirect Impacts (acre)	Compensatory Mitigation	Temporary Impacts* (acre)
LC-A (Fish)	F	0 (6 SF)	N/A	-	-	0.023
LC-A	F	-	-	0.018	SE 104th	-
LC-B	F	0.097	on-site	-	-	0.216
LC-C	F	-	-	-	-	0.008
LC-D	F	-	-	-	-	-
LC-E (Fish)	F	0.051	N/A	-	-	-
LC-F	N	0.042	on-site and SE 104th	-	-	-
LC-G	F	0.050	on-site	-	-	0.008
LC-G (Fish)	F	0.044	N/A	-	-	0.030
LC-H	F	0.042	on-site	-	-	0.015
LC-I	F	0.021	SE 104th	-	-	0.006
LC-J	F	0.006	on-site	-	-	0.008
LC-J (Fish)	F	-	-	-	-	0.003
RR-A	F	-	-	-	-	-
RR-B	O/N	0.016	SE 104th	-	-	0.014
RR-C	N	-	-	-	-	0.002
RR-D	N	0.160	on-site	-	-	0.023
DC-A (Fish)	F	0.097	N/A	0.016	N/A	0.104
DC-B	N	-	-	-	-	-
DC-C	N	0.053	on-site	-	-	0.001
DC-D (Fish)	F	0.003	N/A	-	-	0.012
DC-E	F	0.022	on-site	-	-	0.034
DC-E (Fish)	F	0 (3 SF)	N/A	-	-	0.002
DC-F	N	0.017	on-site and SE 104th	-	-	0.003
Totals		**0.721**		**0.034**		**0.512**

F = Fish bearing
N = Non fish bearing
O= Other
SF = square feet
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.
* All temporary impacts will be restored on-site; no compensatory mitigation is proposed
Grey highlight = Streams within King County Shoreline Jurisdiction

3.2. Stream Buffer Impacts

The project will include unavoidable permanent and/or temporary impacts (including stream buffer to stream conversion) to the buffers of 12 streams. Where stream buffer overlaps wetland buffer, impacts were evaluated as a wetland buffer impact and are not addressed herein to avoid double-counting buffer impacts.

3.2.1. Permanent Buffer Impacts

The proposed project will permanently impact 5.509 acres of stream buffer (Table 5). Permanent impacts are associated with filling or excavating stream buffers for the proposed roadway and stormwater improvements. Although these areas can frequently be replanted with

native shrubs and trees, they are still considered a permanent impact because they will be considered part of the roadway/drainage infrastructure in the future instead of protected critical areas.

3.2.2. Stream Buffer to Stream Conversion

The proposed project will permanently convert 0.413 acres of stream buffer to new stream channel (Table 5). These impacts occur where a stream channel is being realigned due to roadway or stormwater impacts. Since these impacts are associated with transportation infrastructure improvements, these are considered permanent stream buffer impacts.

3.2.3. Stream Buffer Conversion

The proposed project will convert 0.034 acres of stream buffer (Table 5). Vegetation conversion impacts are associated with the proposed permanent clear zone associated with roadway expansion. Vegetation conversion impacts occur when a forested vegetation community is permanently converted to a scrub-shrub community to maintain sight distances along the roadway. Buffer vegetation conversion areas will remain buffer, but their functions will be permanently impacted because trees cannot be established in the clear zone, in accordance with WSDOT policy.

3.2.4. Temporary Buffer Impacts

The proposed project will temporarily impact 0.816 acres of existing stream buffer (Table 5). Temporary stream buffer impacts may include vegetation clearing during construction. Temporarily impacted stream buffers will be restored following construction.

Table 5. Stream Buffer Area Impacts

Stream Name	Stream Type	Permanent Impacts (acre)	Stream Buffer to Stream Conversion (acre)	Stream Buffer Conversion (acre)	Temporary Impacts (acre)
LC-A (Fish)	F	-	0.018	-	-
LC-A	F	-	-	-	-
LC-B	F	-	-	-	-
LC-C	F	-	-	-	-
LC-D	F	0.086	-	-	0.141
LC-E (Fish)	F	-	-	-	-
LC-F	N	0.580	0.020	-	0.075
LC-G	F	1.634	-	-	0.007
LC-G (Fish)	F	0.981	0.271	-	0.116
LC-H	F	0.233	0.025	0.034	0.051
LC-I	F	0.260	0.002	-	0.042
LC-J	F	0.027	-	-	-
LC-J (Fish)	F	-	-	-	-
RR-A	F	0.116	-	-	0.037
RR-B	O/N	0.001	-	-	0.018
RR-C	N	-	-	-	-
RR-D	N	1.033	0.035	-	0.092
DC-A (Fish)	F	-	-	-	-
DC-B	N	-	-	-	-
DC-C	N	-	-	-	-
DC-D (Fish)	F	-	-	-	-
DC-E	F	0.390	0.033	-	0.166
DC-E (Fish)	F	-	-	-	-
DC-F	N	0.168	0.009	-	0.071
Totals		**5.509**	**0.413**	**0.034**	**0.816**

F = Fish bearing
N = Non fish bearing
O= Other
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.
Grey highlight = Streams within King County Shoreline Jurisdiction

3.3. Stream Functions Impacted

Stream and stream buffer impacts will affect existing water conveyance functions, water quality functions, and habitat functions (including geomorphic processes that inform these functions). Water conveyance functions include storage capacity to slow or store surface water and provide water to downstream fish-bearing waters during summer months. Water quality functions refer to stream characteristics or conditions that directly impact contaminant concentrations, water temperature, dissolved oxygen, and turbidity (water quality standards defined in WAC 173-201A-200). Impacts associated with pH are not discussed herein further, as the project will not cure concrete below the OHWM or have other activities potentially resulting in high pH. Fecal coliform is also not discussed because the project is not anticipated to affect human or animal waste transport in or near waterbodies. Habitat functions include complexity, connectivity, and other biological functions (such as in-stream habitat availability and indirect habitat input like litterfall/nutrient source and woody debris recruitment for downstream fish-bearing waters). Information on stream functions impacted by stream is below.

3.4. Stream Impact Summaries

The impacts to streams and associated functions that would result from the proposed project are summarized in the following sections and area divided between fish passage impacts and impacts associated with transportation related activities.

3.4.1. Lake Creek/Stream LC-A

Lake Creek (WRIA ID #07-0393), a tributary to Raging River, is a perennial stream that flows east to west and crosses SR 18 through twin culverts just south of the I-90/SR 18 interchange.

Fish Passage Impacts

The existing SR 18 crossing of Lake Creek includes two 42-inch-diameter, 80-foot-long concrete culverts that are listed as fish passage barriers due to slope. The culverts will be replaced with a fish-passable four-lane bridge that will span a minimum of 44 feet. The structure will be designed to have a minimum freeboard clearance of 3 feet. The proposed crossing will remove the existing culverts and replace them with a reconstructed stream channel beneath the proposed bridge. To tie in the new stream channel with the existing stream channel, a small portion of the stream will be filled, resulting in 6 square feet (< 0.001 acre) of permanent impact. This impact will likely be eliminated during final stream design.

Temporary impacts will occur within the construction clearing and grubbing limits along the stream channel where it crosses under SR 18. Temporary impacts will consist of vegetation removal in the stream to allow equipment access as well as temporary fill in the stream for the stream diversion. The project will temporarily impact all stream functions to some extent when the stream is diverted into a pipe during construction.

Stream buffer impacts at Lake Creek consist of permanent conversion of buffer to new stream channel.

The project will improve water conveyance functions by replacing two undersized culverts with a fish-passable bridge crossing. It will benefit water conveyance functions by returning to a more natural hydrograph, decreasing flood risk, and improving groundwater exchange. The bridge crossing will also restore woody debris and sediment transport. During construction, fines will be layered with coarser material and washed to fill void spaces prior to diverting the stream to the new channel. This will provide greater certainty that the stream will not flow subsurface through the streambed gravel. The project is expected to improve water quality because the project will provide stormwater treatment of runoff from SR 18 and I-90 where there is currently no treatment.

Replacing the twin culverts with a fish-passable bridge will restore in-stream habitat at the stream crossing as well as access to 7,113 linear feet of potential upstream fish habitat (approximately 0.39 acre of potential spawning habitat and 3.6 acres of potential rearing habitat) (WSDOT 2020a). In-stream invertebrate/resident fish habitat and adjacent riparian vegetation will be temporarily impacted during construction but will be restored to pre-project conditions or better.

Overall, we expect the fish barrier removal to provide a net increase in aquatic resource functions and services following this portion of project construction. Therefore, WSDOT proposes that this portion of stream impact would not require compensatory mitigation. Temporary impacted areas will be restored on site.

Transportation Impacts

A minor indirect stream impact will occur associated with adding two lanes to SR 18. This impact is primarily due to the bridge shading and additional pavement associated with the two new lanes.

Compensatory mitigation is proposed for the indirect stream impacts resulting from the additional overwater structure and potential shading due to the height of the bridge above the stream.

3.4.2. Stream LC-B

Stream LC-B is a seasonal fish-bearing stream that originates from Wetlands LC-27 and LC-28 and flows north, paralleling eastbound SR 18, until it joins with Lake Creek upstream of the Lake Creek culverts under SR 18.

Transportation Impacts

All impacts to Stream LC-B are a result of work other than (not associated with) fish passage. The SR 18 road prism will be expanded for stormwater treatment and for separation of roadway stormwater from Stream LC-B. Stream LC-B will be realigned to the east, which will result in permanent impacts from filling and moving the existing stream channel to accommodate new stormwater treatment features but the entire channel will be reconstructed to the east resulting in no net loss of waters.

Temporary stream impacts will also occur due to clearing and grubbing of vegetation to allow equipment access as well as temporary fill in the stream for stream diversion. No stream buffer impacts will occur. The project will temporarily impact all stream functions to some extent during construction.

Although the project will relocate Stream LC-B, its overall water conveyance stream functions will be maintained in the new configuration. The new Stream LC-B channel has been modeled to provide appropriate bankfull width, slope, and streambed substrate. Water quality will improve long-term with construction of the proposed stormwater treatment improvements. The project will result in temporary impacts to in-stream macroinvertebrate communities. These communities are anticipated to recover to existing levels of function or better post-construction based on proposed stream design and anticipated improvement in water quality.

As there is no loss of waters at Stream LC-B and functions are expected to be restored post construction, compensatory mitigation is not proposed for Stream LC-B.

3.4.3. Stream LC-C

Stream LC-C is a seasonal fish-bearing stream originating from Wetland LC-04 that flows north along the northeastern boundary of Wetland LC-04, parallels westbound SR 18, and discharges to Lake Creek. During high flow events, water travels through a culvert that runs under SR 18 and enters both Streams LC-C and LC-B.

Transportation Impacts

All impacts to Stream LC-C are a result of work other than (not associated with) fish passage. The project will result in temporary impacts to Stream LC-C associated with roadway widening. Vegetation clearing and grubbing for equipment access as well as temporary fill for stream

diversion will result in minor temporary impacts to in-stream macroinvertebrate communities and riparian vegetation.

No permanent impacts will occur and therefore no compensatory mitigation is proposed for Stream LC-C. All temporarily impacted areas will be restored.

3.4.4. Stream LC-D

Stream LC-D is a seasonal fish-bearing stream that is assumed to drain into Lake Creek outside of the project area.

Transportation Impacts

The project will have no permanent or temporary impacts to the stream channel. However, the project will result in minor permanent and temporary impacts to the stream buffer associated with excavation for replacing a culvert, construction access, and the proposed permanent access for a new drainage pond. All impacts to stream buffer will result from work other than (not associated with) fish passage.

The impacted riparian vegetation consists largely of roadside grasses within the interstate highway median, which provide some water quality filtration and stormwater runoff functions but limited shading and other habitat function. Riparian vegetation removal may temporarily impact these functions during construction. These impacts will be reduced with best management practices, and temporary impact areas will be restored with stream buffer plantings. No permanent stream impacts will occur and therefore no compensatory mitigation is proposed for Stream LC-D.

3.4.5. Streams LC-E and LC-G

Streams LC-E and LC-G are combined into the following section as a comprehensive approach to fish passage at the I-90/SR 18 Interchange was developed to address both streams.

Stream LC-E is a perennial stream that originates from ditched areas northwest of the I-90/SR 18 Interchange. It flows east toward southbound SR 18 through one culvert prior to turning south and flowing parallel to southbound SR 18, where it changes to a southerly direction and flows through two more culverts. From there, it drains south into Stream LC-G, which outlets to Lake Creek. Stream LC-E is considered to be potentially fish-bearing based on hydrologic connectivity with Lake Creek, and the stream meets the physical criteria for a fish-bearing stream but currently does not support fish use due to downstream barriers that prevent fish access.

Stream LC-G is a perennial fish-bearing stream that flows east to west along the north side of westbound I-90. The stream appears to originate from a high groundwater table that daylights within an excavated and channelized stream channel. Stream LC-G collects highway stormwater runoff and discharges from Wetland LC-12, then converges with Stream LC-F and turns to flow south through an outfall underneath I-90 and into Lake Creek. There are six culverts that are fish passage barriers along Stream LC-G due to a combination of slope, water surface drop, and velocity (WDFW 2018). The project includes replacing the six culverts with a realigned above-ground channel through most of the interchange and reducing the number of crossings to just two fish-passable culverts at the westbound I-90 off-ramp and eastbound I-90 on-ramp.

Fish Passage Impacts

Overall, functions lost from the permanent stream impacts would be more than compensated for on site, with the functional lift provided by the improvements to riparian and instream habitat, stream flow and water quality within the interchange. All impacts to Stream LC-E and a majority of impacts to Stream LC-G will result from work associated with the interchange fish passage design. As a result of this work, there will be permanent and temporary impacts to both Streams LC-E and LC-G. In coordination with state and tribal partners, a plan for fish passage work in the interchange was developed to improve overall fish habitat potential in the interchange. This plan includes diverting water from Stream LC-E to Stream LC-G in the interchange, and the Stream LC-E channel will be permanently filled and replaced with a non-fish bearing stormwater conveyance channel. As this will no longer be a stream channel, no stream buffer impacts will occur.

When considering permanent impacts and stream creation in Stream LC-E and LC-G, there is a net gain in stream area (sq ft) and a net loss of linear feet of stream channel. The historic location of any streams through what is now the I-90/SR 18 interchange is unknown, and the current alignments of both LC-E and LC-G are heavily affected by the highway and stormwater infrastructure of adjacent state, county and city facilities. The interchange stream design concept is intended to convey the same flows through the interchange with improved water quality and fish habitat from the existing condition. Stream LC-E is currently a degraded channel formed from roadway ditches that conveys untreated stormwater to Stream LC-G. This stream provides low functions for water quality and habitat. Current vegetation does not provide shading and water quality is poor because of stormwater inputs. Water quality will be improved because the road runoff associated with Stream LC-E will be treated prior to discharging into Stream LC-G. There is no current fish use in Stream LC-E, though it is categorized as a Type F stream. Though the conversion will result in a loss of streambed and associated habitat functions (including macroinvertebrate habitat and conveyance functions associated with the streambed), diverting Stream LC-E flows to Stream LC-G will enhance the hydrology and function of Stream LC-G. The functional gain provided by the work in the interchange would offset the net linear loss of poorly functioning stream channel, without additional compensatory mitigation required.

The project will improve water conveyance functions by replacing six culverts with a daylighted stream channel realignment and two culverts with a minimum span of 14 feet. The project will benefit water conveyance functions by returning the stream to a more natural hydrograph, with decreased flood risk and improved groundwater exchange. Where previously a trickle existed, the stream has a 17.6% projected mean percent increase in bankfull flow, and an 8.4% projected mean percent increase in bankfull width, by the 2040's. Through widening and deepening this channel, stream functions including temperature moderation, velocity variation, flood storage and flood control functions will be enhanced.

Existing habitat function is limited within the I-90/SR 18 interchange, as the stream's narrow width and poorly functioning buffer provide limited habitat for passerine birds, small mammals, and invertebrates. The project will result in improved fish passage and habitat functions, both instream and for the stream buffer and net functional benefit to the stream. Habitat function may be temporarily impacted by riparian vegetation removal within clearing and grubbing limits and streambed disturbance during the channel realignment. This will be balanced by restoring groundwater exchange through the hyporheic zone in the reconstructed streambed (providing

cool water inputs) as well as re-establishing native vegetation for overbank shading when construction is complete. Replacing the existing culverts with a daylighted streambed will increase habitat availability for fish and other aquatic organisms. Other streambed design elements that will provide enhanced habitat features include appropriately sized streambed sediment; added channel sinuosity; and a combination of boulder and large woody material structures interacting below the OHWM (WSDOT 2020a).

The estimated upstream habitat gain from the interchange streams includes a minimum of 1,720 linear feet of new habitat in the daylighted stream channel, in addition to newly-accessible habitat upstream of WDFW Barrier ID 943823.

Work at Stream LC-G will also result in permanent and temporary impacts to the stream buffer. A portion of the stream buffer will be converted to stream channel as part of the proposed fish passage correction and channel realignment. Temporary impacts from construction clearing and grubbing as well as temporary fill for stream diversion and equipment access will be restored following construction.

Transportation Impacts

A small area of permanent impacts to Stream LC-G are a result of clearing and grading to tie in the new channel with the existing channel that is tied to realignment of the I-90 off-ramp.

As a result of the fish passage barrier correction and realignment of Stream LC-G, there will be a net functional lift to aquatic resources in the interchange and therefore, additional compensatory mitigation is not proposed for impacts to this stream.

3.4.6. Stream LC-F

Stream LC-F is a non-fish-bearing tributary that flows into Stream LC-G, which outlets to Lake Creek. Stream LC-F enters the project area on the east side of northbound SR 18 and flows south, discharging through an outfall conveying stormwater underneath I-90 and draining to Stream LC-G.

Transportation Impacts

All impacts to Stream LC-F are a result of work other than (not associated with) fish passage. Realigning the I-90 westbound off-ramp is a necessary part of the interchange realignment and will result in permanent stream impacts from shifting the Stream LC-F channel to the east, piping a portion of the channel and adding rip-rap to the remainder of the new channel. Permanent and temporary impacts will occur to the stream buffer. In addition, a portion of the stream buffer will be permanently converted to new stream channel. Depending on final design and construction sequencing, a temporary stream bypass may be needed during construction, which would temporarily affect water conveyance functions.

Water conveyance functions will be maintained in the new configuration because the new stream channel has been modeled to provide appropriate bankfull width, slope, and streambed substrate. Stream LC-F will be re-aligned to the east for the proposed interchange configuration and rip-rap lined to reduce erosion and scour as required by the HRM. Although the proposed condition will degrade the quality of the streambed substrate, this channel is not fish-bearing, and the proposed change will improve water quality conditions downstream by removing an erosive source of sediment. Existing habitat function is limited, as the stream's narrow width and poorly functioning buffer provide limited habitat for passerine birds, small mammals, and invertebrates. Habitat function may be temporarily impacted by riparian vegetation removal

within clearing and grubbing limits and streambed disturbance during the realignment. The final stream channel configuration will provide equivalent or better buffer habitat function when native plantings are established. The project will result in permanent impacts to in-stream macroinvertebrate communities since the stream channel will be riprapped and a portion of the stream will be piped. While there is no net loss of waters, compensatory mitigation is proposed for permanent change to stream functions.

