WSDOT

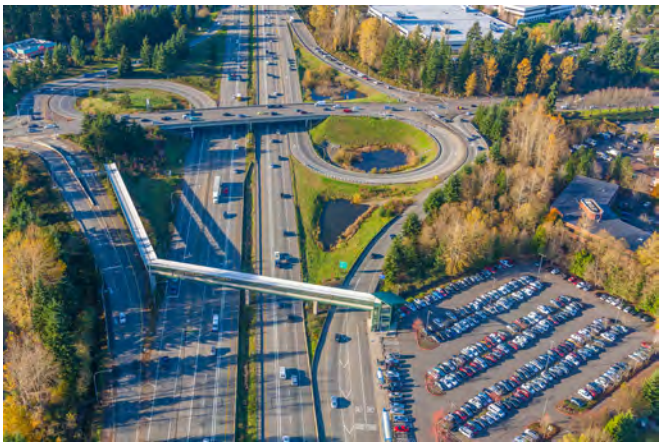
U. S. Department of Transportation
Federal Highway Administration

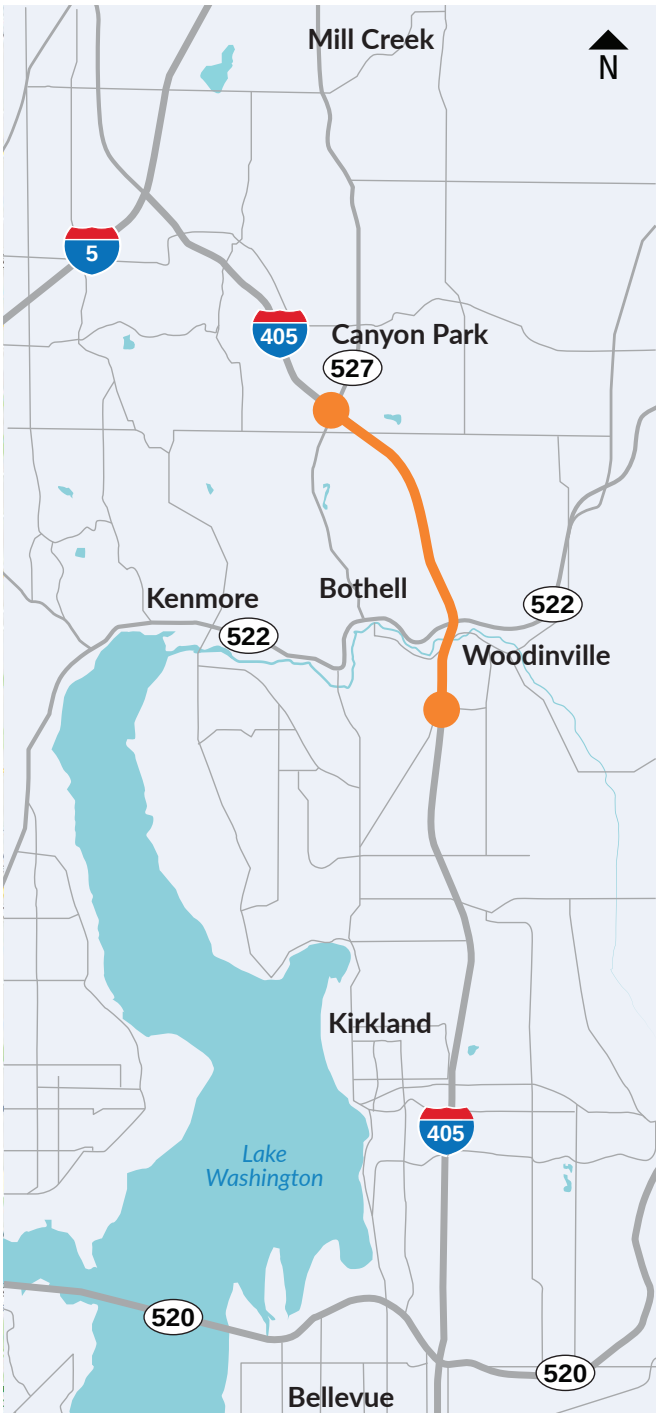
MAY 2020

ENVIRONMENTAL ASSESSMENT

Appendix I: Ecosystems Discipline Report

I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (MP 21.79 to 27.06)





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SECTION 1 SUMMARY

This *Ecosystems Discipline Report* was prepared in support of the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (Project) Environmental Assessment (EA). This report evaluates the environmental effects of proposed improvements on Interstate 405 (I-405) from milepost (MP) 21.79 to MP 27.06 in support of the EA.

1.1 Purpose of this Discipline Report

The purpose of this report is to identify ecosystems in the study area and discuss how the Project may result in temporary (construction) or long-term (operational) effects to those resources. This report also identifies the policies and regulations that govern ecosystems resources, summarizes the study approach used to identify and evaluate ecosystems, details potential Project effects, and describes measures included in the Project to avoid or minimize effects.

1.2 Study Approach

The Washington State Department of Transportation (WSDOT) gathered existing information on wetlands, aquatic and terrestrial habitats, and species in the study area through available literature, agency data, previous reports within and near the Project vicinity, and online resources. WSDOT collected additional information on these ecosystems by conducting wetland delineations, stream habitat surveys, and site visits to verify terrestrial conditions and wildlife presence. The information was then compared to the Project footprint to assess potential temporary and permanent effects.

1.3 Existing Conditions

Three primary types of ecosystems exist within the study area: wetlands, aquatic habitats, and terrestrial habitats.

1.3.1 Wetlands

Wetlands are transitional zones between terrestrial and aquatic environments. A total of 52 wetlands covering approximately 17 acres were delineated in the study area. The 52 wetlands were rated as Category II (5 wetlands), Category III (28 wetlands), and Category IV (19 wetlands). The hydrogeomorphic classifications include 29 depressional wetlands, 22 slope wetlands, and one riverine wetland. The Cowardin classes present are primarily palustrine emergent, palustrine scrub-shrub, and palustrine forested (Cowardin 1979).