3.4.7. Stream LC-H

Stream LC-H is a seasonal stream presumed to be potentially accessible fish habitat. The stream enters the project area from its northeastern extent and flows west alongside I-90 in a ditched channel. It drains to Stream LC-G, which then flows to Lake Creek.

Transportation Impacts

All impacts to Stream LC-H will result from work other than (not associated with) fish passage. Stream LC-H will be shifted to the north as part of roadway widening needed for the proposed interchange reconfiguration. The project will result in permanent and temporary impacts to Stream LC-H and the stream buffer. A portion of the stream buffer will be permanently converted to stream area. Temporary impacts will occur due to vegetation clearing and grubbing to allow equipment access as well as for temporary fill if a stream diversion is needed.

The project will convert a portion of the existing adjacent riparian buffer to create a new stream channel of equivalent width or greater that will follow the same drainage pattern. There is no anticipated change to the volume or velocity of water conveyed by Stream LC-H. Habitat function may be temporarily impacted by riparian vegetation removal within clearing and grubbing limits and streambed disturbance during the channel realignment. Overall habitat function in the final configuration is anticipated to be equivalent or better than at present when the realigned streambed is installed and restoration plantings establish.

As there will be no loss of stream function and no loss of waters, compensatory mitigation is not proposed for Stream LC-H. All temporary impacts will be restored.

3.4.8. Stream LC-I

Stream LC-I is a seasonal stream that forms from a combination of high groundwater table and stormwater discharges south and east of the I-90/SR 18 interchange.

Transportation Impacts

All impacts to Stream LC-I will result from work other than (not associated with) fish passage. The project will result in permanent stream impacts from SR 18 widening and grading for a proposed stormwater detention pond. Temporary stream impacts will occur due to clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion, if needed. The project will result in permanent and temporary impacts to the stream buffer. A portion of the stream buffer will be permanently converted to stream area.

The project will result in an overall loss of streambed at this location. However, the loss will be relatively minor and is not anticipated to affect existing water conveyance functions. The proposed stormwater treatment in the area will improve overall water quality function within the remaining channel. In addition, a hydroperiod analysis was conducted to verify that stormwater changes would not significantly impact hydrology of this stream system. The decrease in available streambed is not anticipated to measurably affect in-stream aquatic communities

because the permanent impact will be minor. Other habitat functions and processes will also be temporarily impacted during streambed disturbance and riparian vegetation disturbance activities but will be restored following construction.

As a result of the net loss of waters proposed, compensatory mitigation is proposed for the permanent loss of waters at Stream LC-I.

3.4.9. Stream LC-J

Stream LC-J is a seasonal stream that originates southwest from the SE 104th Street junction with SR 18 and drains southward almost immediately into Lake Creek. Impacts to Stream LC-J will result from both fish passage work and work not associated with fish passage.

Transportation Impacts

The project will result in permanent and temporary impacts to the stream and permanent impacts to the stream buffer. Permanent impacts will result from widening of SR 18 and a portion of the permanent impacts will result from channel regrading for the Lake Creek fish passage barrier correction. Temporary impacts to the stream will occur due to clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion.

The project will not result in a loss of water or a change to water conveyance stream functions. The project will provide minor improvements to habitat connectivity and function by regrading Stream LC-J for an improved connection to Lake Creek and restoring the streambed with appropriately sized streambed mix. Overall, there will be a net linear gain and increase in stream area at LC-J due to the realignment.

Since there is not a net loss of channel or loss of waters at Steam LC-J, compensatory mitigation is not proposed.

Fish Passage Impacts

A portion of the temporary stream impacts are a result of fish passage work at Stream LC-J to improve the connection with Lake Creek. Temporary impacts will be restored on site.

3.4.10. Raging River/Stream RR-A

The Raging River (WRIA ID #07-0384), which flows generally east to west, crosses under SR 18 approximately 1.5 miles south of the I-90/SR 18 interchange at approximately River Mile 7.9.

Transportation Impacts

The project will have no permanent or temporary impacts to the stream channel. A new bridge will be constructed to accommodate the additional two lanes of traffic along SR 18 but due to the height of the bridge at this location, this is not expected to have any measureable impact on stream functions due to shading or overwater structure that would result from the additional lanes. However, the project will result in permanent and temporary impacts to the stream buffer associated with work other than (not associated with) fish passage. If a temporary work trestle is used to span the river during construction of the proposed Raging River Bridge, all trestle footings will be located landward of the OHWM. The project will result in minor permanent and temporary impacts to the stream buffer associated with construction access for the bridge.

The project will not directly impact water conveyance, water quality, or habitat stream functions. The riparian buffer does not contain trees near the SR 18 crossing because these trees were already removed to provide clearance for high-voltage power lines in the area. The riparian

vegetation to be disturbed consists of Himalayan blackberry and low-growing shrubs and grasses, which provide some water quality filtration and stormwater runoff functions but limited shading and other habitat function. Riparian vegetation removal might temporarily impact these functions during project construction. These impacts will be controlled with best management practices and restored following establishment of stream buffer plantings. Minor habitat functional lift is also anticipated through the replacement of Himalayan blackberry and other invasive species with native woody vegetation following construction.

3.4.11. Stream RR-B

Stream RR-B is an ephemeral stream originating from Wetland RR-04. It flows west toward SR 18, then combines with a ditch conveyance feature at the base of slope adjacent to SR 18 eastbound lanes. From there it flows south to just north of the Raging River bridge, where it sheet-flows into the Raging River over a vegetated area with no defined channel connection.

Transportation Impacts

The project will permanently and temporarily impact the stream and stream buffer as a result of roadway widening, stormwater treatment improvements (media filter drains), culvert extension, and a new catch basin, not associated with fish passage work. A portion of Stream RR-B will be permanently filled to construct the new Raging River bridge. Temporary impacts will occur due to clearing and grubbing of vegetation to allow equipment access for installation of stormwater improvements (media filter drains) along SR 18.

The project will have impacts on water conveyance due to filling a portion of the stream channel. Water is still expected to sheet flow into Raging River but at a different location.

The existing riparian vegetation has diminished quality due to maintenance clearing for the overhead power lines along much of the lower reach. Therefore, the existing riparian vegetation does not provide shading, and its removal will have no net impact on Stream RR-B water temperature or associated habitat function. Temporarily impacted areas will be revegetated with native woody vegetation after construction is complete. Impacts are not likely to affect downstream waters because Stream RR-B is providing low habitat functions and is not expected to change as a result of project impacts. In addition, media filter drains are proposed further upstream to improve water quality in Stream RR-B and the Raging River.

Due to the linear loss of stream channel, compensatory mitigation is proposed for permanent impacts to Stream RR-B.

3.4.12. Stream RR-C

Stream RR-C is a seasonal fish-bearing stream east of SR 18 and south of Raging River. Stream RR-C receives flow from Stream RR-D and outfalls to the Raging River.

Transportation Impacts

Due to existing flooding problems at this location, the project will replace the culvert between Streams RR-C and RR-D with a rip-rap lined channel. Minor temporary impacts will occur in Stream RR-C due to clearing and grubbing of vegetation to allow equipment access. However, the stream will not be permanently impacted by the project. No stream buffer impacts will occur. All impacts to Stream RR-C will result from work other than (not associated with) fish passage.

The existing channel is lined with erosion control material and Stream RR-C provides little habitat. Project impacts may temporarily affect habitat conditions, but the stream will be restored

immediately following construction. Impacts are not likely to affect downstream waters because Stream RR-C is providing low habitat functions and is not expected to change as a result of project impacts.

3.4.13. Stream RR-D

Stream RR-D is a 2- to 3-foot-wide seasonal non-fish bearing stream originating from wetlands and tributaries uphill and east of SR 18. The stream has been channelized to convey hillside flow in its upper reaches, and to convey stormwater where it is a channelized ditch along SR 18. Stream RR-D flows north to a perched culvert that discharges on the hillside to form Stream RR-C.

Transportation Impacts

All impacts to Stream RR-D will result from work other than (not associated with) fish passage. The project will result in permanent and temporary impacts to the stream and the stream buffer due to roadway widening and stormwater treatment improvements. A portion of the stream buffer will be permanently converted to stream. Most of Stream RR-D will be permanently filled for slope stabilization measures, and the remaining stream will be relocated to a new channel east of SR 18. If water is flowing at the time of construction, a temporary stream diversion may be installed which would temporarily impact all stream functions.

The new channel will receive the same hydrologic input from water flowing from the adjacent slope as sheet flow so there will be no change to water quantity as a result of the slope stabilization. Media filter drains will be installed between the SR 18 roadway and Stream RR-D to provide enhanced stormwater treatment. This will direct stormwater runoff away from Stream RR-D, and the treated water will discharge to Stream RR-C.

Stream RR-D currently lacks habitat features, and the bed is mostly silt. The new channel will be 3 feet wide and lined with grass. This will provide some additional water quality improvements and could trap sediment from hillside runoff. Though the new channel will be shorter and will result in a loss in linear feet of stream habitat, the grass-lined channel and proposed stormwater improvements will increase habitat conditions in the remaining stream channel. Impacts are not likely to affect downstream waters because Stream RR-D is providing low habitat functions and is not expected to change as a result of project impacts. After construction is complete, the media filter drain area west of the stream will be seeded with grass. The hillside east of the stream channel will be planted with native trees and shrubs to provide future shade, woody debris recruitment, and leaf litter to Stream RR-D.

While there will be a linear loss of stream channel, overall functions of the stream will be maintained and there will be a net increase in square footage of stream channel so additional compensatory mitigation is not proposed. Temporarily impacted areas will be restored.

3.4.14. Deep Creek/Stream DC-A

Deep Creek (WRIA ID #07-0396) is a designated shoreline and perennial tributary to the Raging River that originates from the north slopes of Taylor Mountain. Within the project area, it flows southeast to northwest under SR 18 MP 25.69 through a 12-foot-wide, 264-foot-long corrugated steel culvert that is considered a barrier to fish passage because of slope.

Fish Passage Impacts

The project proposes to replace the culvert with a bridge over Deep Creek. The new bridge will be approximately 400 feet long and 79 feet wide to accommodate three travel lanes and shoulders. The bridge will be approximately 65 feet above the new stream channel, which will be constructed below the bridge along with a new floodplain.

Stream realignment and removal of the existing culvert will result in permanent and temporary stream impacts. A temporary stream diversion will be installed prior to removing the culvert and finalizing construction of the new stream channel alignment. Temporary impacts will occur within the construction clearing and grubbing limits along the stream channel where it crosses under SR 18 and will consist of vegetation removal to allow equipment access as well as temporary fill for stream diversion. No impacts will occur to stream buffers. Most of the bridge construction, roadway fill removal, and new stream channel will be completed in the dry because work will occur around the stream, which will be contained in the existing culvert. The project will improve water conveyance functions by replacing an undersized culvert with a fish-passable bridge. It will benefit water conveyance functions by returning to a more natural hydrograph, decreasing flood risk, and improving groundwater exchange.

Replacing the existing culvert with a fish passable bridge will restore the in-stream habitat at the stream crossing as well as access to 11,080 linear feet of potential upstream habitat (Heilman et al. 2019). The proposed design will include large woody material (LWM) and other habitat features to provide habitat enhancement and stability. In-stream invertebrate/resident fish habitat and adjacent riparian vegetation will be temporarily impacted during construction but will be restored to pre-project conditions or better after construction is complete

Transportation Impacts

The bridge will be wider to accommodate the additional two lanes of traffic along SR 18 but due to the height of the bridge at this location, this is not expected to have any measureable impact on stream functions due to shading or overwater structure that would result from the additional lanes. All other impacts to Deep Creek will result from fish passage barrier correction work discussed above.

3.4.15. Stream DC-C

Stream DC-C is a seasonal non fish-bearing stream originating from Wetland DC-06. The stream parallels westbound SR 18, flowing north down a moderate to steep slope before discharging into Wetland DC-03 at the base of the road fill prism and eventually draining to Deep Creek.

Transportation Impacts

All impacts to Stream DC-C will result from work other than (not associated with) fish passage. The project will permanently and temporarily impact Stream DC-C. Stream DC-C will be relocated to the west and realigned to accommodate the SR 18 roadway expansion/realignment and bridge construction over Deep Creek. Due to the steep topography in this location, most of the realigned stream channel will be riprapped to reduce velocity and minimize the potential for erosion. Temporary impacts will also occur due to clearing and grubbing of vegetation to allow equipment access. No impacts to stream buffer will occur. If water is flowing at the time of construction, a temporary stream diversion may be installed.

Although the project will realign Stream DC-C, its overall water conveyance stream functions will be maintained in the new configuration. The project will likely have no measurable increase in untreated stormwater or contaminants post-construction. Removal of existing vegetation that currently provides shading adjacent to the stream may result in a temporary increase in water temperature until restoration plantings establish. However, this will likely be alleviated by cool groundwater exchange through the hyporheic zone, fed in part by adjacent wetlands. Stream DC-C provides poor habitat and the channel is lined with geotextile fabric, is incised at the outlet, and is seasonal in nature. The project will result in permanent impacts to in-stream macroinvertebrate communities since the stream channel will be riprapped. Impacts are not likely to affect downstream waters because Stream DC-C is providing low habitat functions and is not expected to change as a result of project impacts.

As a result of minor changes to stream functions, compensatory mitigation is proposed for Stream DC-C. Temporarily impacted areas will be restored.

3.4.16. Stream DC-D

Stream DC-D is a perennial fish-bearing stream that originates in Wetland DC-01 at the base of the slope on the south side of SR 18 and discharges to Deep Creek approximately 75 linear feet upstream of the existing Deep Creek culverts.

Fish Passage Impacts

All impacts to Stream DC-D will result from fish passage barrier correction work. The project will result in permanent and temporary stream impacts. Stream DC-D will be regraded and realigned to tie into the new Deep Creek channel, which will result in permanent stream impacts. Temporary impacts will occur due to clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion.

The project will temporarily impact all stream functions to some extent when the stream is diverted into a pipe during construction. Although the project will realign Stream DC-D, its overall water conveyance stream functions will be maintained in the new configuration because the new stream channel has been modeled to provide appropriate bankfull width, slope, and streambed substrate.

The project will result in temporary impacts to in-stream macroinvertebrate communities and riparian vegetation; however, they are anticipated to recover to existing levels of function or better post-construction, based on proposed stream design.

As the work at Stream DC-D is related to fish passage barrier correction, will provide improved aquatic resources functions and will not result in a loss of waters, compensatory mitigation is not proposed for Stream DC-D. Temporarily impacted areas will be restored.

3.4.17. Stream DC-E

Stream DC-E is a seasonal tributary to Deep Creek originating from roadway runoff and Wetland DC-06, east of SR 18. It flows south, parallel to eastbound SR 18, and empties into Deep Creek just upstream of the Deep Creek culvert under SR 18. A portion of the stream flows under an access road and is contained within an approximate 18-inch-diameter corrugated metal pipe culvert. Impacts to Stream DC-E will result from both fish passage work and work not associated with fish passage.

Transportation Impacts

The project will permanently and temporarily impact Stream DC-E but will result in no net loss of waters. Due to roadway widening, the stream channel will be realigned to the east. If water is flowing at the time of construction, a temporary stream diversion may be installed which would temporarily impact all stream functions. Permanent and temporary stream buffer impacts will occur. Temporary stream buffer impacts will result from clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion. A portion of the stream buffer will be permanently converted to stream area with the realignment.

Although the project will realign Stream DC-E, its overall water conveyance stream functions will be maintained in the new configuration because the new stream channel has been modeled to provide appropriate bankfull width, slope, and streambed substrate. The project will result in stormwater improvements to Stream DC-E and will likely have no measurable increase in untreated stormwater or contaminants post-construction. Removal of existing vegetation that currently provides shading adjacent to the stream may result in a temporary increase in water temperature until restoration plantings establish. However, this will likely be alleviated by cool groundwater exchange through the hyporheic zone, fed in part by adjacent wetlands. The project will result in temporary impacts to riparian vegetation and to in-stream macroinvertebrate communities. They are anticipated to recover to existing levels of function or better post-construction, based on proposed stream and restoration design.

Fish Passage Impacts

The project will result in permanent and temporary impacts to Stream DC-E due to the stream channel realignment. Stream DC-E will be regraded and realigned to tie into the new Deep Creek channel, which will result in permanent stream impacts. Temporary impacts will occur due to clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion.

The project will result in temporary impacts to in-stream macroinvertebrate communities and riparian vegetation; however, they are anticipated to recover to existing levels of function or better post-construction, based on proposed stream design.

3.4.18. Stream DC-F

Stream DC-F receives seasonal flows from Wetland DC-07 and roadway runoff from SR 18. The stream flows north, parallel to westbound SR 18, and then flows east through a culvert under SR 18. Stream DC-F then enters Wetland DC-08 and is assumed to flow into Deep Creek outside of the project area.

Transportation Impacts

All impacts to Stream DC-F will result from work other than (not associated with) fish passage. The project will result in permanent and temporary impacts to the stream and stream buffer due to roadway widening. A portion of the stream buffer will be permanently converted to stream area. The stream channel will be realigned, and the existing culvert will be extended to accommodate roadway widening, which will result in permanent impacts. In addition, most of the realigned stream channel will be riprapped to reduce velocity and minimize the potential for erosion. Temporary impacts will result from clearing and grubbing of vegetation to allow equipment access as well as temporary fill for stream diversion.

The project is not likely to have permanent impacts to water conveyance stream functions. The project will convert a portion of the adjacent riparian buffer to create a new stream channel of equivalent width or greater that will follow the same drainage pattern. The project will likely have no net change in untreated stormwater or contaminants post-construction. The project will result in permanent impacts to in-stream macroinvertebrate communities because the stream channel will be riprapped. Impacts are not likely to affect downstream waters because Stream DC-F is providing low habitat functions and is not expected to change as a result of project impacts.

Due to the permanent impacts to the in-stream habitat functions, compensatory mitigation is proposed for Stream DC-F.

3.5. Habitat Conservation Areas

A desktop analysis was performed to determine the potential presence of species listed under KCC 21A.24.382 Wildlife habitat conservation areas – development standards. The analysis included reviewing Priority Habitats and Species (PHS) data, aerial photographs, published literature, prior field studies conducted by WSDOT, documents related to listed species (i.e., biological assessment and biological opinions), and other documents prepared for the project. Results of the analysis for each of the nine species listed in KCC 21A.24.382 within proximity to the shoreline zones are presented below:

3.5.1. Bald Eagle

There are no Bald Eagle (*Haliaeetus leucocephalus*) nests within 800 feet of the project. Neither WSDOT GIS data nor WDFW Priority Habitat and Species (PHS) data (WDFW 2022a) identified any nests within one mile of project activities (WSDOT 2020b). A WSDOT project biologist visited the project area on March 23, 2020, and did not observe any nests (WSDOT 2020b).

3.5.2. Great Blue Heron

There are no Great Blue Heron (*Ardea herodias*) rookeries within 1,000 feet of the project. No rookeries were identified in the PHS data. Known rookeries are in the western part of King County near Puget Sound, Lake Washington, and Lake Sammamish (Stabins et al. 2006). Rookeries are typically near high-quality foraging habitat, which includes estuarine and freshwater wetlands, slow-moving rivers, sloughs, and lakes (Gibbs 1991, Kelly et al. 2009, Machmer 2009, Azerrad 2012). Both Raging River and Deep Creek are fast-moving waters. Wetlands are present near both streams, but they tend to be small and/or forested, which limits their use by Great Blue Herons for foraging. Of the over 2,000 observations of Great Blue Heron in King County reported to iNaturalist, no observations were reported near the project area (iNaturalist 2022). The nearest observation was at a pond several miles north of the project in the city of Snoqualmie. Given the limited availability of suitable foraging habitat at Raging River and Deep Creek, the presence of a Great Blue Heron rookery near the project is highly unlikely.

3.5.3. Marbled Murrelet

There are no documented Marbled Murrelet (*Brachyramphus marmoratus*) nests within a half mile of the project. The most prominent land use surrounding the project is timber harvest, so the landscape is dominated by large stands of early seral stage trees (WSDOT 2019). Nonetheless, patches of larger trees are present that provide potentially suitable habitat for the Marbled Murrelet (WSDOT 2019). Most of the potentially suitable habitat is considered marginally suitable, but a small area of moderately high to highly suitable habitat is present northwest of the existing bridge over Raging River (WSDOT 2019). Protocol surveys of

potentially suitable habitat were performed in 2019 and 2020 but no Marbled Murrelets were detected (Parametrix 2020).

3.5.4. Northern Goshawk

There are no Northern Goshawk (*Accipiter gentilis*) nests known to occur near the project. No Northern Goshawk nests were identified in the PHS data (WDFW 2022). Northern Goshawk nesting is typically associated with older forest stands with dense large trees and high canopy closure for nesting (Shuster 1980, Reynolds et al. 1982, Moore and Henny 1983, Hall 1984, Crocker-Bedford and Chaney 1988, Hayward and Escano 1989, Daw 1996). The most prominent land use surrounding the project is timber harvest, so the landscape is dominated by large stands of early seral stage trees (WSDOT 2019). Nonetheless, patches of larger trees are present near Raging River and Deep Creek (WSDOT 2019). Although, studies have shown that across its range the Northern Goshawk uses a wide variety of habitat types (Reynolds et al. 2008), in Washington nesting occurs almost exclusively in late seral stage coniferous forest (WDFW 2020b). In addition, Northern Goshawks in King County are uncommon. Only four observations of Northern Goshawks in King County have been reported to iNaturalist compared to almost 500 observations of Cooper's Hawk (*Accipiter cooperii*) and Sharp-shinned Hawk (*Accipiter striatus*), the other forest accipiters or true hawks found in Washington (iNaturalist 2022). None of the observations of Northern Goshawks in King County were near the project area (iNaturalist 2022). Most of the reported observations in Washington are from eastern Washington or the Okanogan National Forest well north of the project (iNaturalist 2022).

3.5.5. Osprey

There are no Osprey (*Pandion haliaetus*) nests known to occur near the project. No Osprey nests were identified in the PHS data (WDFW 2022b). Almost 500 observations of Ospreys have been reported in King County to iNaturalist, but no Ospreys have been observed near the project area (iNaturalist 2022). The nearest observation was over 4 miles away along the Snoqualmie River. Ospreys feed almost exclusively on fish and typically forage in large waterbodies, such as lakes, reservoirs, estuaries, and large, slow-moving rivers (Ueoka and Koplin 1973, Harmata et al. 2007). Given the relatively small size of Raging River and Deep Creek, these streams are not expected to provide good foraging habitat for Ospreys. Therefore, nesting by Ospreys near the project is unlikely, even if suitable trees are present.

3.5.6. Peregrine Falcon

There are no Peregrine Falcon (*Falco peregrinus*) nests known to occur near the project. No Peregrine Falcon nests were identified in the PHS data (WDFW 2022a). Peregrine Falcons typically nest on cliffs near water (WDFW 2022c). Twenty-six observations of Peregrine Falcons in King County have been reported to iNaturalist, but no Peregrine Falcons have been observed near the project area (iNaturalist 2022). The nearest observation was over 4 miles away along the Snoqualmie River where cliff habitat is present. Given the lack of cliff habitat in the vicinity of the project, Peregrine Falcons are not expected to be present.

3.5.7. Spotted Owl

There are no known Spotted Owl (*Strix occidentalis*) nests near the project and nesting is unlikely to occur. The biological assessment prepared for the project concluded that small patches of suitable habitat exist within the project action area; however, those patches are too small to support resident, territorial pairs and nesting (WSDOT 2019). The project action area is

in the Western Washington Lowlands province, which covers the low-elevation lands adjacent to Puget Sound and encompasses the Interstate-5 corridor south to the Columbia River and the southwestern Washington timber-production lands (WSDOT 2019). Most of the forestland in the province has been intensively managed for timber production (WSDOT 2019). Based on the condition of forestland at the site and within the Western Washington Lowlands, the US Fish and Wildlife Service (USFWS) issued a concurrence on May 19, 2020, and concluded that potential effects to nesting spotted owls due to disturbance and vegetation removal from construction activities is discountable (USFWS 2020).

3.5.8. Townsend's BigEeared Bat

No active nursery colonies, roosting areas, or winter hibernacula for the Townsend's big-eared bat (*Corynorhinus townsendii*) were identified in the PHS data (WDFW 2022a). There are no caves, mines, buildings, or tunnels in the vicinity of the project that could be used for roosting or hibernating. The only structure in the vicinity of Raging River and Deep Creek is the bridge over Raging River. Townsend's big-eared bats have a strong preference for caves or cave-like roosting habitat (Pierson et al. 1999). Cave-like environments can include mines, building attics, and other structures. An examination by Sherwin et al. (2000) of 820 potential roosting sites in Utah, determined that none of the 105 bridges examined were used by Townsend's big-eared bats for day roosting. Although more than 80% of the sites examined by Sherwin et al. (2000) were mines and less than 5% were caves, 85% of the day roosting occurred in caves and only about 21% occurred in mines. Given the absence of caves or cave-like environments in the project area and vicinity, Townsend's big-eared bats are not expected to be present in or near the project area.

3.5.9. Vaux's Swift

There are no Vaux's Swift (*Chaetura vauxi*) nests known to occur near the project. No Vaux's Swift nests were identified in the PHS data (WDFW 2022a). Nest sites for Vaux's Swifts are strongly correlated with old-growth coniferous forest (Manuwal and Huff 1987, Bull and Cooper 1991, Bull and Hohmann 1993). The most prominent land use surrounding the project is timber harvest, so the landscape is dominated by large stands of early seral stage trees (WSDOT 2019b). Nonetheless, patches of larger trees are present near Raging River and Deep Creek (WSDOT 2019). Sixteen observations of Vaux's Swifts have been reported to iNaturalist but none near the project area (iNaturalist 2022). The nearest observation was almost 10 miles away at Lake Sammamish State Park.

3.5.10. Wildlife Summary

No nests, rookeries, nursery colonies, roosting areas, or winter hibernacula for the regulated species were identified in the project area. While areas of suitable habitat may be present within the County's limits for these species, effects on these species are expected to be limited because work will occur within and along the existing right-of-way for SR 18. Potential impacts to federally regulated species, including species protected under the Endangered Species Act, have been fully addressed by WSDOT. Field studies will be conducted later to assist in verifying species presence within the vicinity of the project. Results of these field studies will be provided in future permit submittals.

3.6. Geotechnical Critical Areas

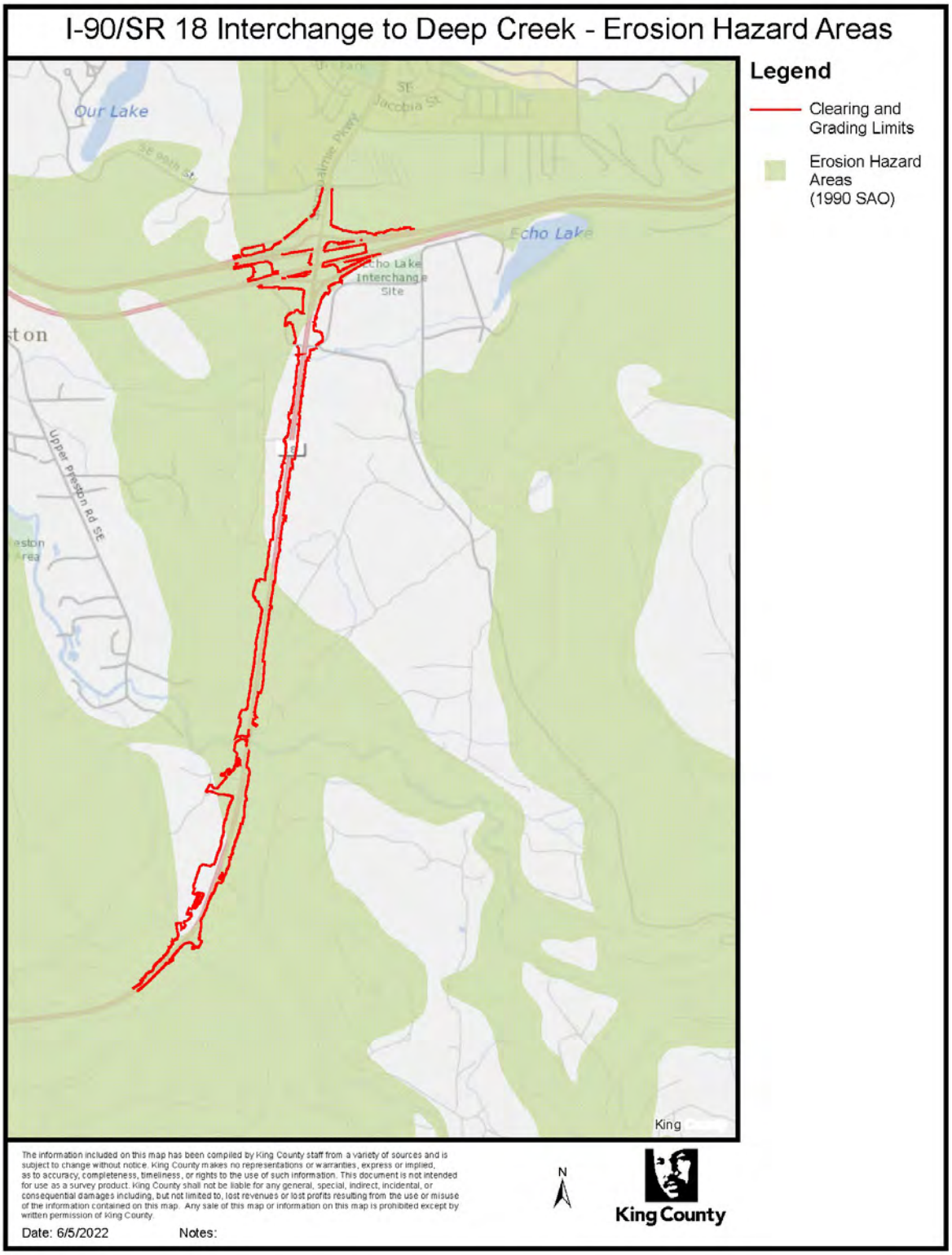
WSDOT conducted several studies to assess the existing geotechnical conditions at the project site and provided geotechnical recommendations for the project. These studies include:

- The Final - Geotechnical Baseline Report I-90/SR18 I/C to Deep Creek - Interchange Improvements & Widening XL-5557 (WSDOT 2021c)
- I-90_SR18 Final Historical Data Report Washington State Department of Transportation I-90/SR 18 I/C to Deep Creek – Interchange Improvements & Widening (Jacobs 2020)
- I-90/SR 18 Interchange to Deep Creek Interchange Improvements and Widening (XL-5557) WSDOT NW Region FINAL Geotechnical Data Report R2 (Jacobs 2021a)
- I-90/SR 18 Interchange Improvements Final – Conceptual Geotechnical Design Recommendations (Jacobs 2021b)
- Additional studies to collect more design-specific information will be conducted in 2022, pending approval of permits from King County.

3.6.1. Erosion Hazard Areas

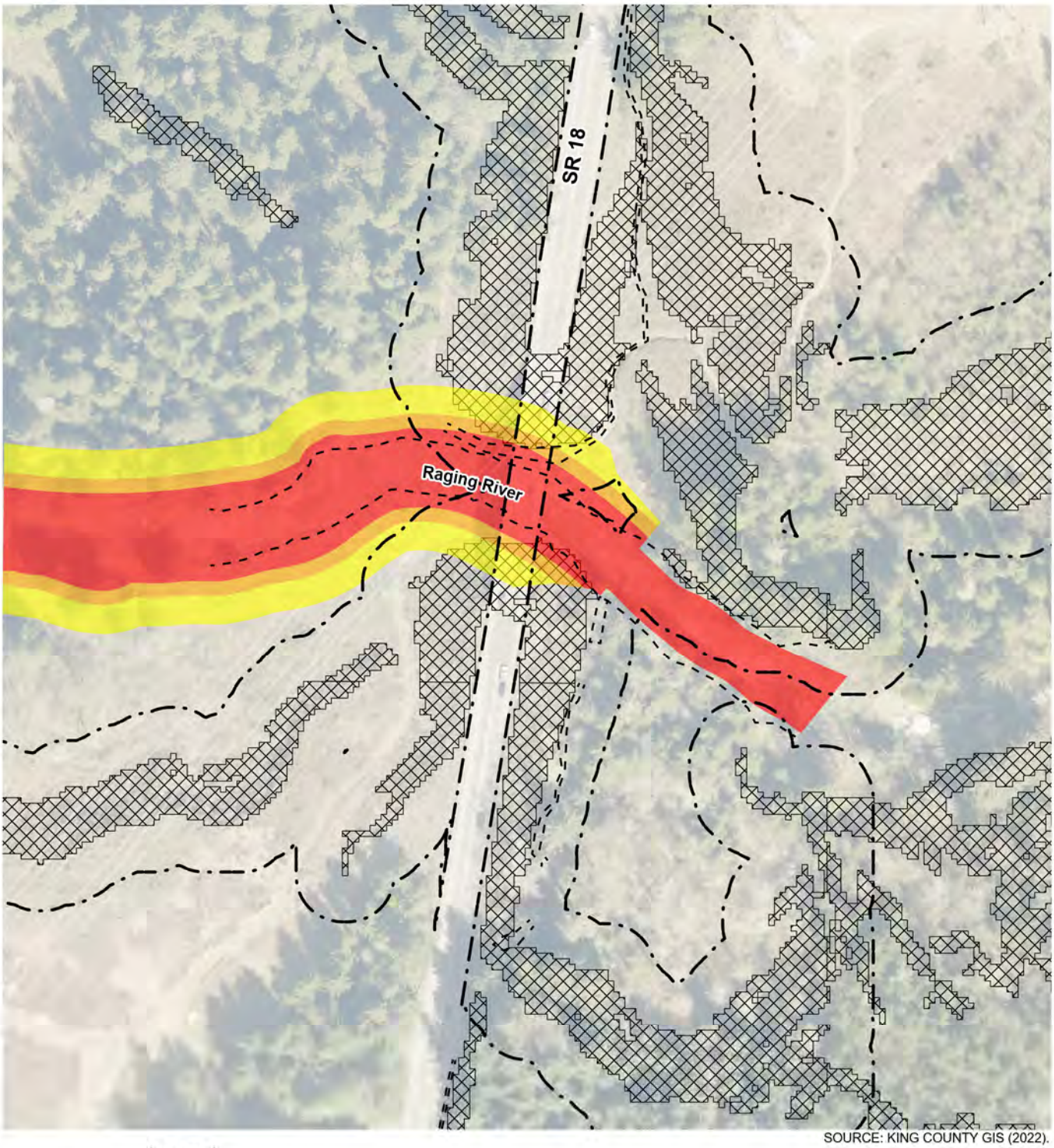
- King County iMap identifies much of the project area as potential erosion hazard area (Figure 3).

.Figure 3. King County Erosion Hazard Areas.



3.6.2. Steep Slope Hazard Areas

- King County iMap identifies several areas of regulated steep slopes within the project area as potential erosion hazard area. Naturally occurring steep slopes are found on the valley walls near Raging River and Deep Creek. Artificial steep slopes are located along portions of the SR 18 corridor and near I-90 where steep slopes were constructed as part of the roadway improvements. These steep slopes serve to limit the area of impacted from the roadway and are considered part of the WSDOT facility. All slopes meeting the King County definition of regulated steep slopes are shown in Figures 4A and 4B (see below). Note that regulated steep slopes have a 50-foot buffer.



SOURCE: KING COUNTY GIS (2022).

Legend

- Delineated OHWL
- Steep Slopes
- 50 ft Steep Slope Buffer
- King County Low Hazard Migration
- King County Moderate Hazard Migration
- King County Severe Hazard Migration

SCALE: 1" = 160' (8.5X11 SHEET)

0' 80' 160' 320'

PREPARED FOR: STANTEC ARCHITECTURE.