Wetland ecosystems in the study area are generally degraded, as all identified wetlands have been affected by urbanization to an extent. The functionality and value of wetlands within the study area vary greatly. Many of the wetlands in the study area receive water through groundwater, precipitation, and stormwater runoff. Wetland vegetation mainly consists of trees of varying maturity, shrubs, and/or grasses intermixed with nonnative invasive plant species. Wetland conditions within the study area are described in greater detail in Section 4.1 of this report and Section 4.2 of Appendix L, *Draft Wetland and Stream Assessment Report*, of this EA.

1.3.2 Streams and Aquatic Resources

Aquatic areas are streams, rivers, and lakes that support aquatic organisms or life stages of organisms. Within the study area, WSDOT assessed multiple streams located in the Juanita Creek, Sammamish River, and North Creek basins. Aquatic ecosystems within the study area vary from small stream channels to a large river. Historically, many rivers and streams in the study area have been channelized, diked, and/or straightened to accommodate development.

This report primarily focuses on resident and anadromous fish species that inhabit the waterbodies within the study area; however, aquatic areas also offer habitat for amphibians and macroinvertebrates, a major prey source for fish. The study area hosts a number of federal-listed, state-listed, and special-status fish species. Aquatic habitat conditions within the study area are described in greater detail in Section 4.2 of this report, Section 4.3 of Appendix L, *Draft Wetland and Stream Assessment Report*, and Sections 6.2 and 7.2 of Appendix N, *Biological Assessment*, of this EA.

1.3.3 Terrestrial Wildlife

Terrestrial areas typically include upland habitat that provide wildlife areas for feeding, migrating, resting, and breeding. Terrestrial habitat in the study area consists of forests, shrubs, grasses, and maintained vegetation. Many invasive species have propagated areas abutting the highly disturbed I-405 corridor. Elsewhere in the study area, landscaping shrubs and trees associated with residential and commercial development have been planted. Other locations within the study area are preserved with second-growth forests adjacent to stream systems that offer a variety of habitats.

Terrestrial ecosystems within the study area are generally fragmented. Fragmentation can limit access to resources, decreasing survival odds and reproductive success. Despite the varying levels of urbanization throughout the I-405 corridor, these ecosystems still support an array of resident and transient animal and bird species. No federally or state listed terrestrial species are known to inhabit the study area. Terrestrial conditions within the study area are described in greater detail in Section 4.3 of this report.

1.4 Project Effects Overview

1.4.1 No Build Alternative

With the No Build Alternative, only routine activities such as road maintenance, repair, and safety performance improvements would take place. There would be no construction effects on wetlands, aquatic habitat, and terrestrial habitat. However, conditions for natural resources would not be improved. Because of anticipated increases in traffic volumes and congestion, the amount of untreated stormwater entering the nearby water bodies from I-405 could affect water quality and aquatic habitat over time. The water quality and quantity retrofit proposed as a part of the Project would not be implemented, and those benefits would not be realized. Correcting the identified fish barriers would likely be delayed in the No Build Alternative along with any anticipated hydrologic and habitat benefits.

1.4.2 Build Alternative

Operational Effects

The Project would result in permanent effects on 21 wetlands (up to 6 acres) and associated wetland buffers (up to 4 acres). Additionally, the Project would result in up to 1 acre of permanent indirect wetland impacts. Where feasible, design modifications were made to the Project footprint to avoid or minimize permanent effects on wetlands and wetland buffers. All permanent impacts will be mitigated in accordance with local, state, and federal regulations.

The Project would benefit aquatic habitats and species by removing four existing bridge piers in the Sammamish River and replacing five fish barriers with restored stream connections. The fish barrier corrections would result in improved anadromous fish access to approximately 24,330 linear feet of upstream habitat. The Project would result in up to 16,600 square feet of permanent stream impacts and up to 15,900 square feet of permanent stream buffer impacts. Aquatic ecosystems in the study area would receive increased stormwater runoff through three new stormwater outfalls. Water from those outfalls would be treated before discharging into the selected streams.

Approximately 15.5 acres of vegetation would be permanently cleared in the study area. Trees will be replaced in accordance with the WSDOT *Roadside Policy Manual* (WSDOT 2015), which aims to replant trees within the Project limits where feasible and uses a ratio that considers the existing size of the trees. Study area noise levels for wildlife species would be similar to the No Build Alternative.

Construction Effects

Project construction would temporarily affect about 0.25 acre of wetlands and up to 1 acre of wetland buffers in the study area. After the Project is complete, these temporarily disturbed areas will be restored and replanted with appropriate native vegetation, but habitat functions will be temporarily diminished while the planted trees, shrubs, and emergent plants become established.

The Project would result in up to 5,700 square feet of temporary stream impacts and up to 143,400 square feet of temporary stream buffer impacts. The Project's temporary stream and stream buffer impacts would result from the five proposed restored stream connections, channel regrading, roadway widening, and the installation of bridge abutments and retaining walls.

Construction would require temporary clearing of approximately 8.5 acres of vegetation. Any temporarily cleared areas would be restored with native species appropriate to the area, reducing the effects of the disturbance to when revegetation has become established. Trees will be replaced in accordance with the WSDOT *Roadside Policy Manual* (WSDOT 2015), which aims to replant trees within the Project limits where feasible and uses a ratio that considers the existing size of the trees. Construction activities and equipment moving to and from the Project site would temporarily increase noise in the study area, which may adversely impact nearby wildlife. Noise generated from construction equipment would extend approximately 1.9 miles over land before attenuating to ambient noise levels.

SECTION 2 PROJECT DESCRIPTION

2.1 Proposed Project Elements

The Project begins on I-405 south of the I-405/SR 522 interchange at milepost (MP) 21.79 and continues to just north of the I-405/SR 527 interchange to MP 27.06. Exhibit 2-1 lists improvements proposed with the Project. Exhibit 2-2, Sheets 1 through 5, show the locations of the proposed improvements.