PBS

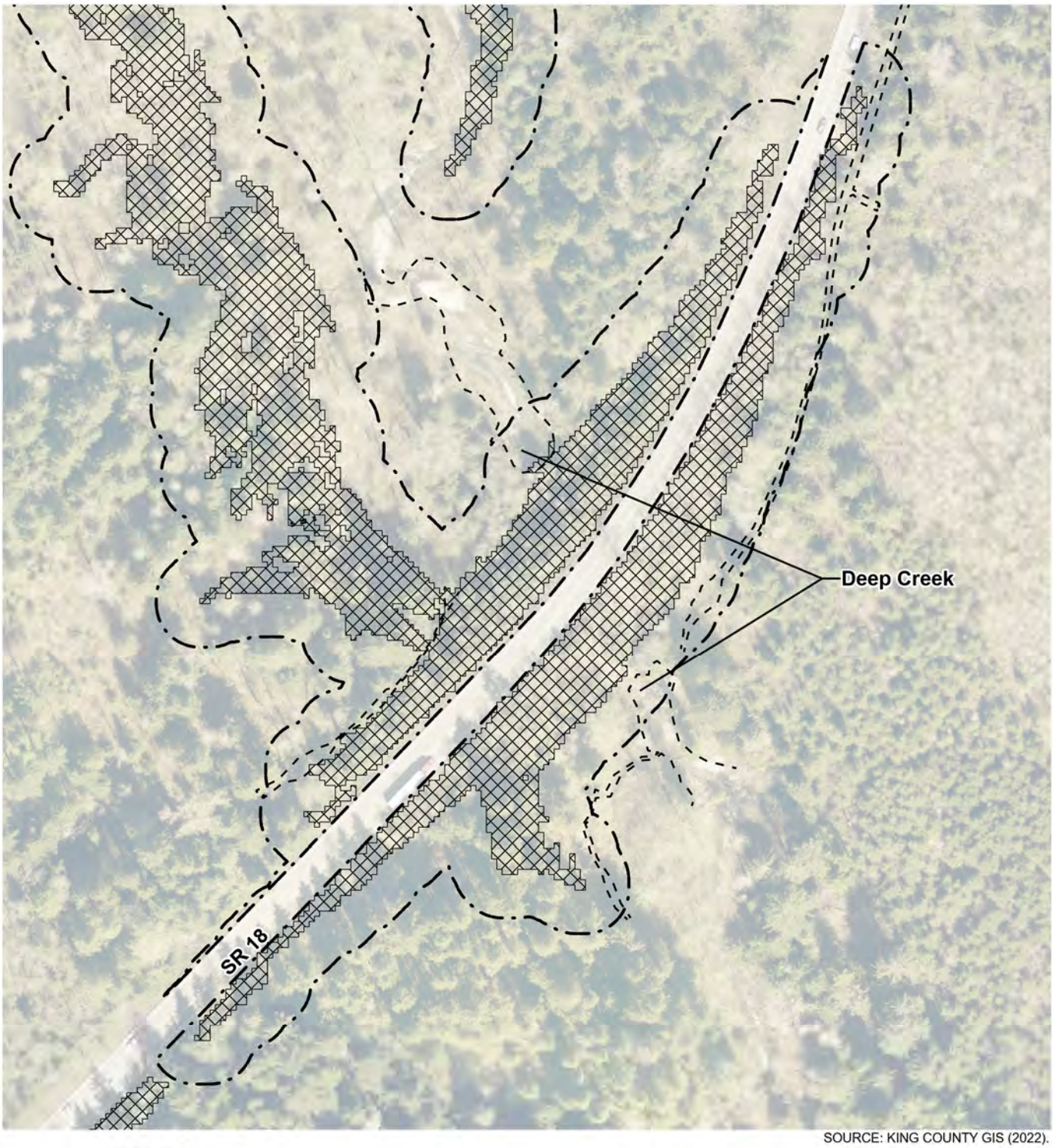
STEEP SLOPES & CHANNEL MIGRATION ZONES

I-90/SR 18 I/C TO DEEP CREEK INTERCHANGE IMPROVEMENT & WIDENING
KING COUNTY, WASHINGTON

JUN 2022
45039.002

FIGURE
4A

Filename: L:\Projects\45000\45039\45039-002\NR\GIS\APRX\190_SR18_ShorelineDesignation\190_SR18_ShorelineDesignation.aprx Plot Date/Time: 6/6/2022 10:12 AM



SOURCE: KING COUNTY GIS (2022).

Legend

- Delineated OHWL
- Steep Slopes
- 50 ft Steep Slope Buffer

SCALE: 1" = 170' (8.5X11 SHEET)

0' 85' 170' 340'

PREPARED FOR: STANTEC ARCHITECTURE.

PBS

STEEP SLOPES & CHANNEL MIGRATION ZONES

I-90/SR 18 I/C TO DEEP CREEK INTERCHANGE IMPROVEMENT & WIDENING
KING COUNTY, WASHINGTON

JUN 2022
45039.002

FIGURE
4B

Filename: L:\Projects\45000\45039\45039-002\NR\GIS\APRX\190_SR18_ShorelineDesignation\190_SR18_ShorelineDesignation.aprx Plot Date/Time: 6/6/2022 10:11 AM

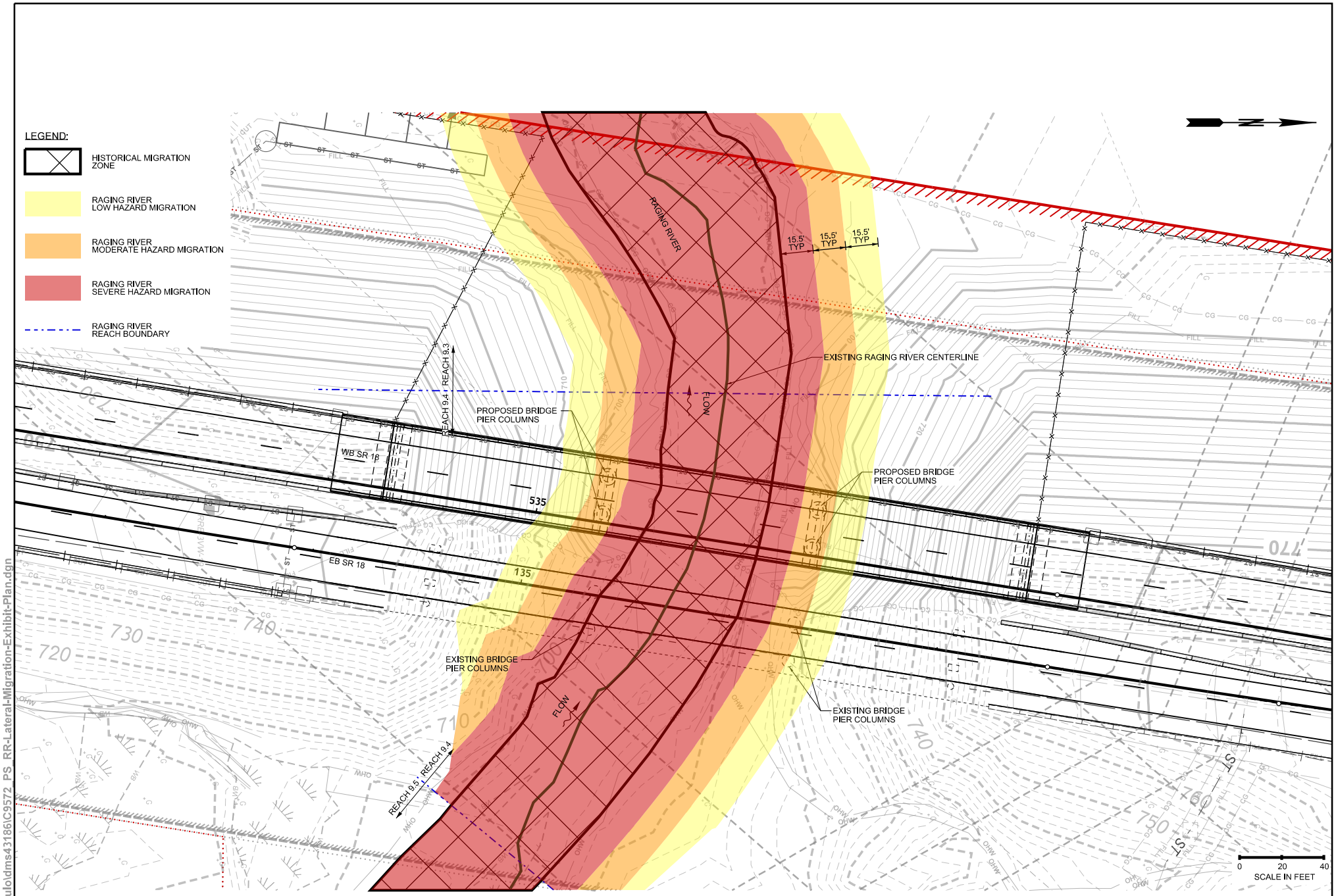
3.6.3. Wetland and Aquatic Area Buffer Extensions

Th applicant is aware that regulated buffers for wetlands or aquatic areas that include steep slope or landslide area are extended to the limits of the wetland or stream buffer or the top of the steep slope or landslide hazard area, whichever is greater.

3.6.4. Channel Migration Zones

King County iMap identifies a channel migration zone on Raging River to the west of SR 18. The County does not identify a channel migration zone for Deep Creek. We understand that the County's mapping of these features reflects limited data availability for these areas.

The project design-build team is conducting more detailed studies to support development of the designs for the bridges at Raging River and Deep Creek. Preliminary drawings reflecting these more detailed channel migration zones are provided below (Figures 5A and 5B).



c:\pw_workinglinfra03\pauloldms43186\C9572_PS_RR-Lateral-Migration-Exhibit-Plan.dgn

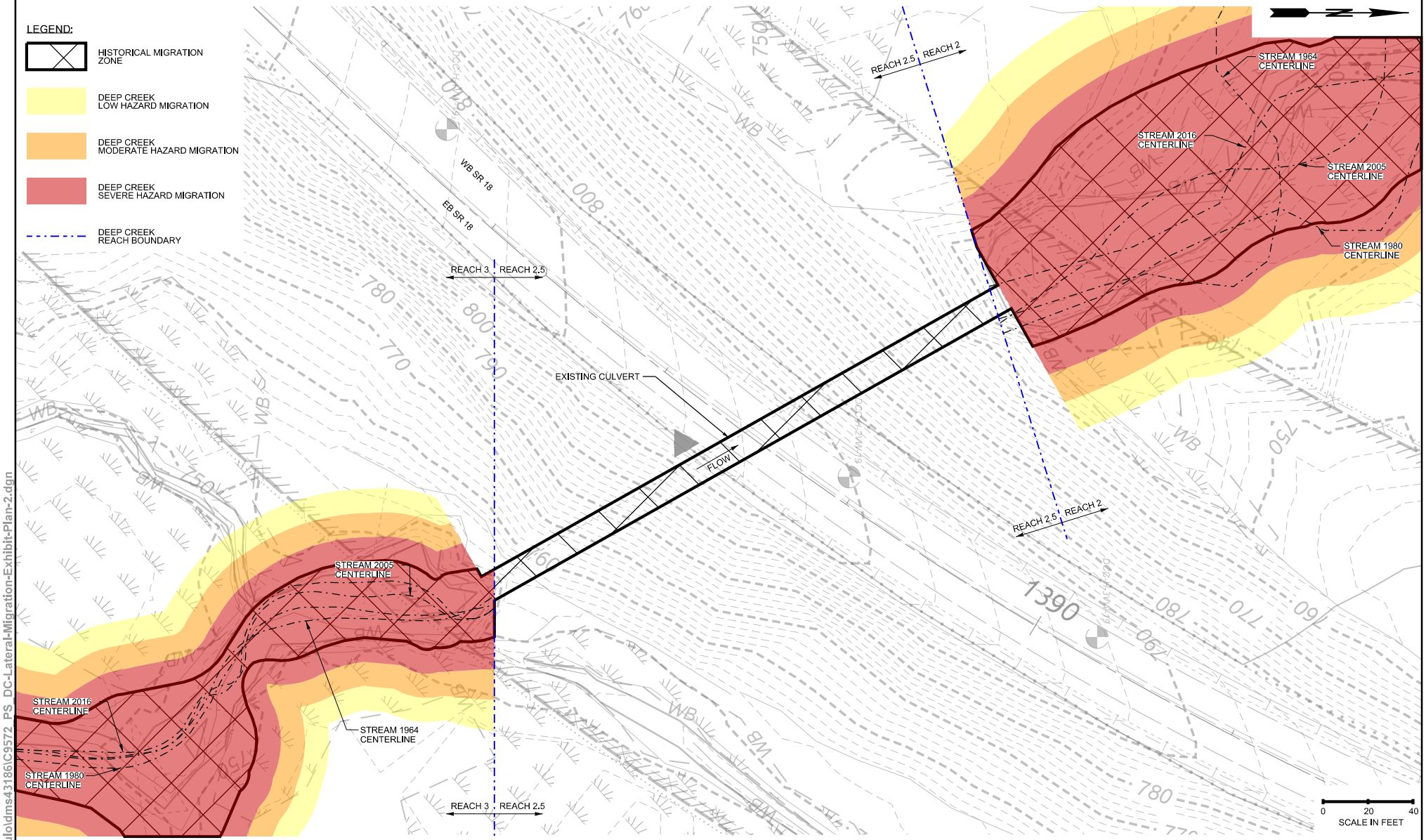
Washington State Department of Transportation

AECOM

Stantec PERTEET PBS HALEY ALDRICH

FIGURE 5A - RAGING RIVER - LATERAL MIGRATION ZONES AT SR 18 CROSSING

PLOTTED BY: PaulO
DATE: 6/7/2022 TIME: 9:13:14 AM



c:\pw_workinglinfra03\pauloldms43186\C9572_PS_DC-Lateral-Migration-Exhibit-Plan-2.dgn

Washington State Department of Transportation

DEEP CREEK - EXISTING LATERAL MIGRATION EXHIBIT

PLOTTED BY: PaulO
DATE: 5/18/2022 TIME: 4:53:06 PM

4. King County Critical Areas Compliance

4.1. Allowed Alterations

Per King County iMap, portions of the project are within erosion hazard critical areas. King County Code (KCC) 21A.24.025 allows for all alterations as long as they comply with the development standards, impact avoidance, mitigation requirements, and other applicable requirements established. Specifically, the code allows construction of new slope stabilization if the following condition is met:

- Condition 15. Only where erosion or landsliding threatens a structure, utility facility, roadway, driveway, public trails, aquatic area or wetland if, to the maximum extent practical, stabilization work does not disturb the slope and its vegetative cover and any associated critical areas.
- Note that the proposed project does not include new slope stabilization. All slope stabilization will be within existing, constructed slope areas. The work will conform with the development standards in KCC 21A.24.220 with regard to timing of clearing (April 1 to October 1) and regular monitoring of surface water discharge form the work area to ensure compliance with water quality standards.

The Deep Creek and Raging River project areas are also impacted by the following critical areas:

- Severe channel migration hazard areas;
- Steep slope hazard areas;
- Wetlands; and
- Aquatic areas

Only alterations within subsection C of KCC 21A.24.025 are allowable within the above critical areas. Furthermore, the alteration must comply with the conditions listed in subsection D of KCC 21A.24.025 among other requirements established.

Table 6 (below) summarizes impacts to these critical areas with “A” signifying alteration is allowable, followed by numbers referring to applicable development conditions in subsection D of KCC 21A.24.025.

Table 6. Project Activities and Critical Areas Affected

Activity	Steep Slope Hazard and Buffer	Wetland and Buffer	Aquatic Area and Buffer and Severe Channel Migration
Construction of new public road right-of-way structure on unimproved right-of-way.		A26	A26
Repair, replacement, or modification within the roadway.	A16	A16	A16
Construction of a new bridge.	A16, 39	A16, 39	A16, 39
Expansion of bridge or culvert	A16, 17	A16, 17, 31	A17, 31
Construction of new surface water conveyance system.	A32, 33	A32, 38	A32, 38

The following text expands on Table 6 and the applicable development conditions in subsection D of KCC 21A.24.025, providing responses to each condition based on the project activity and its effects on the critical areas listed above.

4.1.1. Construction of New Public Road Right-Of-Way Structure on Unimproved Right-Of-Way

Steep Slope Hazard and Buffer

The primary steep slope hazard areas at Deep Creek and Raging River are the side slopes of the constructed roadway embankments, which are legally created fill slopes. Regrading of these slopes is allowed for construction of the new bridges and associated approaches.

Wetland and Buffer; Aquatic Area and Buffer; and Severe Channel Migration

Alteration of the remaining critical areas within the Deep Creek and Raging River project areas are subject to alteration condition 26 and summarized in Table 7 (below).

Table 7. Alteration Condition 26 Responses

Condition Requirement	Response	
	Deep Creek	Raging River
There is not another feasible location with less adverse impact on the critical area and its buffer.	*There is no feasible alternative for the bridge location with less impact to the critical area and its buffer. An alternative location for the bridge east of the existing crossing would increase impacts to critical areas and buffers by requiring fill in streams and wetlands found east of SR 18.* *Although locating the bridge east of SR 18 would avoid impacting wetlands west of the highway, this alternative location would impact wetlands east of the highway that are currently proposed to be avoided.* *The project area at Deep Creek also includes aquatic areas and buffers. King County iMap does not indicate any severe channel migration hazard area associated with Deep Creek. However, Aspect Consulting LLC conducted an analysis of lateral migration and determined that a severe channel migration hazard area exists at the SR 18 crossing.* *Currently no streams will be impacted by the project, except Deep Creek, which will be restored following removal of the existing culvert and roadway embankment. The stream restoration activities would not be affected by the bridge location. No work is proposed in the severe channel migration hazard area determined by Aspect Consulting LLC.*	*The project area at Raging River includes aquatic areas and buffers and a severe channel migration hazard area. Currently, no fill in wetlands or impacts to streams is proposed at Raging River. No work is proposed in the severe channel migration hazard area.* *There is no feasible alternative for the bridge location with less impact to the critical areas and their buffers. An alternative location for the bridge east of the existing crossing would increase impacts to critical areas and buffers by requiring fill in wetlands and streams found east of SR 18.*

Condition Requirement	Response	
	Deep Creek	Raging River
The corridor is not located over habitat used for salmonid rearing or spawning or by a species listed as endangered or threatened by the state or federal government unless the department determines that there is no other feasible crossing site.	*Per Kevin Lee, Snoqualmie watershed habitat biologist, Washington Department of Fish and Wildlife, Deep Creek and Raging River are accessible by salmon for spawning and rearing. The proposed bridge is located over this habitat. To change the bridge location over Deep Creek or Raging River would not avoid the habitat. There is no other feasible location that would avoid crossing over the habitat.*	
The corridor width is minimized to the maximum extent practical.	*The corridor is the minimum necessary to accommodate the proposed road construction and meet engineering standards.*	
The construction occurs during approved periods for instream work.	*Any required instream work will only occur during the approved in-water work window.*	*No instream work is proposed.*
The corridor will not change or diminish the overall aquatic flow peaks, duration or volume or the flood storage capacity.	*The project will create new impervious surface that will increase the runoff of stormwater going to Deep Creek and Raging River. To avoid changing flow peaks, runoff from new impervious surfaces will be collected and conveyed to a stormwater detention facility, which will control the flow of stormwater runoff to the creek. No work will occur within the 100-year floodplain for Deep Creek or Raging River.*	
No new public right-of-way is established within a severe channel migration hazard area.	*King County iMap does not indicate any severe channel migration hazard area associated with Deep Creek. However, Aspect Consulting LLC conducted an analysis of lateral migration and determined that a severe channel migration hazard area exists at the SR 18 crossing. The project will expand the right-of-way at Deep Creek within the area identified as a severe channel migration hazard area. Although the right-of-way will be expanded, the proposed bridge will span the severe channel migration hazard area and no work is proposed in the hazard area.*	*The project will expand the right-of-way at Raging River within an area identified as a severe channel migration hazard area. Although the right-of-way will be expanded, the proposed bridge will span the severe channel migration hazard area and no work is proposed in the hazard area.*

4.1.2. Repair, Replacement or Modification Within the Roadway

Alteration is subject to alteration condition 16 and allowed when performed by, at the direction of, or authorized by a government agency in accordance with regional road maintenance guidelines.

The National Marine Fisheries Service (NMFS) has issued a biological opinion that evaluates impacts of the project on listed threatened and endangered species and designated critical habitat and specifies non-discretionary terms and conditions to minimize adverse effects to species and habitat. The project will be constructed in accordance with the biological opinion and regional road maintenance guidelines.

Steep Slope Hazard Areas, Wetlands, and Their Associated Buffers

The proposal includes removal of the existing culvert and new construction within steep slope hazard areas, wetlands, and their associated buffers. The I-90/SR 18 project is proposed by the Washington State Department of Transportation.

Aquatic Area and Buffer and Severe Channel Migration

Deep Creek

The proposal includes removal of the existing culvert, new construction, and restoration of the stream channel for Deep Creek within aquatic areas and buffers. Although no severe channel migration hazard area is mapped on Deep Creek at the SR 18 crossing, Aspect Consulting LLC conducted an analysis of lateral migration and determined that a severe channel migration hazard area does exist at the crossing. No work will occur in the severe channel migration hazard area. The I-90/SR 18 project is proposed by the Washington State Department of Transportation.

Raging River

The proposal includes new construction within the aquatic area buffer but no construction in the aquatic area of Raging River. A severe channel migration hazard area is present in the project area; however, no work is proposed in the hazard area. The I-90/SR 18 project is proposed by the Washington State Department of Transportation.

4.1.3. Construction of a New Bridge

Alteration is subject to alteration conditions 16 and 39. Condition 16 states alteration is allowed when performed by, at the direction of, or authorized by a government agency in accordance with regional road maintenance guidelines; a discussion of condition 16 as it pertains to the critical areas can be found in the following text. Alteration condition 39 is multifaceted and responses are contained the following table (Table 8).

The NMFS has issued a biological opinion that evaluates impacts of the project on listed threatened and endangered species and designated critical habitat and specifies non-discretionary terms and conditions to minimize adverse effects to species and habitat. The project will be constructed in accordance with the biological opinion and regional road maintenance guidelines.

Additionally, the I-90/SR18 project is proposed by the Washington State Department of Transportation.

Steep Slope Hazard Areas, Wetlands, and Associated Buffers

Deep Creek

The proposal includes removal of the existing culvert and new construction within steep slope hazard areas, wetlands, and associated buffers.

Raging River

The proposal includes new construction within steep slope hazard areas, wetlands, and associated buffers.

Aquatic Area and Buffer and Severe Channel Migration

Deep Creek

The proposal includes removal of the existing culvert, new construction, and restoration of the stream channel for Deep Creek within aquatic areas and buffers. Although no severe channel migration hazard area is mapped on Deep Creek at the SR 18 crossing, Aspect Consulting LLC conducted an analysis of lateral migration and determined that a severe channel migration hazard area does exist at the crossing. No work will occur in the severe channel migration hazard area.

Raging River

The proposal includes new construction within the aquatic area buffer but no construction in the aquatic area of Raging River. A severe channel migration hazard area is present in the project area; however, no work is proposed in the hazard area.

Table 8. Alteration Condition 39 Responses

Condition Requirement	Response	
	Deep Creek	Raging River
There is no feasible alternative with less impact on the critical area and its buffer.	*The steep slope hazard areas within the project area at Deep Creek are primarily associated with the existing roadway embankment. There is no feasible alternative for the bridge location that would avoid the steep slopes associated with the roadway embankment, wetlands, or aquatic areas.* *Proposed work south of the creek and west of SR 18 may occur in a steep slope hazard area not associated with the roadway embankment. An alternative location for the bridge east of the existing crossing would likely still be in a steep slope hazard area not associated with the roadway embankment and would increase impacts to other critical areas and buffers found east of SR 18.* *An alternative location for the bridge east of the existing crossing would increase impacts to critical areas and buffers by requiring fill in wetlands and streams found east of SR 18. An alternative location for the bridge east of SR 18 would avoid impacting wetlands west of the highway but instead would impact wetlands east of the highway that are currently proposed to be avoided.* *King County iMap does not indicate any severe channel migration hazard area associated with Deep Creek. However, Aspect Consulting LLC conducted an analysis of lateral migration and determined that a severe channel migration hazard area exists at the SR 18 crossing.*	*The steep slope hazard areas within the project area at Raging River are primarily associated with the existing roadway embankment. There is no feasible alternative for the bridge location that would avoid the steep slopes associated with the roadway embankment, wetlands, or aquatic areas.* *Proposed work south of the river and west of SR 18 may occur in a steep slope hazard area not associated with the roadway embankment. An alternative location for the bridge east of the existing crossing would increase work within steep slope hazard areas not associated with the roadway embankment and would increase impacts to other critical areas and buffers found east of SR 18.* *An alternative location for the bridge east of the existing crossing would increase impacts to critical areas and buffers by requiring fill in wetlands and streams found east of SR 18. Currently, no fill in wetlands is proposed at Raging River. No streams will be impacted by the proposed project. No work is proposed in the severe channel migration hazard area.*

Condition Requirement	Response	
	Deep Creek	Raging River
There is no feasible alternative with less impact on the critical area and its buffer.	*Currently no streams will be impacted by the project, except Deep Creek, which will be restored following removal of the existing culvert and roadway embankment. The stream restoration activities would not be affected by the bridge location. No work is proposed in the severe channel migration hazard area determined by Aspect Consulting LLC.*	
To the maximum extent practical, the bridge or culvert is located to minimize impacts to the critical area and its buffer.	*The corridor is the minimum necessary to accommodate the proposed road construction and meet engineering standards.*	
The bridge or culvert is not located over habitat used for salmonid rearing or spawning unless there is no other feasible crossing site.	*Per Kevin Lee, Snoqualmie Watershed Habitat Biologist, Washington Department of Fish and Wildlife, Deep Creek and Raging River are accessible by salmon for spawning and rearing. The proposed bridge is located over this habitat. To change the bridge location over Deep Creek or Raging River would not avoid the habitat. There is no other feasible location that would avoid crossing over the habitat.*	
Construction occurs during approved periods for in-stream work.	*Any required instream work will only occur during the approved in-water work window.*	*No instream work is proposed.*
Bridge piers or abutments for bridge crossings are not placed within the FEMA floodway, severe channel migration hazard area, or waterward of the ordinary high-water mark.	*Bridge piers and abutments will not be within a FEMA floodway, severe channel migration hazard area, or waterward of the ordinary high-water mark.*	

4.1.4. Construction of New Surface Water Conveyance System

Alteration is subject to alteration condition 32 and allowed in an existing roadway if conducted consistent with the regional road maintenance guidelines.

The NMFS has issued a biological opinion that evaluates impacts of the project on listed threatened and endangered species and designated critical habitat and specifies non-discretionary terms and conditions to minimize adverse effects to species and habitat. The project will be constructed in accordance with the biological opinion and regional road maintenance guidelines.

Steep Slope Hazard Areas, Wetlands, Aquatic Areas, Associated Buffers, and Severe Channel Migration

Deep Creek

The proposed surface water conveyance system is not proposed within an existing roadway. The new surface water conveyance system will be part of the proposed bridge and associated roadway for the crossing of Deep Creek. The bridge, new roadway embankment, and stormwater outfall will be within wetlands and/or wetland buffers. The proposed location of the outfall for the new stormwater detention facility is west of the new roadway embankment. All or some of the features identified will be within the aquatic area buffer.

Raging River

Only a small section of the proposed surface water conveyance system is within an existing roadway. Most of the new surface water conveyance system will be part of the proposed bridge and associated roadway. In addition, the proposed location of the outfall for the new stormwater detention facility lies west of the proposed bridge. Portions of the bridge and new roadway embankment will be within wetland buffers. All or some of the features identified will be within the aquatic area buffer.

Additionally, alteration is also subject to alteration conditions 33 and 38 with regard to steep slope hazard areas and wetland/aquatic/severe channel migration, respectively. Conditions 33 and 38 are multifaceted. Summaries of each condition and corresponding responses can be found in Tables 9 and 10 (below).

Table 9. Alteration Condition 33 Responses

Condition Requirement	Response	
	Deep Creek	Raging River
The alterations will not subject the critical area to an increased risk of landslide or erosion.	*A portion of the proposed surface water conveyance system will be within the new roadway embankment and attached to the new bridge, so it should have no effect on risk of landslide or erosion. The proposed location of the outfall for the new stormwater detention facility is west of the new roadway embankment and is not located within the steep slope hazard area.*	*A portion of the proposed surface water conveyance system will be within the new roadway embankment and attached to the new bridge, so it should have no effect on risk of landslide or erosion. The proposed location of the outfall for the new stormwater detention facility is west of the new roadway embankment and crosses a steep slope hazard area. A geotechnical analysis will be conducted to evaluate project impacts and to serve as the basis for any revisions or changes to the project design.*
Vegetation removal is the minimum necessary to locate the utility or construct the corridor.	*Vegetation removal required for the proposed stormwater outfall will be kept to a minimum. No additional vegetation removal will be required within the shoreline management area for construction of the stormwater conveyance system.*	
Significant risk of personal injury is eliminated or minimized in the landslide hazard area.	*The conveyance system is not within a delineated landslide hazard area.*	

Table 10. Alteration Condition 38 Responses

Condition Requirement	Response	
	Deep Creek	Raging River
Conveying the surface water into the wetland or aquatic area buffer and discharging into the wetland or aquatic area edge has less adverse impact upon the wetland or aquatic area buffer than if the surface water were discharged at the buffer's edge and allowed to naturally drain through the buffer.	*The proposed location for the stormwater outfall was selected based on topography, soils, wetlands, ordinary high water, and the distance the stormwater needed to be conveyed to reach the outfall. This location allows for discharged water to sheet flow into the surrounding area and infiltrate into the soil or continue to flow overland without concern for erosion.*	
The volume of discharge is minimized through application of low impact development and water quality measures identified in the King County Surface Water Design Manual.	*The stormwater facilities will be designed in accordance with the WSDOT Highway Runoff Manual.*	
The conveyance and outfall are installed with hand equipment where feasible.	*The conveyance and outfalls will be installed using standard construction equipment. Installation using hand equipment is not feasible.*	
The outfall shall include bioengineering techniques where feasible.	*The outfalls will discharge to vegetated upland areas. No bioengineering will be required.*	
The outfall is designed to minimize adverse impacts to critical areas.	*The outfalls have been located and designed to minimize adverse impacts to critical areas. The outfalls and associated conveyances from the new stormwater detention facilities will be located near the new roadway embankments. The proposed locations for the outfalls will allow discharged water to sheet flow into the surrounding area and infiltrate into the soil or continue to flow overland without concern for erosion.*	

4.2. Development Standards for Erosion Hazard Areas

Per KCC 21A.24.220, the following development standards apply to development proposals and alterations on sites containing erosion hazard areas. The italicized text below each standard contains project-specific responses.

a. Clearing in an erosion hazard area is allowed only from April 1 to October 1, except that:
    1. Clearing of up to fifteen-thousand square feet within the erosion hazard area may occur at any time on a lot;

Clearing in the project area will exceed fifteen-thousand square feet.

    2. Clearing of noxious weeds may occur at any time; and

Noxious weeds will be cleared throughout the project area.

    3. Forest practices regulated by the department are allowed at any time in accordance with a clearing and grading permit if the harvest is in conformance with chapter 76.09 RCW and Title 222 WAC;

No forest practices are proposed outside the right-of-way.

b. All subdivisions, short subdivisions, binding site plans, or urban planned developments on sites with erosion hazard areas shall retain existing vegetation in all erosion hazard areas until building permits are approved for development on individual lots.

Not applicable.

c. If the department determines that erosion from a development site poses a significant risk of damage to downstream wetland or aquatic areas, based either on the size of the project, the proximity to the receiving water or the sensitivity of the receiving water, the applicant shall provide regular monitoring of surface water discharge from the site. If the project does not meet water quality standards established by law or public rules, the county may suspend further development work on the site until such standards are met.

The applicant is aware of this provision.

5. Mitigation

The mitigation described in this chapter involves avoidance, minimization of wetland impacts, and compensatory mitigation for unavoidable wetland impacts.

5.1. Mitigation Sequence

Federal, Washington State, and King County regulations require that mitigation efforts follow a prescribed sequence. For King County, project sequence is outlined in KCC 21A.24.125, as follows:

1. Avoiding the impact or hazard by not taking a certain action;
2. Minimizing the impact or hazard by:
    a. Limiting the degree or magnitude of the action with appropriate technology; or
    b. Taking affirmative steps, such as project redesign, relocation, or timing;
3. Rectifying the impact to critical areas by repairing, rehabilitating, or restoring the affected critical area or its buffer;
4. Minimizing or eliminating the hazard by restoring or stabilizing the hazard area through engineered or other methods;
5. Reducing or eliminating the impact or hazard over time by preservation or maintenance operations during the life of the development proposal or alteration;
6. Compensating for the adverse impact by enhancing critical areas and their buffers or creating substitute critical areas and their buffers; and
7. Monitoring the impact, hazard, or success of required mitigation and taking remedial action.

5.1.1. Avoidance and Minimization of Wetland and Stream Impacts

WSDOT has avoided and minimized impacts to wetlands and wetland buffers to the greatest extent practicable. Along the length of the project, the project footprint was reduced to the extent feasible by steepening the highway side slopes. New ROW fencing will be required in areas where the ROW has been expanded. The project design considered pulling in the new right-of-way (ROW) fence to the project's clear/grub edge to reduce tree impacts, but WSDOT policy requires that the fence be placed adjacent to (just inside of) the outer ROW boundary.

A hydroperiod analysis was conducted to verify that the stormwater design would not hydrologically impact project wetlands. The project design also includes enhanced stormwater treatment to reduce water quality impacts to wetlands and streams. WSDOT avoided or minimized permanent impacts to wetlands, streams, and their buffers by shifting stormwater detention ponds away from these environmentally sensitive areas, where practicable. Other roadside stormwater treatments (predominately media filter drains) were also designed and located to avoid impacts to wetlands, streams, and their buffers when possible. Shifting stormwater facilities to avoid all impacts to wetlands, streams, and buffers would have, in some cases, resulted in greater environmental impacts (including clearing of marbled murrelet suitable habitat) and was not feasible due to stormwater requirements, road widening, and general site constraints.

The design has reduced the amount of clearing to the extent practicable, and will minimize permanent impacts to wetlands, streams, and their buffers by replanting impacted areas outside of clear zones and sight distance requirements with native trees and shrubs after construction is complete. Temporarily impacted wetlands and buffers that cannot be restored as forested areas will be replanted with native shrub communities. Compensatory mitigation will replace wetland area and functions lost as a result of these unavoidable impacts.

In addition to design measures, best management practices (BMPs) will be implemented during construction of the project to avoid or minimize adverse impacts to wetlands, streams, and their buffers. High-visibility fencing will be used to demarcate clearing limits and to keep equipment out of environmentally sensitive areas. Stormwater BMPs will be utilized to limit erosion and subsequent sediment-laden water from entering wetlands and streams. To reduce clearing impacts associated with installing new ROW fence along the expanded ROW, the fencing will be manually transported and installed without the use of motorized equipment. Clearing will be limited to trimming with hand-held equipment and no trees will be removed. Site-specific construction impact avoidance and minimization measures include:

- Lake Creek: All in-water work in Lake Creek will be completed during the in-water work window of July 1 through September 15. To avoid roadway closures, the project may take up to two in-water work windows to complete the bridge construction. However, the stream will be restored between the in-water work window periods; i.e., a stream bypass will not be used outside of the in-water work window.
- Raging River: A temporary work trestle over Raging River will be required to move construction equipment from the south side of the river to the north side during construction of the new bridge. The temporary work trestle will fully span the Raging River. No in-water piles will be used.
- Deep Creek: All in-water work in Deep Creek and its tributaries will be completed during the in-water work window of July 1 through September 15. The new bridge will be constructed outside of the OHWM, and the in-water work will be limited to one in-water work window when the existing culvert is removed, the streambed regraded, and the habitat features placed in the new stream channel.

Ways in which impacts to wetlands and stream have specifically been minimized during the roadway design are outlined below by subwatershed.

Lake Creek

The project will correct a fish passage barrier at Lake Creek by removing two 3.5-foot-diameter culverts and replacing them with a fish passable structure. The project proposes to avoid permanent impacts to Lake Creek by replacing the existing culverts with a single-span bridge that has a minimum 40-foot-wide hydraulic opening, thereby avoiding any piers in the stream channel and associated floodplain.

The project initially proposed a roundabout or traffic signal at the intersection of SR 18 and SE 104th Street. These improvement alternatives were eliminated to reduce impacts to the buffers of Wetlands LC-4, LC-5, and LC-27.

The access road associated with Gate 817 has challenging ingress/egress due to the narrow driveway, limited sight distance, and high speeds of SR 18. The driveway will be expanded; however, the acceleration and deceleration tapers were reduced as much as possible to avoid and minimize impacts to Wetlands LC-3 and LC-4 and their buffers. The project also includes

constructing a chain-up area along SR 18, which was located to avoid Stream LC-C and Stream LC-C buffer impacts.

A stormwater pond was initially proposed in the Stream LC-D buffer, southwest of the interchange. The stormwater design was revised in order to relocate the stormwater pond to the I-90 median, west of the interchange. Although the stormwater pond still impacts Stream LC-D's buffer, impacts are in a disturbed area. Moving the pond reduced impacts to the forested, higher-quality portion of the Stream LC-D buffer.

Permanent impacts to Stream LC-I are unavoidable due to required stormwater facilities. However, the stormwater design was revised to maximize hydrologic input to Stream LC-I and maintain existing conditions as much as possible.

Raging River

Impacts to the Raging River buffer are unavoidable due to the necessary bridge abutments and associated fill placement for the new bridge. However, the project was designed to avoid impacts below the OHWM of Raging River. The proposed bridge will be a multi-span bridge with no in-water piers.

Stream RR-D has unavoidable impacts associated with repairing a landslide area and regrading a steep slope adjacent to SR 18. The design team reviewed moving Stream RR-D further from the highway, but determined that the impacts to the mature forest in the area would outweigh any benefits associated with moving the stream channel further from the road. The design also initially included regrading Stream RR-C as part of the Stream RR-D hillside regrade to reduce the overall slope between Streams RR-C and RR-D. However, it was determined that fixing the grade was not worth the impacts to Stream RR-C and associated wetlands. Instead, media filter drains will be installed between the SR 18 roadway and Stream RR-D to provide enhanced stormwater treatment. This will direct stormwater runoff away from Stream RR-D, and the treated water will discharge to Stream RR-C. Although the loss of roadway runoff into Stream RR-D may diminish overall water conveyance quantity, it will result in an increase in water quality in both Streams RR-C and RR-D. In addition, riprap was proposed to line this channel to reduce velocities. It was determined that riprap was not required and the channel will be lined with grass that will improve instream functions with the elimination of a hardened channel.

Deep Creek

The project will correct a fish passage barrier at Deep Creek by removing a 12-foot-diameter culvert and replacing it with a fish passable structure. The project will avoid permanent impacts to Deep Creek by replacing the culvert with a single-span bridge that has a minimum 100-foot-wide hydraulic opening, thereby avoiding any piers in the stream channel and associated floodplain. To reduce impacts to wildlife, the ROW fence in the Deep Creek area will be limited to a wildlife-passable fence to allow animals to cross SR 18 beneath the Deep Creek bridge. The Deep Creek stream design includes banks that are at least 5 feet wide to allow for terrestrial wildlife passage.