Exhibit 2-1. Improvements Proposed with the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

Project Element	I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project
I-405 lanes and shoulders from SR 522 to SR 527	– Create a dual ETL system from MP 21.79 (south of the I-405/SR 522 interchange) to MP 27.06 (just north of the I-405/SR 527 interchange). • From MP 21.79 to MP 22.30: Restripe existing lanes to create a dual ETL system. • From MP 22.30 to MP 26.30: Resurface and widen I-405 to add one ETL in each direction. • From MP 26.30 to MP 27.06: Widen I-405 to construct direct access ramps and connect to the existing single ETL starting near MP 26.30.
I-405 tolling from SR 522 to SR 527	– Construct new tolling gantries to collect tolls for the ETLs and direct access ramps.
I-405/SR 522 interchange area	– Construct new direct access ramps (one in each direction) and two inline transit stations in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines, and site furnishing such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Construct a bus station and turnaround loop, pick-up and drop-off facilities, and new non-motorized connection to the North Creek Trail near the SR 522 interchange. Funding and construction timeline to be coordinated with local transit agencies. – Construct new northbound bridge through the SR 522 interchange. • Reconfigure the northbound I-405 to eastbound SR 522 ramp from one lane to two lanes. – Reconfigure I-405 on- and off-ramps. • Realign the southbound I-405 to westbound SR 522 ramp. • Realign the eastbound and westbound SR 522 ramps to northbound I-405.
SR 522 roadway	– Add three signalized intersections, which would change where the freeway portion of SR 522 begins and ends. Signals would be added at the following locations: • The northbound I-405 to westbound SR 522 off-ramp and the eastbound SR 522 to northbound I-405 on-ramp. • The southbound I-405 to eastbound SR 522 ramp. • Between the above two locations where the new I-405 ETL direct access ramps connect with SR 522.
228th Street SE	– Widen the northbound I-405 bridge over 228th Street SE.

Exhibit 2-1. Improvements Proposed with the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

Project Element	I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project
SR 527 interchange area	– Construct new direct access ramps to the north, south and east just south of SR 527 at 17th Avenue SE. – Construct two inline transit stations (one in each direction) in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines, and site furnishing such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Reconstruct the pedestrian bridge over I-405.
17th Avenue SE, 220th Street SE, SR 527	– Reconfigure 17th Avenue SE and portions of 220th Street SE and SR 527 to include a roundabout at the Canyon Park Park and Ride, bicycle and pedestrian improvements, and improvements at the SR 527 and 17th Avenue SE intersections with 220th Street SE.
Fish passage	– Replace five fish barriers with restored stream crossings at the following streams: • Par Creek (WDFW ID 993083) • Stream 25.0L (WDFW ID 993104) • North Fork of Perry Creek (WDFW ID 08.0070 A0.25) • Two fish barriers at Queensborough Creek (WDFW ID 993084 and 993109)
Sammamish River bridges	– Remove the existing northbound I-405 to eastbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. – Remove the existing northbound I-405 to westbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. – Build a new bridge for northbound I-405 traffic over the Sammamish River. – Build a new bridge over the Sammamish River for the new direct access ramp at SR 522. – Build a new bridge over the Sammamish River for the northbound I-405 to SR 522 ramp.
Noise and retaining walls	– Construct 3 new noise walls near NE 160th Street and SR 527. See Exhibit 2-2, Sheets 1, 4 and 5. – Construct several new retaining walls. See Exhibit 2-2, Sheets 1 through 5.
Stormwater management	– Provide enhanced treatment for an area equivalent to 100 percent of new PGIS (approximately 24 acres). – Retrofit about 23 acres of existing untreated PGIS and continue to treat stormwater from the approximately 44 acres of PGIS that currently receives treatment. – Construct three new stormwater outfalls, one on the Sammamish River and two on the North Fork of Perry Creek.
Construction duration	– Construction is expected to last 3 to 4 years, beginning in 2021.

ETL = express toll lane; ID = identification number; MP = milepost; OHWM = ordinary high water mark; PGIS = pollution-generating impervious surfaces; WDFW = Washington Department of Fish and Wildlife

Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 1 of 5

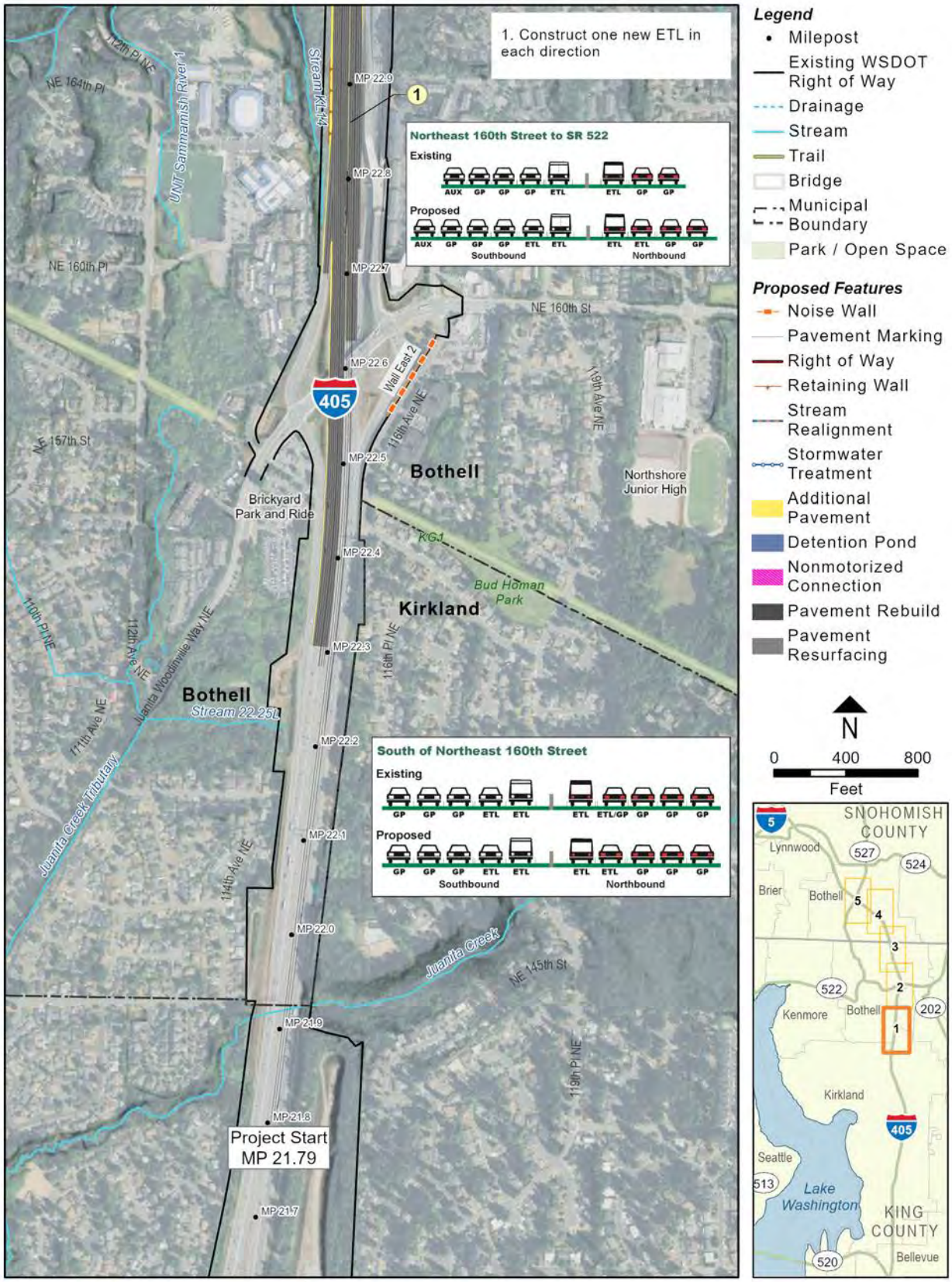
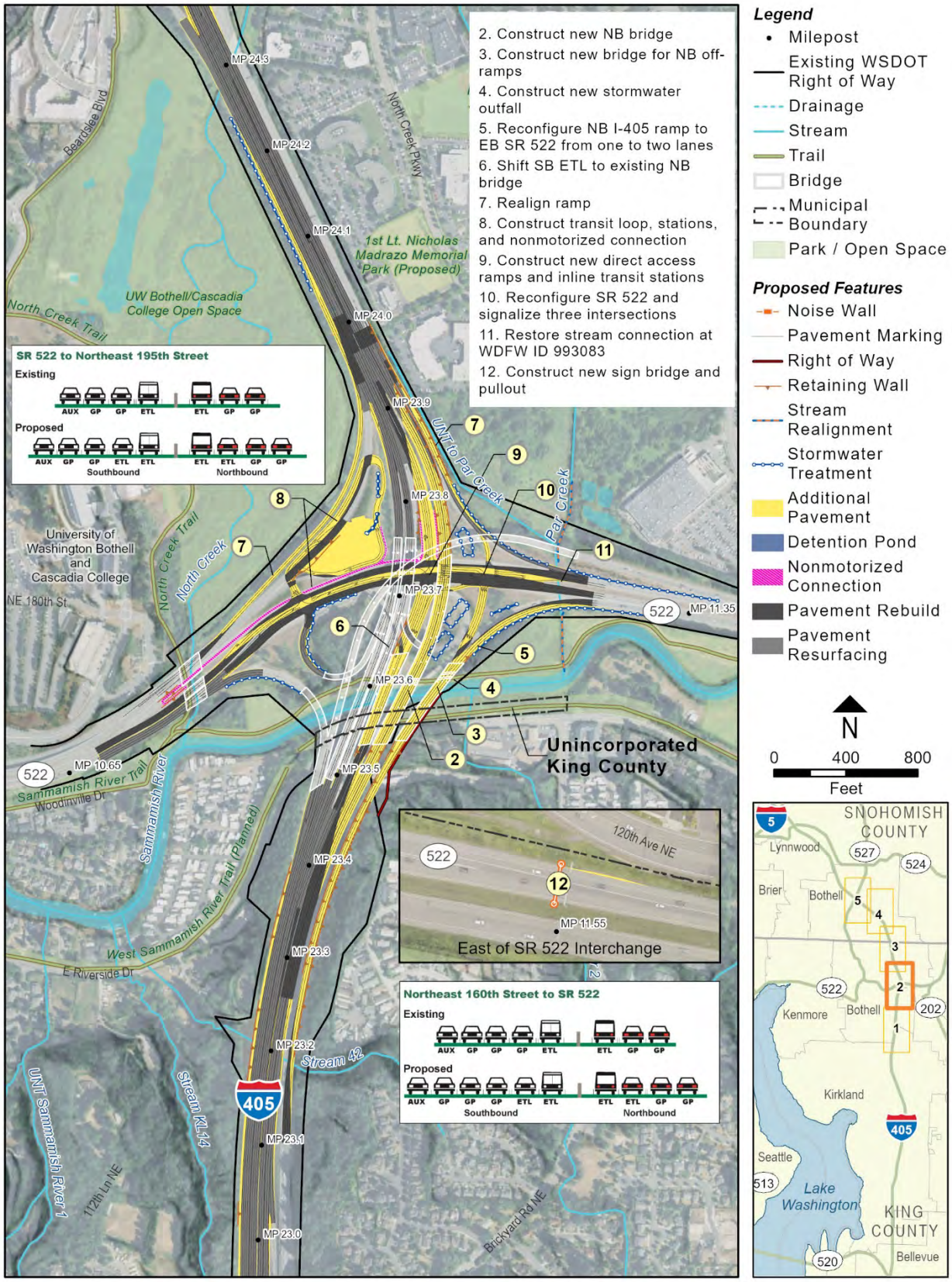


Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 2 of 5



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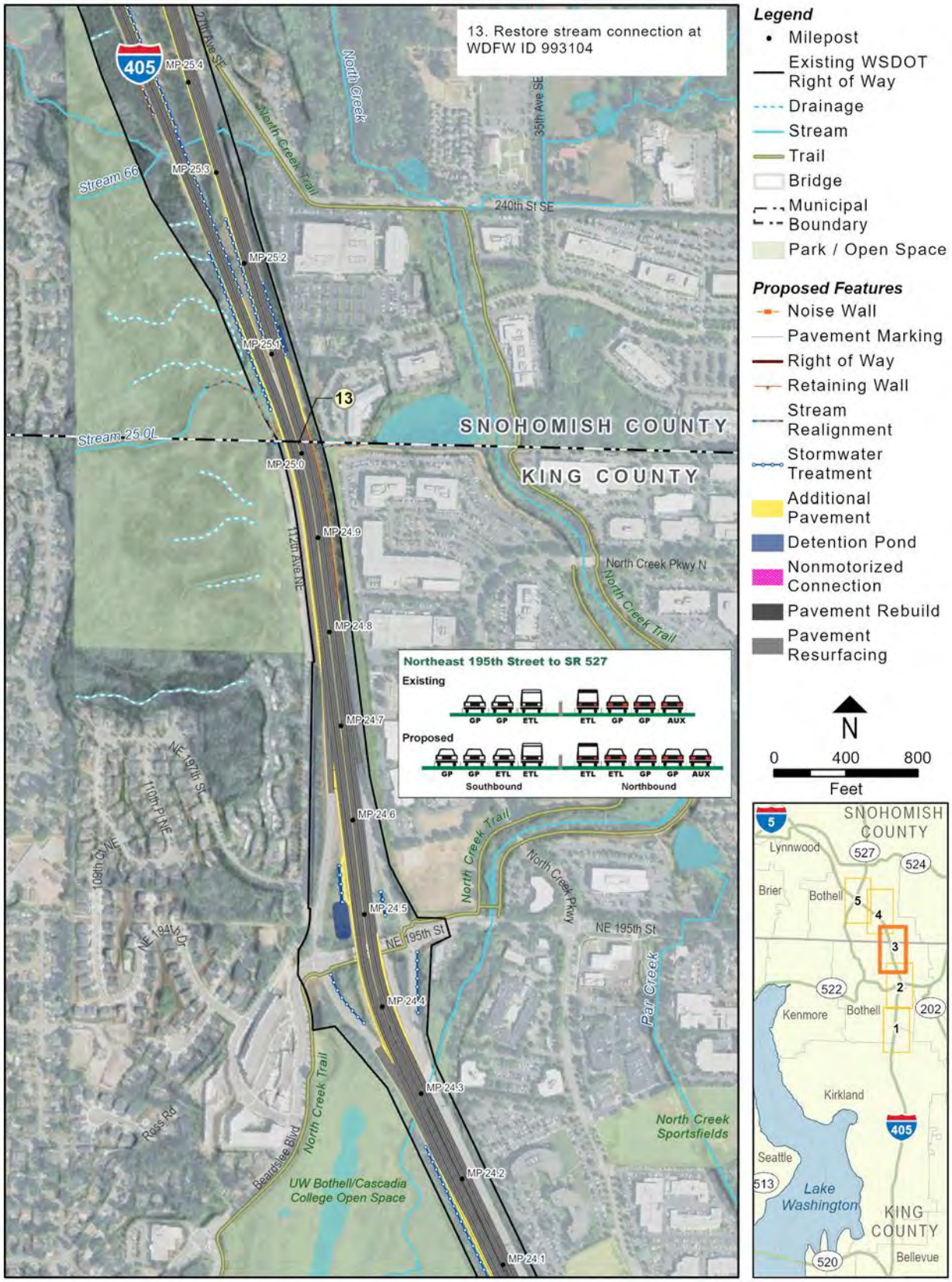


Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 4 of 5

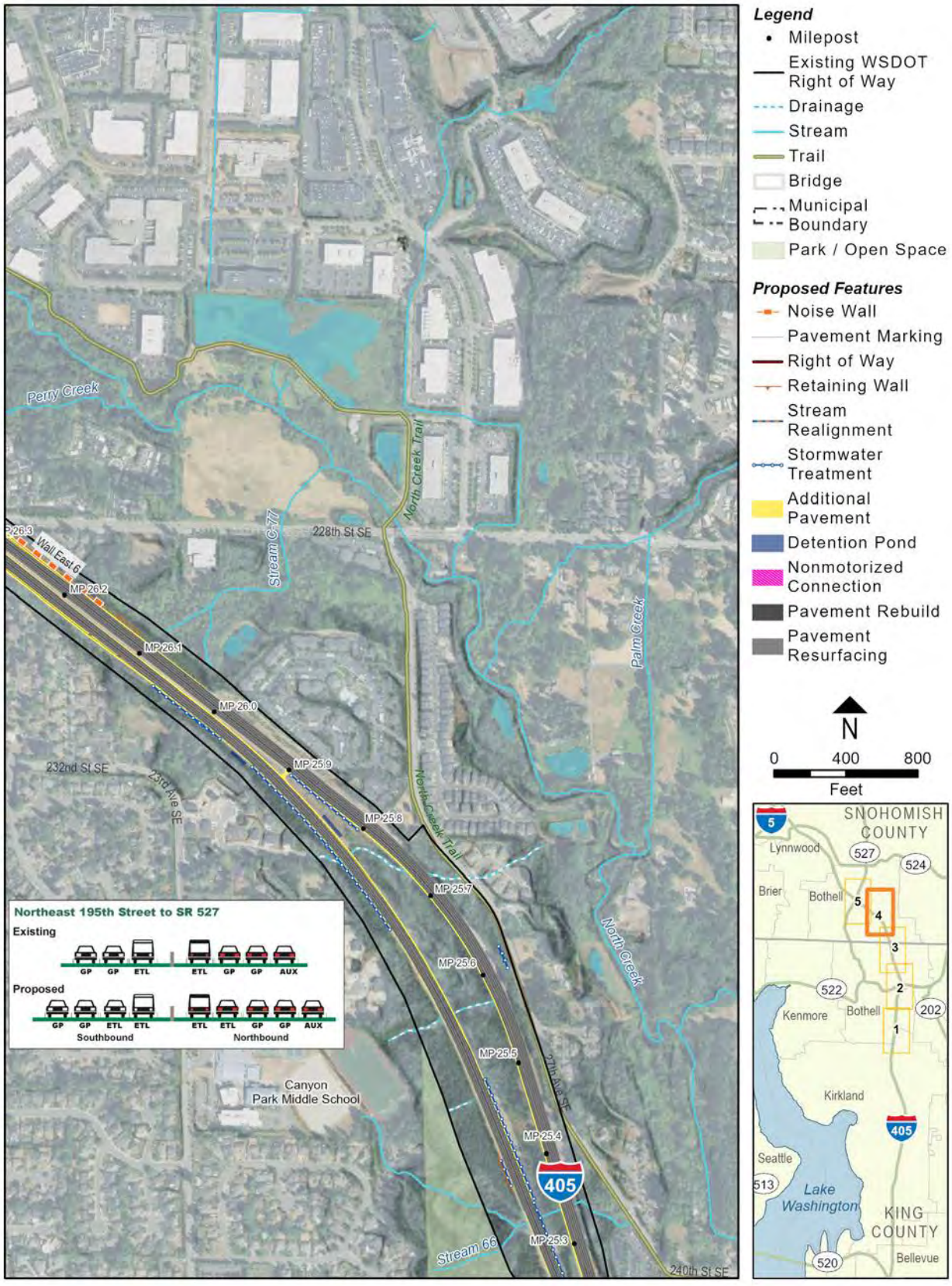
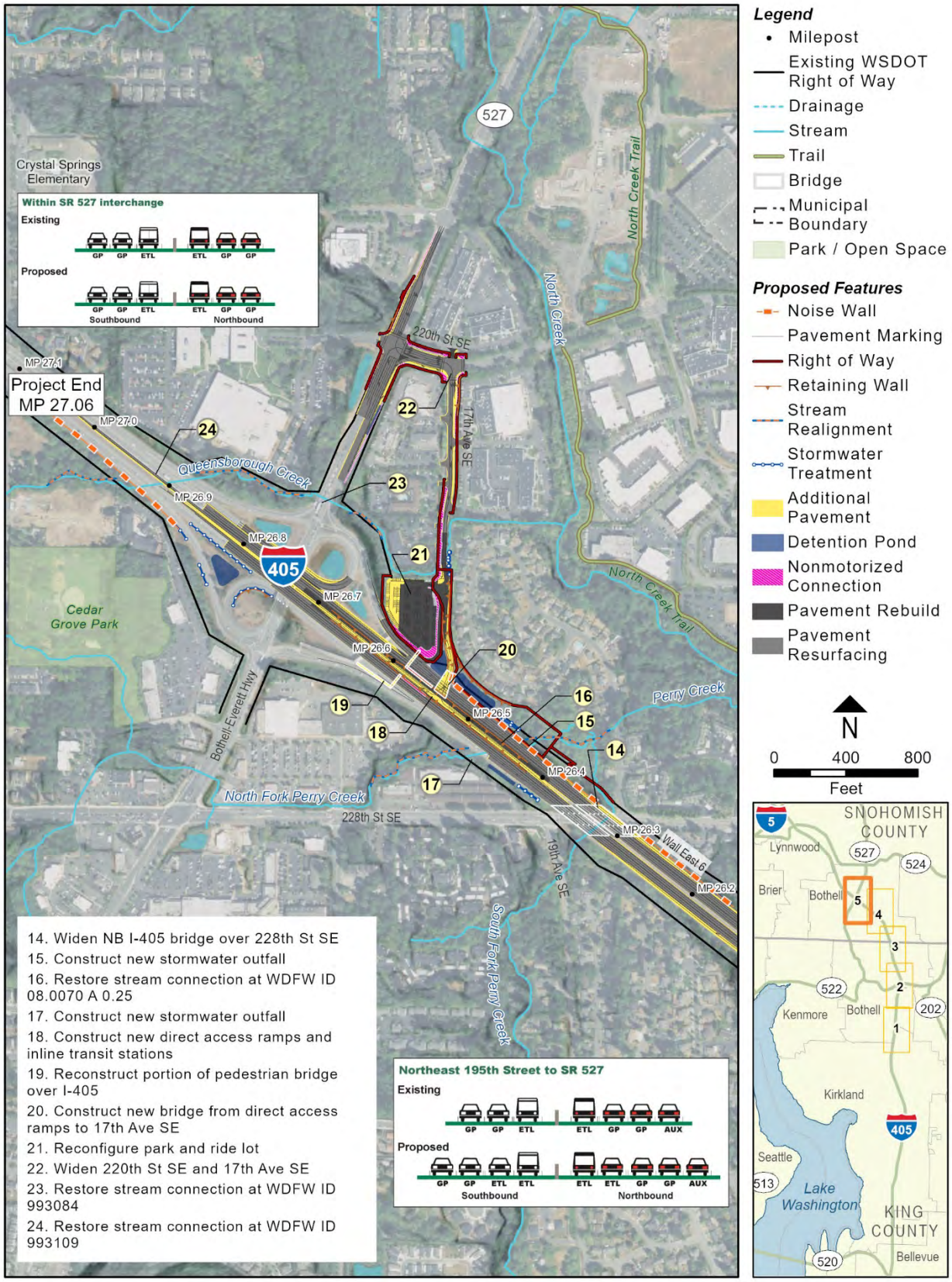


Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 5 of 5



2.2 Express Toll Lanes Overview

How do I get more information about ETLs on I-405?
https://wsdot.wa.gov/Tolling/405/

Currently, there is one ETL in each direction of I 405 between SR 522 and SR 527. WSDOT expects that the new ETL in this section would operate in the same way as the existing ETL, from 5 a.m. to 7 p.m. on weekdays. At all other times and on major holidays, the ETLs would be free and open to all without a *Good To Go!* pass. During operating hours:

- **Single-occupancy vehicles** would pay a toll to use the ETLs with or without a *Good To Go!* pass.
- **Transit, High-Occupancy Vehicles (HOV) 3+, and motorcycles** would travel for free with a *Good To Go!* flex or motorcycle pass.
- **HOV 2+** would travel for free from 9 a.m. to 3 p.m. with a *Good To Go!* flex pass. From 5 a.m. to 9 a.m. and 3 p.m. to 7 p.m. HOV 2+ would pay a toll to use the ETLs with or without a *Good To Go!* flex pass.
- **Large vehicles** over 10,000 pounds gross vehicle weight would not be able to use the ETLs at any time.

2.3 Project Construction Overview

WSDOT expects to construct the Project using a design-build delivery method, in which WSDOT executes a single contract with one entity for design and construction services. 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. If the contractor proposes design modifications not covered by this Environmental Assessment, additional environmental review would be conducted as needed.

Construction would generally occur between 2021 and 2025, but construction activities in some areas would be complete prior to 2025. Once a contractor is selected for the Project, they could use multiple work crews in multiple locations to reduce the overall construction period. Work would include removing existing asphalt and concrete surfaces, clearing and grading adjacent areas, laying the aggregate roadway foundation, placing new asphalt and concrete surfaces, replacing culverts, and building and demolishing bridges. Removing bridge piers from the Sammamish River could require the construction of temporary work bridges and would require in-water work, which may include temporary use of cofferdams and a work barge, depending on the contractors' chosen means and methods. Realigning the I-405 mainline would require approximately 170,000 cubic yards of excavation and 166,000 cubic yards of fill.