Widening SR 18 and constructing the Deep Creek bridge will require the relocation of Stream DC-C further to the west. Due to steep slopes in the area, it was difficult to find an alignment that would have a streambed slope that would not result in significant impacts to the surrounding mature forested area. The current design was a result of several revisions to minimize forested impacts and impacts to Wetland DC-3.

The access road associated with DNR Gate 834 has unsafe ingress/egress due to the narrow driveway, limited sight distance, and high speeds of SR 18. The driveway will be expanded; however, the acceleration and deceleration tapers were reduced as much as possible to avoid and minimize impacts to Stream DC-E and its buffer.

5.1.2. Rectifying Impact

Temporary impacts to critical areas and buffers will be regraded to match natural slopes, soils will be amended if required, and the disturbed areas will be replanted with appropriate native vegetation.

Stormwater outfalls will be located to reduce the potential effects of discharges on critical areas.

5.1.3. Restoring or Stabilizing Hazard Areas

Potential hazards related to the streams in the project area will be minimized or eliminated by replacing the existing culvert at Deep Creek with a new bridge that meets WDFW Water Crossings Design Guidelines and removing an existing constraint in the shoreline zone. A new channel will be created with a suitable channel design, appropriate streambed material, and large woody debris to support channel forming functions currently absent due to the culvert.

Steep slope areas, new streambanks, and disturbed streambanks will be stabilized with dense plantings of native woody species.

5.1.4. Reducing or Eliminating Impacts or Hazards

The effects of the project will be reduced over time by revegetating disturbed areas and monitoring to ensure the success of rectification efforts. Corrective actions (such as replanting, changing species composition in unsuccessful areas, etc.) will be implemented as necessary.

Existing untreated impervious surface within the project footprint will be treated, resulting in an overall improvement in water quality for these areas versus the baseline condition. Stormwater outfalls will be located to reduce the potential effects of discharges on critical areas.

In combination, these measures will reduce the impact of the project over time.

5.1.5. Compensating Adverse Impacts

Unavoidable impacts to critical areas and their buffers will be compensated for with a combination of mitigation credits from an approved compensatory mitigation bank and on-site restoration of instream fish habitat.

5.1.6. Monitoring Impacts or Hazards

Mitigation for the proposed project improvements includes a plan for long-term monitoring, maintenance activities, and adaptive management measures to address any performance issues that result during the mitigation monitoring period.

5.2. Alternatives Analysis

The following section summarizes the alternative analysis conducted for the project. The analysis was prepared to satisfy the Section 404(b)(1) guidelines under the Clean Water Act and addresses the King County code requirement for an analysis of alternatives demonstrating that adverse impacts to wetlands, wetland buffers, and aquatic area buffers resulting from the project have been minimized.

The 404(b)1 analysis was prepared consistent with American Association of State Highway and Transportation Office (AASHTO) Practitioner's Handbook: Applying the Section 404(b)(1) Guidelines in Transportation Project Decision-Making. Table 11 summarizes alternatives considered, compliant with KCC 21A.24.125 and KCC 21A.25.080.

Practicable alternatives must meet the project purpose and need. Screening criteria used to determine practicability include cost, logistics, environmental factors, engineering design standards, and safety. Any alternative that does not satisfy these screening criteria is not considered practicable.

Table 11. Summary of Alternative Analysis

Alternative Type	Explanation	Feasible?
Water Dependency	The project is not water dependent; however, it is an improvement to existing Interstate highway facilities that currently bisect the Raging River, Lake Creek, and Deep Creek.	N/A
Alternative Project Site	Geographic review for Alternative Project Sites is limited to the existing I-90 and SR 18 infrastructure corridors. There are no suitable alternative sites geographically removed from the existing I-90 and SR 18 that will meet the project's purpose and need without significant, unreasonable obstacles and substantially greater environmental, economic, and social impacts.	No, does not meet project purpose and need.
No Action Alternative	WSDOT evaluated a No Build Alternative to compare the effects of maintaining the status quo to the effects of the Build Alternatives. With the No Build Alternative, only routine activities such as road maintenance, repair, and safety performance improvements would take place over the next 20 years.	No, does not meet project purpose and need.
Ramp Metering	Ramp metering can be employed with success for highways with demand issues on the mainline of a highway. However, at this location the issue is the turning movements at the ramp intersections. Ramp metering does not benefit the interchange and does not provide the reduction in traffic congestion required.	No, does not meet project purpose and need.
Flyover Ramps and/or Roundabout Intersections	The preferred WSDOT design option as of June 2015 was to construct two flyover ramps and roundabout intersections in place of the current signals. These alternatives were studied in detail by WSDOT and summarized in an Interchange Justification Report in December 2013. The flyover ramp design had a large footprint with substantial environmental impacts. The impact of this design to wetlands and streams within the interchange was dramatically reduced by changing to a diverging diamond interchange (DDI).	No, does not minimize environmental impact.

Alternative Type	Explanation	Feasible?
Dogbone Interchange	The dogbone interchange is essentially a continuous roundabout that serves both pairs of highway ramps. A fatal flaw analysis determined that this option would be ineffective because it required three travel lanes to operate at adequate Level of Service; and, as a result, the existing I-90 mainline bridge structures would require lengthening, triggering unwanted construction activities that would disrupt mainline traffic, as well as additional wetland and stream impacts.	No, does not minimize environmental impact.
Widening I-90	Lengthening the I-90 off-ramps could improve safety by providing more room for queues to form with separation from high-speed I-90 traffic. This alternative would not enhance the interchange operations in any capacity.	No, does not meet the project purpose and need.
Preferred Alternative	The preferred alternative includes a four-lane diverging diamond interchange to replace the existing conventional diamond interchange at I-90 and SR 18. A new stream will be constructed along the east side of the roadway under the I-90 bridges, along with new fish passable culverts under the westbound-off and eastbound-on ramps. A new pedestrian accessible route will be constructed along the west side of the roadway under the I-90 bridges that will connect between the westbound on- and eastbound-off ramps. SR 18 will also be widened from two existing lanes to a total of four lanes between SE 104th Street and Deep Creek. The existing twin circular concrete culverts at Lake Creek will be replaced with a new bridge with a minimum 44-foot span to provide fish passage. A new two-lane bridge will be constructed for the southbound direction across the Raging River, with the existing Raging River Bridge converted for use as two northbound lanes. A new four-lane bridge will replace the existing Deep Creek fish passage barrier culvert to be compatible with future widening of SR 18 to the south as part of a separate project. SR 18 between Deep Creek and the southern project limit will be reduced to three lanes to tie into the existing three lanes.	Yes.

WSDOT has concluded that the preferred alternative is the only alternative that is practicable with respect to the project purpose and need. The preferred alternative has been designed in a manner that both satisfies engineering design standards for mobility, safety, and geotechnical/structural integrity and minimizes impacts to the affected environment, including waters of the US, and wetlands, buffers, and aquatic area buffers regulated by King County.

Avoidance and minimization measures have been incorporated into construction BMPs and the project design to the extent practicable, and compensatory mitigation has been implemented to offset unavoidable impacts. The proposed compensatory mitigation has been developed in a manner to result in a net gain of ecological functions relative to the loss of lower-quality aquatic ecosystem habitat from unavoidable impacts. In light of the proposed mitigation, WSDOT asserts that there is no practicable alternative to the proposed discharge to waters of the US that will have less adverse impacts on the aquatic ecosystem.

5.3. Compensatory Mitigation Need

Due to the heavily forested nature of most of the SR 18 corridor, the project will result in unavoidable clearing of forested wetland, riparian, and buffer areas.

5.3.1. Regulatory Requirements

Wetland Mitigation Requirements

As identified in the Governor's Executive Order 89-10 (Protection of Wetlands: "No Net Loss") and WSDOT Policy P2038 (Wetlands Protection and Preservation), WSDOT is required to ensure no net loss of wetlands acreage and function is caused by department actions, and to increase the quantity and quality of wetlands in the long term. In addition to meeting the "no net loss" agency policy, the total area of compensatory mitigation proposed is generally based on Wetland Mitigation in Washington State, the joint guidance document produced by Washington Department of Ecology (Ecology) in partnership with WSDOT and other resource agencies (Ecology et al. 2021, 2006), and King County's Critical Areas Ordinance (King County Municipal Code [KCC] 21A.24).

Short-term temporary wetland impacts associated with vegetation disturbance or removal for construction access or temporary fill are required to be restored to pre-impact conditions by establishing native wetland vegetation. Long-term temporary impacts to wetlands are also required to be restored to pre-impact conditions; however, the joint guidance document (Ecology et al. 2021) recommends that they also be mitigated as permanent impacts at one-fourth of the established ratio.

The project will impact Category I, II, and III wetlands and proposes to compensate for permanent wetland impacts at a mitigation bank as described further in Chapter 7. Mitigation ratios recommended by the bank, and approved by the USACE and Ecology, are proposed.

According to the King County Critical Areas Ordinance (KCC 2021), mitigation of permanent wetland impacts should occur at various ratios based on the impacted wetland category but the ratios can be decreased if the applicant shows the following:

The applicant demonstrates by documentation submitted by a qualified wetland specialist that the proposed mitigation actions have a very high likelihood of success based on hydrologic data and prior experience;

The applicant notes that the proposed use of mitigation bank credits guarantees that the mitigation was success constructed and has met the required performance standards.

The applicant demonstrates by documentation by a qualified wetland specialist that the proposed actions for compensation will provide functions and values that are significantly greater than the wetland being impacted;

The proposed use of bank credits provides suitable mitigation that is likely to provide increase function and value due to the co-location of multiple habitat types.

The applicant demonstrates that the proposed actions for mitigation have been conducted in advance of the impact caused by the development proposal and that the actions are successful;

The applicant notes that the proposed use of mitigation bank credits guarantees that the mitigation was constructed and met the required performance standards prior to the proposed impacts.

As a result, we believe proposed mitigation bank credit ratios satisfy the requirements described in KCC 21A.24.340). The proposed use of mitigation ratios for bank credits also satisfies requirements for long-term mitigation success and implementation of a scientifically rigorous mitigation, monitoring and adaptive management program, and so meet the requirements outlined in KCC 21A.24.342 for an agreement to modify mitigation ratios.

Wetland and Stream Buffer Mitigation Requirements

On-site aquatic area buffer mitigation must meet all the standards in KCC 21A.24.380 in addition to meeting a replacement ratio of 1:1 mitigation area to impact. The on-site aquatic buffer mitigation for this project will be limited to restoration of temporarily impacted aquatic buffer areas.

Off-site aquatic area buffer mitigation must meet all the standards in KCC 21A.24.380 in addition to meeting a replacement ratio of 2:1 mitigation area to impact for Type F streams, and a ratio of 1.5:1 for Type N streams. This applies to mitigation located in an approved Habitat Bank, King County Mitigation Reserves Program (MRP), or King County Department of Natural Resources and Parks.

Off-site aquatic buffer mitigation will be provided through the use of mitigation bank credits at an approved compensatory mitigation bank. Mitigation ratios recommended by the bank, and approved by the USACE and Ecology, are proposed.

Stream Mitigation Requirements

King County requires a minimum stream mitigation ratio of 1:1 if mitigation occurs within the area of impact or within a half mile. Ecology and the Washington Department of Fish and Wildlife (WDFW) require stream mitigation which provides equal or better biological functions and values, compared to the existing conditions, per RCW 90-74-005 through 90-74-020. USACE determines the requirements for compensatory stream mitigation on a case-by-case basis (NWP Handbook Condition 8). WSDOT will ensure the project's stream mitigation elements are constructed and maintained in accordance with WDFW's Integrated Streambank Protection Guidelines to address the potential mechanisms of streambank failure, or other degradation of mitigation areas (WDFW 2003).

5.3.2. Project Compensatory Mitigation Alternatives Assessed

To compensate for unavoidable impacts, WSDOT investigated various options including mitigation banks, in-lieu fee (ILF) programs, and permittee-responsible mitigation. Due to the accelerated timeline of this project and the nature of design-build, compensatory mitigation has not been finalized and is subject to change based on the final project design and proposed impacts. WSDOT thoroughly investigated all of the options listed and will continue to work to further define the mitigation plan for this project to successfully compensate for impacts to wetlands, streams, and buffers.

Mitigation Bank

WSDOT considered mitigation banks that included the project location in their service area. The only mitigation bank service areas that cover the project location are the Snohomish Basin Mitigation Bank (SBMB) and Skykomish Habitat Mitigation Bank (SHMB). Since both banks would adequately provide similar functions to the wetland functions impacted as part of this project, other banks for which the project is outside the service area were not considered. More information on the site selection rationale for the use of a mitigation bank as compensatory mitigation for a portion of the project impacts is included in Chapter 7.

In-Lieu Fee Program

One In-Lieu Fee (ILF) program is available and applicable to the I-90/SR 18 project: the King County Mitigation Reserves Program (MRP). This program, administered by King County, allows the purchase of mitigation credits and then uses the collected fees to implement mitigation projects in the appropriate service area.

WSDOT assessed whether the King County MRP could be used to provide ILF mitigation for all temporary and permanent wetland impacts associated with the I-90/SR 18 project roadway and associated drainage impacts. The King County MRP does have a service area applicable to the I-90/SR 18 project: the Snoqualmie River service area. Based on discussions with Megan Webb and Michael Murphey at the King County MRP, no in-lieu-fee mitigation projects are currently in design or construction for the Snoqualmie River service area. It would likely take at least three years to locate, design, and construct a mitigation site through the King County MRP program and was determined to be less desirable than a program that includes advanced mitigation (see Mitigation Bank above).

Permittee-Responsible Mitigation

Permittee-responsible mitigation includes creating, reestablishing, rehabilitating, or enhancing wetlands to mitigate for project impacts. Permittee-responsible mitigation is typically conducted in conformance with the mitigation ratios in Wetland Mitigation in Washington State, Part 1: Agency Policies and Guidance (Ecology et al. 2021) to fulfill federal and state requirements and the mitigation ratios set in the local municipal codes to satisfy city requirements.

WSDOT received a request from the Tulalip Tribes to include on-site permittee responsible mitigation for impacts to fish habitat. WSDOT investigated permittee-responsible mitigation for both WSDOT-owned compensatory mitigation sites and on-site compensatory mitigation. There are no WSDOT-owned advance mitigation sites in WRIA 7 with available wetland credits. For permanent wetland impacts, on-site mitigation was considered but there is a lack of opportunity for mitigation due to the existing high-quality habitat surrounding the project area. The project area consists of multiple Category I wetlands, mature forest, and riparian habitat.

For permanent stream impacts, on-site opportunities were also assessed. Most were determined to have little to no compensatory mitigation opportunity due to the quality of existing habitat and the fish passage barriers within the project area are already being addressed. One nearby fish passage barrier owned by King County was identified and would provide increased functions to the stream and the barriers already being addressed in the I-90/SR 18 Interchange. This barrier, Site ID 935013, referred to as the SE 104th Street fish passage barrier, was determined to be the only feasible stream mitigation option in the same aquatic reach as project impacts. This fish passage barrier and stream restoration project is being pursued by WSDOT, as a separate project in partnership with King County, as compensatory mitigation for permanent stream impacts, as well as to address the deviation from Water Crossing Design Guidelines (WDFW 2013) in the correction of the fish passage barriers on LC-E in the interchange stream restoration design. This correction at Site ID 935013, in addition to the design elements for LC-G, will provide equal or greater benefits to fish resources versus stream simulation design criteria.

WSDOT proposes to conduct permittee-responsible mitigation through on-site restoration of temporarily impacted wetlands and buffers. Additionally, WSDOT will create wetland and stream buffers by removing roadway fill as part of the Deep Creek bridge construction.

5.3.3. Project Mitigation Proposal

WSDOT proposes to compensate for wetland, stream, and buffer impacts through a combined approach, including the purchase of bank credits from either the SBMB or SHMB, on-site restoration, and on-site compensatory mitigation. For impacts associated with fish passage work, compensatory mitigation is not proposed due to the overall net functional lift for aquatic resources and associated wetlands. All temporarily impacted areas will still be restored. The mitigation strategy for each type of impact is discussed below and outlined in Table 12. Impacts associated with fish passage are labeled “fish,” and all other impacts are associated with transportation-related work including roadway widening and stormwater.

Permanent and Indirect Wetland Impacts and Buffer Impacts

To satisfy the Governor’s Executive Order 89-10, Ecology’s joint guidance, and King County CAO requirements, WSDOT will purchase credits at a wetland mitigation bank for permanent and indirect wetland impacts and stream and wetland buffer impacts that are not restored on site.

Permanent wetland impacts, indirect wetland impacts, and long-term temporary wetland impacts will be compensated for through the purchase of credits at the bank. The mitigation bank and proposed mitigation ratios are discussed in more detail in Chapter 7 and in the bank use plan (to be developed).

Wetland to Stream Conversion

As a result of fish passage work, some wetlands will be converted to streams. This will result in a higher net benefit to the aquatic system, and compensatory mitigation is not proposed.

Long-Term Temporary Wetland Impacts

For long-term temporary impacts, in addition to being restored on site (with planting), they will also be compensated for at the same ratio as permanent impacts by purchasing credits at a wetland mitigation bank.

Permanent Stream Impacts

No compensatory mitigation is proposed for permanent stream impacts associated with fish passage work since it will result in a higher net benefit to the aquatic system. To satisfy stream mitigation requirements for remaining impacts, WSDOT is partnering with King County to correct the SE 104th Street fish passage barrier to rehabilitate stream channel and open newly created fish habitat through the I-90/SR 18 Interchange as part of a separate project. Stream impacts will be compensated for at different ratios based on fish-bearing status and whether impacts result in a loss of waters or a change to stream functions.

Buffer to Stream Conversion

As a result of stream realignments throughout the project area, some stream and wetland buffers will be converted to stream channel. In areas where this conversion is related to fish passage work, compensatory mitigation is not proposed for these impacts due to the functional lift to aquatic resources in the project area. In areas where conversion is due to other impacts not associated with fish passage, compensatory mitigation is being proposed for the permanent buffer conversion.

Stream Buffer Vegetation Conversion

To comply with King County CAO requirements, compensatory mitigation is being proposed by purchasing credits at a mitigation bank to mitigate impacts in locations where stream buffer is being converted from forested to primarily scrub shrub vegetation. Where possible, the vegetation conversion area will still be replanted with native woody scrub-shrub vegetation.

Temporary Impacts

WSDOT proposes to compensate for all short-term temporary impacts to wetlands, streams, and buffers on site. Temporary impacts will be restored in kind and these areas will be planted with native vegetation. In compliance with KCC 21A.24, a more detailed mitigation plan including a report, and a planting plan addressing temporary impact restoration areas will be provided as part of the clearing and grading permit.

Table 12. Summary of Proposed Compensatory Mitigation

	Impact Area (acre)	Mitigation Bank - SBMB or SHMB (acre)	On-site Restoration at Impact Locations (acre)	Compensatory Mitigation at SE 104th Street
Wetlands				
Permanent Impact	0.793	0.793	0	0
Permanent Impact (fish)	0.147	N/A	N/A	N/A
Indirect Impact	1.572	1.572	0	0
Wetland to Stream Conversion	0.069	N/A	N/A	N/A
Long-Term Temporary Impact	0.328	0.328	0.328	0
Long-Term Temporary Impact (fish)	0.117	N/A	0.117	N/A
Short-Term Temporary Impact	0.014	0	0.014	0
Permanent Buffer Impact	12.552	12.552	0	0
Temporary Buffer Impact	3.055	0	3.055	0
Wetland Vegetation Conversion	0.359	0.359	0	0
Wetland Buffer to Stream Conversion	0.289	0.289	0	0
Wetland Buffer to Stream Conversion (fish)	0.118	N/A	N/A	N/A
Streams				
Permanent Impact	0.288	0	0.288	0
Permanent Impact (fish)	0.433	0	0.433	0.030
Indirect Impact	0.034	0	0	0.034
Temporary Impact	0.512	0	0.512	0
Permanent Buffer Impact	5.509	5.052	0.457*	
Temporary Buffer Impact	0.816	0	0.816	0
Stream Buffer Conversion	0.034	0.034	0.034	0
Stream Buffer to Stream Conversion	0.064	0.064	0	0
Stream Buffer to Stream Conversion (fish)	0.349	N/A	N/A	N/A

*Stream buffer creation at Deep Creek
SBMB = Snohomish Basin Mitigation Bank
SHMB = Skykomish Habitat Mitigation Bank
Fish = Impacts associated with fish passage work. All other impacts are associated with transportation work including widening and stormwater improvements.

6. Compensatory Wetland and Buffer Mitigation

This chapter describes the key elements of the proposed compensatory mitigation for wetland and buffer impacts. WSDOT will purchase credits from one of the approved mitigation banks with credits available that has a service area overlapping the project area.

6.1. Site Location

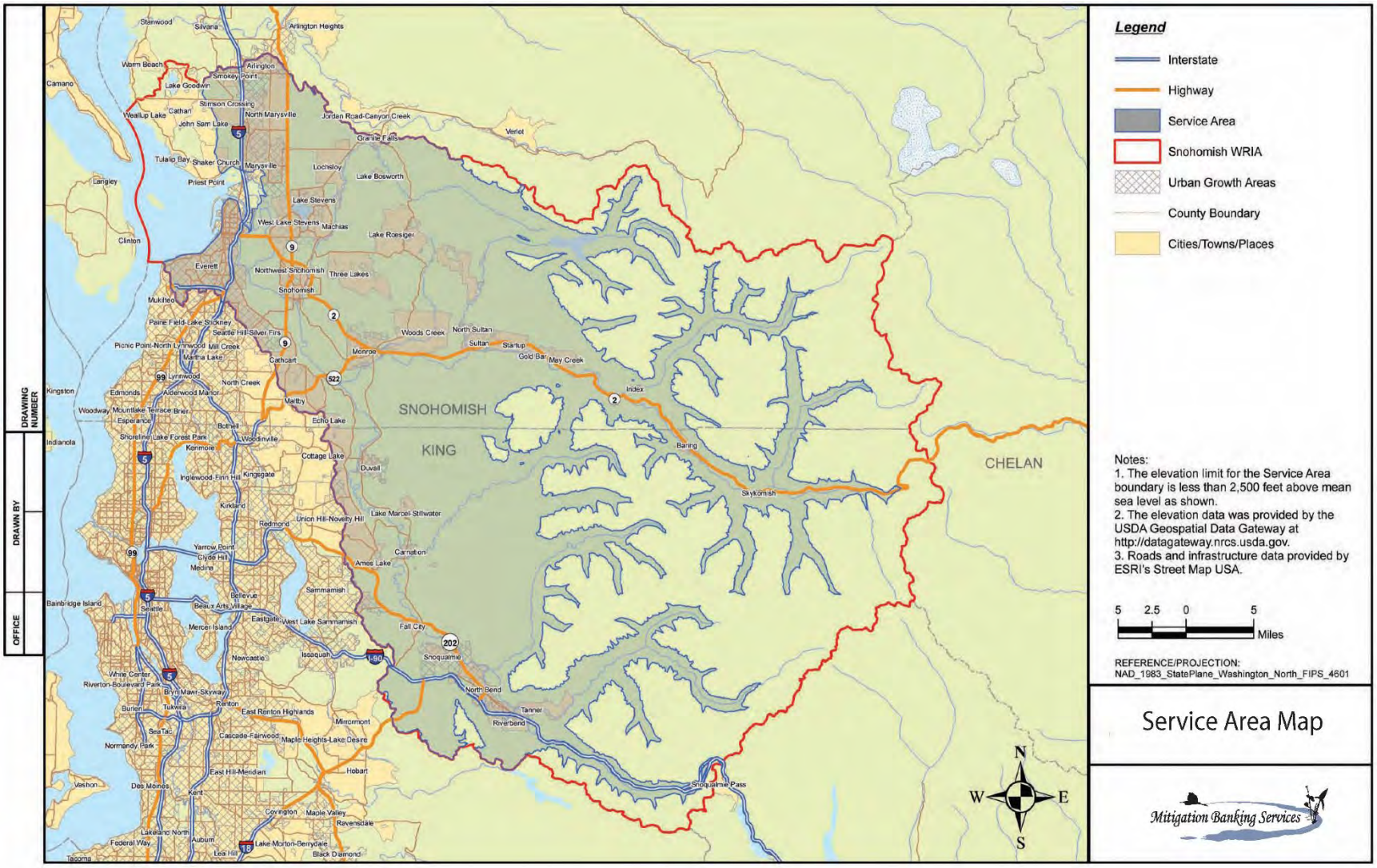
The SBMB is located in the Snoqualmie River valley approximately 3 miles upstream of the confluence of the Skykomish River and the Snoqualmie River. The SBMB is located immediately south of Pearson Eddy within Sections 35 and 36, Township 27 N, Range 7. Historically, the floodplains associated with the Snoqualmie River in this region were part of a large wetland complex that included multiple hydrogeomorphic components (Talasaea 2016). Beginning in the 20th century, this river valley was converted into agricultural land through the clearing of native vegetation, wetland draining, and the creation of dikes along the Snoqualmie River to prevent over-bank inundation. The SBMB was constructed on land that had previously been a flat monoculture of non-native pasture grasses.

The SHMB is located just north of the SBMB upstream of the Skykomish and the Snoqualmie Rivers. The SHMB is located along the Skykomish River near the City of Monroe in Sections 14 and 11, Township 27 N, Range 6E.

The SBMB comprises 200 acres of wetland complex restored to historic conditions, including riparian wetlands, side channel habitat, depressional wetlands, and associated forested uplands. Cowardin vegetation classes found within the SBMB include aquatic bed, emergent, scrub shrub, and forested wetland classes. The site provides both rearing and refuge habitat for juvenile salmonids.

The SHMB restored, rehabilitated, enhanced wetlands adjacent to the Skykomish River and restored a side channel complex and reconnected floodplains. Cowardin vegetation classes found within the SHMB include aquatic bed, emergent, scrub shrub, and forested wetland habitat as well as floodplain uplands. The site provides off channel rearing and refuge habitat for salmon.

Figure 6. Service Area for Snohomish Basin Mitigation Bank and Skykomish Habitat Mitigation Bank



6.2. Rationale for Site Selection

The purchase of wetland mitigation bank credits will provide in-kind, in-watershed mitigation for impacts resulting from the project. Both the project and the SBMB and SHMB are located in WRIA 7. The project is located in the service area for both the SBMB and SHMB. Mitigation bank credits will be purchased for permanent wetland, long-term temporary wetland, and wetland buffer impact mitigation requirements.

The bank was selected the following reasons:

- The project is located in the service area of the banks.
- The project and the banks are within the same watershed.
- Purchase of credits from a Bank is consistent with the mitigation hierarchy established in the 2008 Final Rule on Compensatory Mitigation for Losses of Aquatic resources (Rule).
- No net loss of functions in the watershed, achieve greater than or equivalent wetland functions. Functions that will be replaced at the SBMB or SHMB are similar to functions that will be impacted or lost on site.

The Rule creates a preference for the use of mitigation bank credits to compensate for permitted impacts to aquatic resources. The Rule states “when the permitted impacts are located within the service area of an approved mitigation bank, and the bank has the appropriate number and resource type of credits available, the permittee’s compensatory mitigation requirements may be met by securing those credits from the sponsor” (33 Code of Federal Regulations [CFR] Part 332.3b(2)). As stated previously in this report, the project is within the Bank’s service area and the Bank has an adequate amount of credits available for purchase. For these reasons, the purchase of credits at the Bank is appropriate compensatory mitigation for the project’s permanent impacts to wetlands.

The Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332) indicates that use of mitigation bank credits helps to reduce the risk, uncertainty, and temporal loss of resource functions. Banks are also required to undergo more rigorous scientific analysis and a more comprehensive planning and implementation than permittee-responsible on-site mitigation. Furthermore, bank credits are not released until specific milestones related to protection and development of the bank have been achieved, reducing the risk for failure of the mitigation. For these reasons, the Final Rule indicates a preference for mitigation bank credits where these considerations are applicable.

As noted above, the permanent impacts to wetlands described in Section 2 are located within the service area for the Banks. The Bank sites are located in WRIA 7. The entire 199 acres of the SBMB is located within the Snoqualmie River floodplain, four miles upstream of its confluence with the Skykomish River. The SHMB is located along the north bank of the Skykomish River, approximately 2.5 miles upstream of the confluence with the Snohomish River.

6.3. Wetland Functions Provided

The SBMB and SHMB have both re-created or significantly increased a variety of wetland functions that are important for water quality, hydrology, and habitat at both the site of the mitigation bank and at the watershed scale. These functions include flood flow alteration and dispersion; sediment, nutrient, and toxicant removal; erosion control and shoreline stabilization;

production and export of organic matter; and increased general habitat suitability for a range of native species. The increase of these functions within the banks resulted from the creation of a variety of hydrologic regimes, the increase in vegetative community structure and species diversity, increasing the variety in habitat structures, and through the re-establishment of wetland habitat areas. The functions provided by both banks are summarized below.

Flood Flow Alteration and Dispersion

Flood flow alteration includes reducing the flow of floodwaters during storm events through stormwater retention in wetlands (Null et al. 2000). The capacity for flood flow alteration has been increased within the SBMB site with the creation of side channels and wetlands adjacent to the Snoqualmie River through excavation and dike removal. These features are able to take in, retain, and slowly release stormwater surges. By slowing and controlling the stormwater hydrology in this way, the SBMB site protects downstream habitat and communities from the adverse impacts of flooding. Similarly, the SHMB included removal of portions of a flood control dike to provide flood relief from neighboring farmland and protecting downstream habitat from flooding (Skykomish Habitat 2006). The increased flood storage from these activities is also likely to enhance the interflow of surface and groundwater.

Planting woody vegetation and installing snags and large woody debris (LWD) also contributes to flood flow alteration throughout the wetland and riparian areas of the banks. Woody vegetation, snags, and LWD can moderate stormwater flows and increase residence time in wetlands, thereby reducing the severity of peak flows by dissipating their energy during flood events.

Sediment, Nutrient, and Toxicant Removal

As described in the above section, woody vegetation, snags, and LWD have the ability to slow stormwater surges during flood events. The reduction of floodwater velocity allows for increased sedimentation, thereby allowing floodwaters to deposit sediments and adsorbed pollutants into the wetland. Dense vegetation further increases water quality by filtering out excess nutrients and toxicants and by reducing the downstream movement of sediments. The creation of on-site wetlands and complex habitat in off-channel streams, and the planting of native vegetation are all features of the banks that increase sediment, nutrient, and toxicant removal.

Erosion Control and Shoreline Stabilization

The restored native vegetation communities, especially woody vegetation with broad root systems, increases erosion control and shoreline stabilization. As previously mentioned, woody vegetation can moderate peak storm flows in the Snoqualmie River during flood events while also protecting shoreline and wetland soils from erosion. The SBMB occurs within the 100-year floodplain of the Snoqualmie River and experiences regular flooding during storm events, providing regular opportunity to perform this function. The SHMB is located in the floodplain of the Skykomish River that also experiences regular flooding in this lower reach of the river.

Production and Export of Organic Matter

The restored native vegetation communities at both banks increased the on-site vegetation community structure, allowing a greater density of plants across the wetland and riparian areas and an increase in the production of organic matter. This wetland vegetation also contributes to the export of organic matter during storm events when Snoqualmie River and Skykomish River flood flows move plant materials downstream.

General Habitat Suitability

The re-establishment of a variety of historic wetland hydroperiods and classes has increased the structural complexity and habitat diversity of the sites. Both banks re-established aquatic bed, emergent, scrub shrub, and forested wetland classes, as well as off-channel stream habitat, creating a high degree of habitat interspersion. The vegetation diversity and variety of niche and edge habitats within the banks create a high habitat functional value. The large size of the SBMB and the immediately accessible habitat surrounding the SBMB also contribute to the habitat value by providing migration opportunities and habitat connectivity. The vegetation communities on-site provide other habitat benefits at the site and watershed scale, including woody debris recruitment, over-water shade and microclimate regulation, and increased foraging and resting areas for fish and wildlife. Both the SBMB and SHMB provide documented off-channel rearing and refuge habitat for salmonids, including ESA-listed Chinook salmon and steelhead.

6.4. Proposed Mitigation Credits

WSDOT proposes to compensate for permanent, long-term temporary, and indirect wetland impacts through the purchase of bank credits at the Bank. In addition, WSDOT proposes to compensate for permanent wetland and stream buffer impacts through a credit purchase at the Bank. Credits are the “currency” of the mitigation bank. The value of each credit is equal to its net ecological benefit. For the Bank, the value of one credit was developed to be equal in value to 1 acre of Category III wetland. Specifically, the Bank credit-impact acreage ratio is 1.0 credit per acre (1:1 ratio) of Category III wetland impacts.

For the project, the number of credits proposed to offset each impact type is generally aligned with the agreed-upon ratios at the Bank. The standard ratio is applied when an impact occurs because of the installation of roadway elements. For impacts occurring as a result of a temporal (as opposed to permanent) loss of wetland functions due to long-term vegetation disturbance, the same ratio as permanent impacts is proposed. This ratio is proposed because although impacted areas will be restored, the impact to forested areas will be closer to a permanent impact which aligns with the joint guidance for this type of impact (Ecology et al. 2021). For Category I wetland impacts, the mitigation banking instrument states that the ratio is determined on a case-by-case basis. Based on other projects with Category I wetland impacts that purchased credits at the bank, a 2:1 ratio was used and therefore is proposed for this project. For indirect impacts, the proposed ratios are one-half of the standard ratio which aligns with the joint guidance for this type of impact (Ecology et al. 2021). Table 13 summarizes the number of credits that are proposed to be purchased at either SBMB or SHMB. For wetland impacts, a total of 2.867 credits will be purchased.

For buffer impacts, credits will be purchased to mitigate for 18.407 acres of impacts that include permanent, conversion, and long-term temporary impacts. Critical area buffer impacts will be mitigated for at a 1:1 ratio, which aligns with the King County Critical Areas Ordinance. At SBMB and SHMB, a ratio of 0.2:1 is used, which represents a 1:1 impact to mitigation area and a 5:1 credit generation ratio is used for all wetland and riparian buffer creation and reestablishment areas. For buffer impacts, a total of 3.68 credits will be purchased.

Use of a Bank is a mitigation approach consistent with the King County Critical Areas Ordinance. There will be no temporal loss of wetland area and function because the mitigation is already constructed and the site is currently meeting performance criteria. Furthermore, the

site has created wetlands of higher quality than the portion of the wetlands that are impacted along the highway. Since there will be no temporal loss and the mitigation sites have been successful, WSDOT is proposing to decrease ratios provided in KCC 21A.24.340.B.2 for wetland impacts. In addition, the proposed compensatory mitigation site will provide greater functions than the portion of the wetland being impacted along the highway. This aligns with the criteria provided in KCC 21A.24.340.E for decreased mitigation ratios.

WSDOT will purchase mitigation credits after all necessary permits are issued. Once the credit purchase is complete, a proof of purchase will be submitted to the USACE, Ecology, and King County.

Table 13. Summary of Mitigation Bank Credits for Wetland Impacts

Wetland Number	Ecology and Local Jurisdiction Rating	Wetland Impacts [a]								
		Permanent			Long-term Temporary			Indirect		
		Impact	Ratio	Credit	Impact	Ratio	Credit	Impact	Ratio	Credit
LC-1	I	0.070 AC	2:1	0.140	0.057 AC	2:1	0.114	0.146 AC	1:1	0.146
LC-2	II	0.015 AC	1.2:1	0.018	-		-	-		-
LC-3	I	-		-	0.002 AC	2:1	0.004	0.129 AC	1:1	0.129
LC-4	I	0.023 AC	2:1	0.046	0.057 AC	2:1	0.114	0.452 AC	1:1	0.452
LC-7	III	0.358 AC	1:1	0.358	-		-	-		-
LC-11	III	-		-	-		-	0.028 AC	0.5:1	0.014
LC-23	III	0.054 AC	1:1	0.054	-		-	-		-
LC-25	III	-		-	-		-	0.033 AC	0.5:1	0.017
LC-26	III	-		-	-		-	0.005 AC	0.5:1	0.003
LC-27	II	0.006 AC	1.2:1	0.007	0.031 AC	1.2:1	0.037	0.369 AC	0.6:1	0.221
LC-28	I	0.027 AC	2:1	0.054	0.088 AC	2:1	0.176	0.315 AC	1:1	0.315
LC-29	II	0.004 AC	1.2:1	0.005	-		-	0.023 AC	0.6:1	0.014
RR-8	III	-		-	0.002 AC	1:1	0.002	-		-
DC-1	III	0.040 AC	1:1	0.040	-		-	-		-
DC-3	II	0.165 AC	1.2:1	0.198	0.090 AC	1.2:1	0.108	0.071 AC	0.6:1	0.043
DC-6	II	0.003 AC	1.2:1	0.004	-		-	-		-
DC-7	II	0.028 AC	1.2:1	0.034	-		-	-		-
Total		0.793 AC		0.958	0.328 AC		0.555	1.572 AC		1.354
									Total Credits	**2.867**

[a]Permanent impacts shown are related to roadway improvements. Fish passage impacts are not proposed for compensatory mitigation because this work provides a functional lift to aquatic resources on site.

6.5. King County Wetlands Compliance

According to KCC 21A.24.340, mitigation must be provided at or contiguous with the development site to the extent practical; however, off-site mitigation may be approved when consistent with the provisions of KCC 21A.24.133. Off-site mitigation through the King County Mitigation Reserves Program may be approved per KCC 21A.24.137 when appropriate. Off-site mitigation through wetland mitigation banking may be approved per KCC 21A.24.345.

In the context of this project, suitable property for compensatory mitigation is not available on site or within the nearby adjoining ROW, and credits from the King County Mitigation Reserves Program were not available for projects in this area. The available options include off-site permittee-responsible mitigation and the use of approved bank credits.

Mitigation of temporary impacts to wetlands, streams, and buffers will be provided on site in the form of restoration and enhancement of disturbed areas.