Construction equipment would include backhoes, excavators, front-end loaders, pavement grinders, jack hammers, trucks, vactor trucks, cranes, drilling rigs and augers, concrete pumping equipment, and slurry processing equipment. Specific haul routes and the number of construction vehicles would not be known until a construction contract is signed. When possible, the work sites would be accessed from I-405 and SR 522. Construction staging areas for employee parking, large equipment storage, and material stockpiles would be located within WSDOT and Bothell right of way to the extent possible. The contractor may also find other locations for construction staging.

SECTION 3 STUDY APPROACH

This section presents the approach for the analysis of ecosystems effects for the Project. Section 5, Project Effects, presents the results of the analysis.

3.1 Study Area

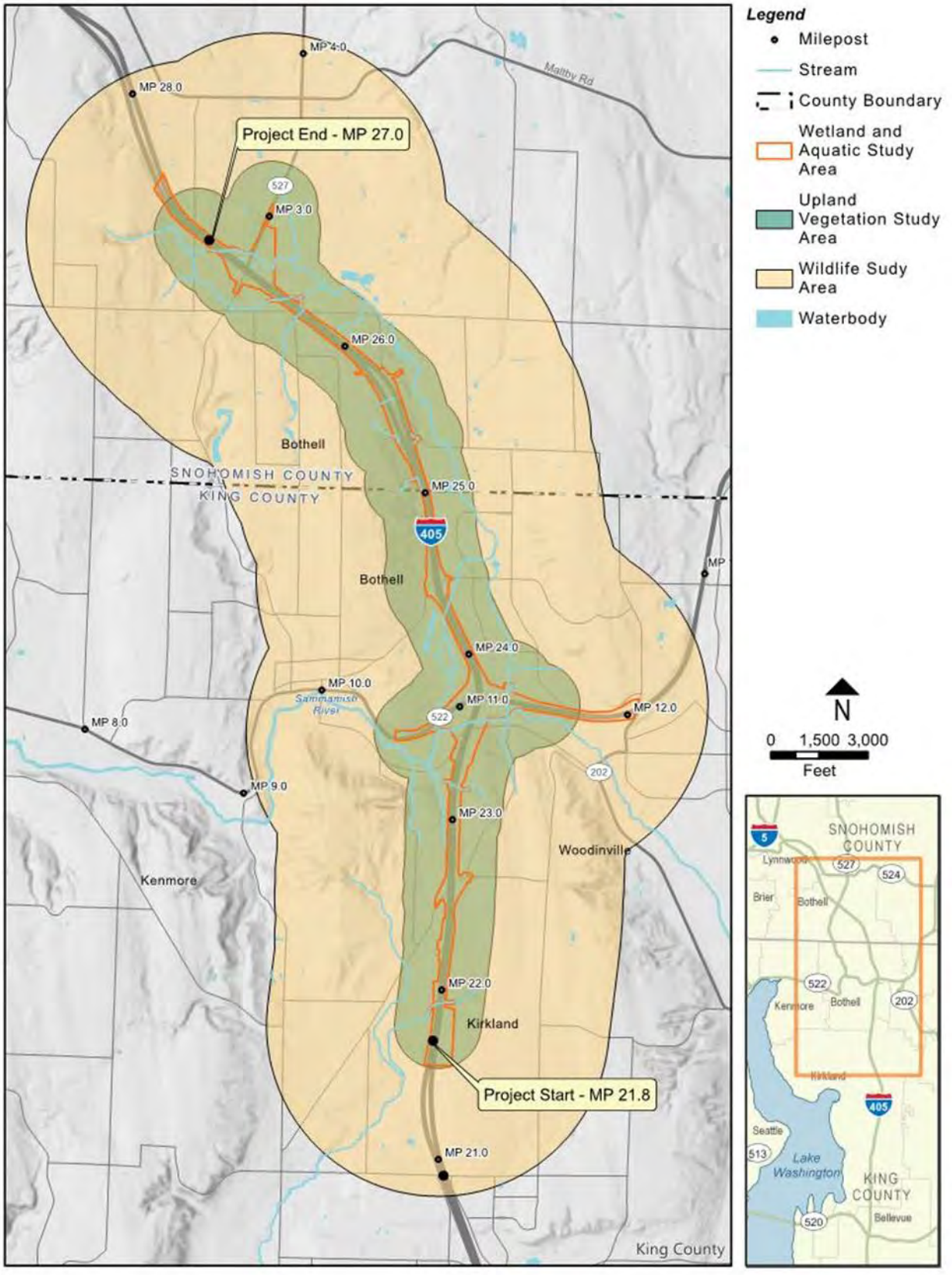
The Project generally includes a 6-mile segment of I-405 extending from south of the I-405/160th Street interchange (milepost [MP] 21.79) to just north of the I-405/ SR 527 interchange (MP 27.06). The Project is located within the cities of Kirkland and Bothell, Washington (Sections 5, 8, and 9 in Township 26 North and Range 5 East, and Sections 30 and 32 in Township 27 North and Range 5 East). The southern limit of the Project occurs at approximately MP 21.79, and the northern limit occurs at approximately MP 27.06. The Project crosses the Sammamish River at river mile 4.6, and it is located within the Cedar-Sammamish Water Resource Inventory Area (WRIA 8).

The study area is situated within the Puget Lowlands of western Washington. The lowlands are physically characterized by a history of glaciation in the region. The glacial movement in the region contributed to the vast variety of the soil deposits in the lowlands region. Some soil horizons are more prone to hydric conditions due to their poor drainage characteristics.

The study area includes areas where temporary or permanent effects to wetlands, aquatic resources, and wildlife habitat from the Project may occur. For wetlands and aquatic resources, the study area comprises the Project footprint, including areas where it extends beyond the WSDOT right of way, and an additional 50 feet beyond the right of way to ensure that all wetlands and streams associated with the Project were included in the analysis, as defined in Section 3.2 of Appendix L, *Draft Wetland and Stream Assessment Report*, of this EA. For aquatic resources, the study area also focuses on the area 300 feet upstream and 300 feet downstream of the location of each project element (e.g., culvert replacements and bridge construction) within a given stream.