Permittee-responsible off-site mitigation is the least desirable of these options, as it requires location of a suitable site in the watershed that addresses both the functions lost as the result of the project and needs of the watershed; a substantial design effort that requires much time to compensate for lost functions and includes a risk of failure to meet performance standards. In addition, the use of banks credit tends to consolidate mitigation at larger sites, potentially increasing ecological value through better habitat connectivity and increased plant and structural diversity. As a result, compensatory mitigation for unavoidable permanent impacts to wetlands, streams, and buffers will be provided through the use of mitigation bank credits at an approved bank site.

This project will follow the requirements of the 2008 Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332) with regard to order of mitigation preference; and the current guidance provided in the Washington State Department of Ecology Wetland Mitigation in Washington State—Part 1: Agency Policies and Guidance (Version 2) (Ecology et al. 2021) with regard to overall mitigation approach.

Compensatory mitigation for wetland to stream conversion impacts as ecological improvements to aquatic areas are not considered in mitigation standards for wetlands (KCC 21A.24.340) but will be incorporated into the critical areas report.

7. Compensatory Stream Mitigation

This chapter describes the key elements of the proposed compensatory stream mitigation through correcting the SE 104th Street fish passage barrier (WDFW ID 935013). The design of the SE 104th Street fish barrier correction site is in progress so all information included in this section is conceptual and will be updated in the final mitigation plan. The goal of the SE 104th Street fish barrier correction is to provide substantial compensatory mitigation for the stream impacts as proposed in this Draft Mitigation Plan.

7.1. Site Location

The SE 104th Street fish barrier correction site is located in WRIA 7 in King County, Section 2, Township 23, Range 7 (Figure 4). The site is mainly within King County ROW. A portion of the project will extend onto a King County Parks parcel (Echo Lake Interchange Site). Downstream of the culvert is US Forest Service land but the work is not expected to extend onto that property.

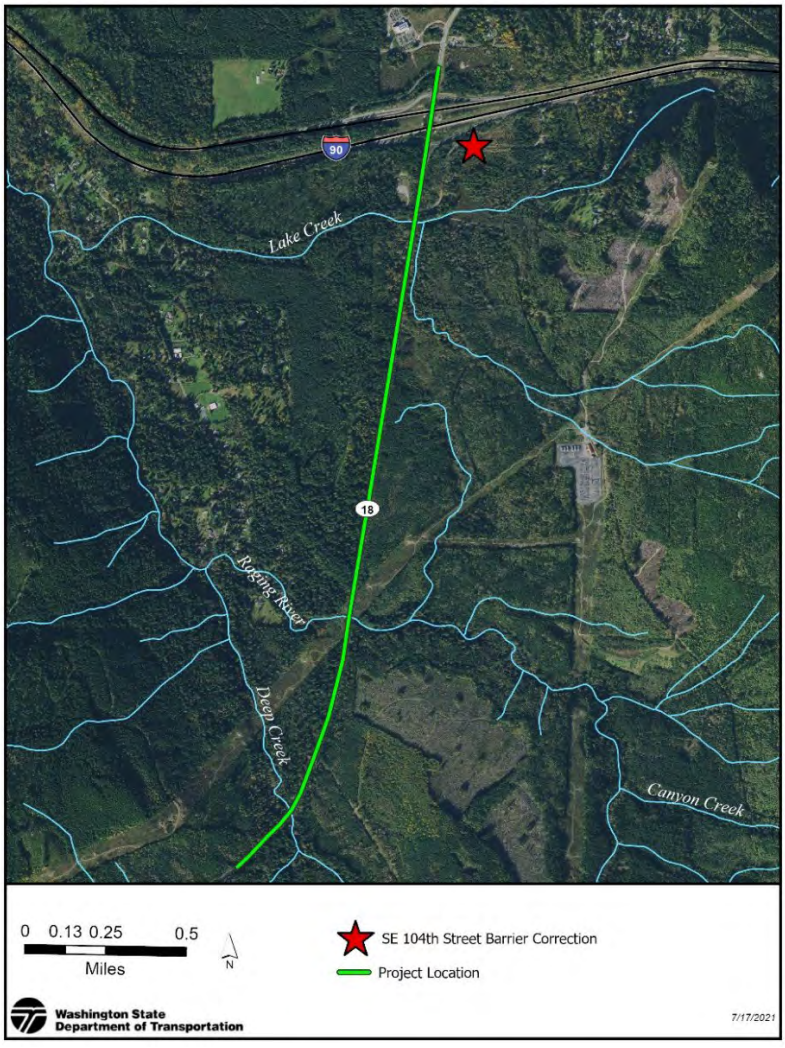


Figure 7. Map showing the location of the stream compensation site in relation to the project impact site.

7.2. Rational for Site Selection

The SE 104th Street site was selected due to its proximity to the project location, and the benefits to the larger project from replacing this barrier and opening newly created habitat. The SE 104th Street site is located immediately adjacent to the project location and downstream of a significant portion of the fish passage work on the project (Figure 4). The stream that flows through this barrier, WDFW ID 935013, under SE 104th Street is the same stream that flows through the I-90/SR 18 Interchange (Stream LC-G) where the stream will be realigned and fish passable structures will be installed. This project location was selected as it will directly open habitat to the newly constructed stream through the interchange. While this barrier is owned by King County, there was no timeline to address this barrier. By completing this work at a similar time to the larger project, this habitat will be available for fish to access from Lake Creek. This project addresses feedback received from regulatory agencies and tribal co-managers and provides a comprehensive mitigation strategy that results in a net benefit to aquatic resources in the project area and within the same subbasin as project impacts.

7.3. Compensation Site Existing Conditions

The existing SE 104th Street culvert (WDFW ID 935013) is a fish passage barrier on Stream LC-G, downstream of the project area. Downstream of the culvert is a large wetland complex that the stream flows through until entering Lake Creek. Upstream of the culvert, the stream flows in a channelized stream along SE 104th Street after flowing through the I-90/SR 18 Interchange in ditched channels and concrete flumes. The portion of the stream in the interchange is being addressed for fish passage barrier corrections and creating a new stream channel throughout the interchange. This portion of the work is expected to be completed in 2024.

Stream LC-G is a perennial stream and currently provides moderate to low quality habitat in the project vicinity. Along SE 104th Street, the stream functions as a roadside ditch, receiving stormwater runoff from SE 104th Street. Along the right bank, there is a lack of a stream buffer due to fill from the road prism. The stream buffer on the left bank is densely vegetated and includes a few mature conifers and deciduous species and many saplings. The stream supports, or has the potential for use by, coho salmon (*Oncorhynchus kisutch*), steelhead trout (*O. mykiss*), sea-run cutthroat trout (*O. clarkii clarkii*), and resident trout species (SWIFD 2021).

Figure 5. Photo of SE 104th Street Fish Barrier Correction Site (Upstream Channel).

7.4. Stream Compensation Site Design

The proposed project will replace the existing 30-inch diameter circular concrete pipe under SE 104th Street with a structure that has a minimum hydraulic opening of 18 feet.

Additional stream design for the SE 104th Street culvert is in progress but will be the responsibility of King County. WSDOT hydraulics is preparing a proposed alignment and will complete the preliminary and final hydraulic design for the site. WSDOT and King County will have regular coordination meetings to discuss the site.

Immediately upstream of the crossing, the project would rehabilitate approximately 500 linear feet of moderate to low quality aquatic habitat. Coupled with a project addressing barriers through the I-90/SR 18 Interchange, this project would provide access to an additional 1,720 linear feet of habitat to the northeast of the Interchange for a total of approximately 2,220 linear feet (0.42 mile) of upstream habitat.

At minimum, the project will allow access to and restore 5,100 square feet of stream channel immediately upstream of the structure. In addition, the stream channel will be shifted away from the SE 104th Street road prism which will improve water quality and riparian habitat functions. The stream buffer will be restored with native woody vegetation.

WSDOT will enter into an agreement with King County that construction of the fish passage project will be completed within five years of the signed agreement. This agreement is still in

development as of the writing of this report. While the work is funded by WSDOT as mitigation for the project, King County will design and construct the project as well as retain ownership and long-term maintenance of the site.

7.5. Stream and Riparian Functions

The SE 104th Street fish barrier correction will provide stream and riparian function including fish habitat, riparian buffer, instream, water conveyance, and water quality functions. Fish habitat will benefit the most from the barrier correction. At the immediate location, the low functioning stream will be rehabilitated. Streambed cobbles will be added to the channel that will improve instream fish habitat as well as habitat for macroinvertebrate communities. The fish barrier correction will open fish habitat throughout the interchange where improvements are being made to the stream channel.

Water conveyance functions will be improved by allowing natural stream flow from Stream LC-G upstream, through the crossing and to the downstream wetlands and Lake Creek. The existing structure is currently submerged on both ends which prohibits natural hydraulic processes at this location. These functions will be restored as part of this project.

Water quality functions will be improved by moving the stream further from the roadway. This will reduce runoff from the roadway that directly enters the stream. In addition, stormwater will be filtered as it flows through the newly planted buffer. This will improve water quality in Stream LC-G as well as Lake Creek downstream.

By realigning the stream away from the roadway, the riparian habitat will be enhanced and will provide nutrients to the stream. The buffers will be planted with native vegetation.

7.6. Stream Mitigation

WSDOT proposes the SE 104th Street fish barrier correction site to compensate for all project permanent stream impacts that are not otherwise mitigated by the project design. As discussed in the stream impacts section, compensatory mitigation is being proposed for permanent stream impacts of 150 linear feet (1,406 square feet) due to a loss of stream channel; this includes 77 linear feet of fish-bearing stream channel and 73 linear feet of non-fish bearing stream channel. There will be an indirect stream impact to Lake Creek as a result of the bridge widening to accommodate two additional lanes that would not be required if just the fish passage work was completed. This area of indirect impacts due to overwater structure and shading is not considered a loss of waters but is a minor impact to functions and is 22 linear feet (790 square feet). Additionally, there is some change to functions in non-fish bearing streams that will be riprap lined. The total length of stream channel that will be lined with riprap is 1,101 linear feet (4,916 square feet). While this is not a loss of waters, it is a degradation of habitat. In total, the SE 104th Street fish barrier correction project will provide an estimated 500 linear feet (5,100 square feet) of restored stream channel in addition to access to 1,720 linear feet (0.33 miles) of fish habitat throughout the interchange. The WSDOT proposal is that the restored stream channel compensates for the permanent stream loss, and the newly opened up habitat compensates for the lost function of the rip-rapped streams and indirect shading.

In addition to compensation for stream channel and function loss from the transportation project, the SE 104th Street site is also proposed to compensate for the deviation from Water Crossing Design Guidelines (WDFW 2013) in the correction of fish passage barriers on LC-E in the interchange. These barriers are subject to the US v. WA 2013 Federal Court Injunction and

WSDOT will document compliance with WDFW and impacted Treaty Tribes outside of this document. WSDOT will continue to coordinate with King County, USACE, Ecology, WDFW, and affected Tribes on the design, permitting construction and monitoring of the SE 104th Street site.

7.7. Site Maintenance and Monitoring

King County will maintain ownership of the SE 10th Street site. A majority of the work will occur within King County ROW and on the adjacent Echo Lake Interchange parcel that is owned by King County Parks that must be maintained as a scenic site and used for conservation purposes based on terms of the acquisition.

As part of the long-term maintenance, King County will monitor the project in alignment with their fish passage monitoring requirements which generally includes five years of monitoring along with any other monitoring required as part of project permitting. In addition, King County will monitor the structure for the entire design life to ensure fish passage. Any planted vegetation will be monitored as well, likely for three years. More information will be available on monitoring as the project progresses.

7.8. King County Aquatic Areas Compliance

According to KCC 21A.24.380, mitigation must be provided at or contiguous with the development site to the extent practical; however, off-site mitigation may be approved when consistent with the provisions of KCC 21A.24.133. Off-site mitigation through the King County Mitigation Reserves Program may be approved per KCC 21A.24.137 when appropriate. Off-site mitigation through wetland mitigation banking may be approved per KCC 21A.24.345.

Mitigation of temporary impacts to wetlands, streams, and buffers will be provided on site in the form of restoration and enhancement of disturbed areas. However, suitable property for compensatory mitigation of the project's permanent impacts is not available on site or within the nearby adjoining ROW, and credits from the King County Mitigation Reserves Program were not available for projects in this area. The remaining available options are permittee-responsible off-site mitigation and the use of approved bank credits.

Permittee-responsible off-site mitigation is the least desirable of these options, as it requires location of a suitable site in the watershed that addresses both the functions lost as the result of the project and needs of the watershed A substantial design effort is required in order to provide suitable compensation for lost functions; the mitigation will take some years to mature, resulting in temporal loss of wetland area and function; and there is a risk that the mitigation will not fully satisfy the performance standards, requiring additional compensation.

The final option is the use of a mitigation bank. Mitigation banks provide compensation through the purchase of credits for mitigation that has been previously designed, constructed, and proven to meet performance standards. As a result, there is no risk of failure to meet standards, and no temporal loss of wetland area or functions. Since mitigation banks are larger in scale, they have a greater potential to address watershed level deficiencies as well as provide for efficient use of WSDOT's public funds.

As a result, compensatory mitigation for unavoidable permanent impacts to wetlands, streams, and buffers will be provided through the use of mitigation bank credits at an approved bank site. This project will follow the requirements of the 2008 Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332) with regard to order of mitigation preference, and the current guidance provided in the Washington State Department of Ecology

Wetland Mitigation in Washington State—Part 1: Agency Policies and Guidance (Version 2) (Ecology et al. 2021) with regard to overall mitigation approach.

8. On-Site Restoration

The following section outlines areas where impacts will be restored on site.

8.1. Temporarily Impacted Areas

After construction, WSDOT will restore all temporarily impacted areas on site. This includes both short and long-term temporary impacts to wetlands (0.459 acres), streams (0.508 acres) and buffers (3.87 acres). Restored areas will be planted with native vegetation, including grasses and shrubs adjacent to the roadway, and trees where there is a suitable setback from the roadway. These areas area identified on the JARPA Restoration Sheets (Sheets 68-98).

In addition, some areas that are being permanently impacted by the placement of fill will also be planted with native vegetation, although these areas are not considered restoration since the area will no longer be a critical area but instead part of the transportation infrastructure. Due to the existing high-quality habitat throughout the project area, areas being planted with shrubs and trees throughout the project area were maximized to the extent allowed by WSDOT planting policies. See the Restoration Sheets and Revegetation Sheets in the JARPA and Planting Plan Drawings for more details on restoration planting areas and planting mixes.

8.2. On-Site Buffer Mitigation at Deep Creek

WSDOT is proposing to use buffer creation at Deep Creek to compensate for stream buffer impacts areas not otherwise mitigated for through bank credits. Stream buffer creation at Deep Creek is the result of roadway fill being removed and native vegetation being replanted. A total of 19,886 square feet of stream buffer will be created. The stream buffer creation will offset 19,886 square feet of stream buffer impacts in the project area at a 1:1 ratio. Under the structure, planting will extend from just below the OHWM through the 100-year floodplain.

The Deep Creek site will be monitored for ten years to ensure plant establishment. Survival will be assessed by WSDOT and the Project's design-build contractor after initial planting, and the landscape contractor will replace all plantings that do not survive within the first year. The design-builder will also reseed any areas of bare soil within the first year. Plant substitutions, if necessary, will be agreed upon by the project biologist and landscape architect. Plants damaged or destroyed by vandalism or wildlife grazing will also require replacement.

8.3. Vegetation Management Plan

The applicant will prepare a vegetation management plan for the affected critical areas and buffers in accordance with the requirements of KCC 21A.24.185 to be included in the clearing and grading permit submittal. The plan will be prepared by a certified arborist and registered landscape architect, with technical assistance from a geologist where geologic hazard areas are involved or an ecologist or wildlife biologist or other qualified specialists where resource protection areas are involved.

The vegetation plan will be based on the informatization provided in the project's Critical Areas Repot and Mitigation Plan, Temporary Erosion and Sediment Control Plan, Planting Plans, and WSDOT guidance on plant establishment, vegetation maintenance practices, and invasive species control procedures.

The vegetation management plan will describe measures and goals for the long term management of sensitive areas. The plan will incorporate management procedures for wildlife habitat protection and enhancement, water quality protection and enhancement, maintaining or improving hydrologic conditions, and protecting the public health and safety from geologic hazards and erosion.

8.4. Monitoring

Following construction, WSDOT will prepare as-built drawings to document that the project was constructed per plan, including riparian restoration areas. The site should be evaluated qualitatively the summer following plant installation to evaluate survival rates and document the presence of non-native invasive species. The WSDOT Plant Establishment crew will monitor and adaptively manage the plantings in the project area to ensure ongoing success.

- Year 1: As-built report will be completed that will include a short cover-letter describing the state of the planted restoration areas and will include photographs of the site. Monitoring will be provided by WSDOT's contractor. The contract will require that planting areas be maintained in a weed free condition, plants to be healthy and vigorous, and 100% replacement of plant mortality.
- Years 2-5: Site performance will be provided by WSDOT's Plant Establishment Crew. The site will be adaptively managed. Activities will include weeding, debris removal, watering and replanting as needed to meet permit obligations.

For the non-buffer restoration areas, these areas will be maintained per the WSDOT roadside restoration requirements and mitigation monitoring protocols.

8.4.1. Contingency Plan

Contingency actions may be needed to correct unforeseen problems and will be coordinated with permitting agencies as needed. Contingency measures will be implemented to meet performance standards unless changes to performance criteria are approved by appropriate permitting agencies.

Problems related to vegetation include plant mortality, and poor growth resulting in low plant cover. Contingencies for plant mortality and insufficient plant cover may include:

- Plant replacement – Additional planting may be required to meet plant survival and plant cover requirements. Per the proposed monitoring requirements 80% plant survival will be required in the first three years of plant establishment. Plant species will be evaluated in relation to site conditions to determine if plant substitutions will be required.
- Weed control – Control of non-native invasive species may be required to meet survival and plant cover requirements. Weed control methods could include mechanical or hand control, mulching, or herbicide application.
- Herbivore control – If plant survival performance criteria are not met due to animal browse, the wildlife responsible will be identified and appropriate control measures will be attempted. This could include plant protection or the use of repellents. However, some pestilent and invasive wildlife species are difficult to avoid. Implementing precautionary measures with design and placement will minimize unwanted species but likely not eliminate them. Wildlife damage and manipulation to plantings and structures should be expected to occur and, with exceptions, it may be necessary to accept the

situation and allow the vegetation to mature under these conditions. Occasionally it may be necessary to dissuade, exclude, and perhaps eliminate these destructive wildlife species. Native species such as beaver may initially have perceived damaging effects on the expected outcome of a restoration site; however, the site modifications that result from their activities can create functions and habitats suited to several other species.

- Vandalism – To prevent vegetation disturbance from vandalism, fence installation and sensitive area signage may be installed.

8.4.2. Noxious and Invasive Weed Control

Washington State-listed and King County-listed noxious weeds will be managed and controlled to reduce competition with and enhance the survival of native tree and shrub plantings and native volunteers.

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