Terrestrial wildlife habitat is split into two study areas: upland vegetation resources and wildlife species. For upland vegetation resources, the study area extends to include a 0.25-mile buffer from the Project footprint. For wildlife species, the study area extends to include a 1.0-mile buffer from the Project footprint. Exhibit 3-1 shows the study area for the Project.

Exhibit 3-1. Ecosystems Study Area



3.2 Policies and Regulations

Wetlands, sensitive fish and wildlife, and their habitats are protected by federal, state, and local laws because of their ecological functions and societal value. The laws, regulations, and associated agencies that govern these resources in the study area are detailed in the next sections.

3.2.1 Wetlands

Numerous federal, state, and local regulations govern development and other activities in or near wetlands. Five agencies have jurisdiction over wetlands in the Project study area:

- U.S. Army Corps of Engineers (Corps)
- Washington State Department of Ecology (Ecology)
- City of Bothell
- City of Kirkland
- City of Woodinville

The federal Clean Water Act (CWA) is the principal piece of legislation that regulates activities that may affect wetlands. The CWA grants the Corps and a designated state agency (in this case, Ecology) the authority to regulate certain activities in wetlands and other types of waterbodies. At the city and county levels, Washington State's Growth Management Act requires that wetlands be protected under the local zoning code or other regulations that have been specifically developed to manage wetlands and other environmentally critical areas. In addition to oversight by these agencies, WSDOT and the Federal Highway Administration (FHWA) are obligated to consider wetland protection and to minimize the destruction, loss, or degradation of wetlands as a result of other orders including:

- U.S. Department of Transportation Order 5660.1A (FHWA)
- Federal Executive Order 11990 of 1978
- State of Washington Executive Order 89-10, Protection of Wetlands (WSDOT)

3.2.2 Streams and Aquatic Resources

Aquatic habitat in the study area is also governed by federal, state, and local entities. The main federal regulations or statutes regulating activities that govern aquatic resources in the study area are:

- CWA Section 401 (water quality)
- CWA Section 404 (discharge of materials to waters of the United States, including wetlands)
- Coastal Zone Management Act
- Endangered Species Act (ESA)
- Rivers and Harbors Act Section 10

State laws that regulate these resources include:

- State Hydraulic Code (Chapter 77.55, Revised Code of Washington [RCW])
- Water Quality Standards for Surface Waters of the State of Washington (Chapter 90.48, RCW)
- Washington State Shoreline Management Act (SMA; Chapter 90.58, RCW) implemented through the Washington Administrative Code (WAC)

According to Ecology, projects meeting the Ecology guidelines or equivalent standards, such as the *Highway Runoff Manual* (WSDOT 2019b), are presumed to meet federal and state water standards. Local critical areas ordinances and shoreline management acts are also in place to regulate effects to aquatic resources. In general, these regulations protect aquatic habitats and the species, both aquatic and terrestrial, that depend on these areas.

The effects on aquatic species associated with the changes to stormwater management have been evaluated in accordance with the 2009 Memorandum of Agreement between WSDOT, FHWA, National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), and U.S. Fish and Wildlife Service (USFWS), which includes the use of the Western Washington Highway Runoff Dilution and Loading Stormwater (HI-RUN) Model.

3.2.3 Terrestrial Wildlife

Terrestrial habitat and wildlife species are regulated by federal and state statutes, as well as by local critical areas ordinances. WSDOT follows all federal regulations or statutes regulating activities that govern terrestrial resources. These regulations within in the study area are:

- ESA
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act

3.3 Data Collection and Study Methods

WSDOT gathered existing information on wetlands, aquatic and terrestrial habitats, and species for the study area through available literature, agency data, and online resources (see Section 7, References, for a full listing). WSDOT also reviewed previous information collected on ecosystems from the *I-405, Bellevue to Lynnwood Improvement Project Environmental Assessment Appendix I: Ecosystems Discipline Report* (WSDOT 2011). This report also references more updated information in Appendix L, *Draft Wetland and Stream Assessment Report*, of this EA.

To determine the quantity and quality of existing ecosystem resources, WSDOT conducted wetland delineations and stream surveys, and qualitatively assessed study area vegetation types and habitat in the field. WSDOT collected additional information during a series of interdisciplinary team site visits in which specialists in fisheries, wetlands, wildlife, road design, drainage design, and permitting reviewed natural and humanmade features in the study area. The information was then compared to the Project footprint to assess potential temporary and permanent effects.

3.3.1 Wetlands

Prior to proceeding with any wetland fieldwork, WSDOT conducted a review of existing wetland information based on National Wetland Inventory (NWI) maps developed by the USFWS. Wetland fieldwork was conducted from March 2019 to May 2019. The fieldwork included delineating wetlands, assigning wetland ratings, and recording observations of soils, hydrology, and vegetation, as well as landscape position and general site conditions. Wetlands within the study are were determined in accordance with the *Regional Supplement to the U.S. Army Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (Corps 2010) and rated using *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014) as adopted by all local jurisdictions within the Project study area (City of Bothell Municipal Code 14.04.500, City of Kirkland Zoning Code 90.55, and City of Woodinville Municipal Code 21.51. 300).

Wetland Naming Convention and Classification

Each wetland in the study area was assigned a unique name based on its location relative to the nearest I-405 or SR 522 MP, starting with I-405 MP 21.94 south of the I-405/SR 522 interchange and extending north to MP 27.45 north of the I-405/SR 527 interchange. The portion of SR 522 within the study area is limited to the area near the SR I-405/SR 522 interchange. The wetland number includes the following designations:

- "L" if the wetland is located adjacent to the southbound lanes of I-405 and the westbound lanes of SR 522.
- "R" if the wetland is located adjacent to the northbound lanes of I-405 and the eastbound lanes of SR 522.
- "M" if the wetland is located within the I-405 median.

Wetlands in the study area were classified using two different systems: hydrogeomorphic (HGM) classification and Cowardin classification (Cowardin 1979). The HGM classification describes the hydrologic function and topographic location of the wetland within its ecosystem. Additionally, wetlands in the study area were classified according to the Cowardin classification system. This system bases the classification of wetlands on vegetation and hydrology characteristics. For this Project, WSDOT assigned each wetland in the study area one or more Cowardin classes.

Wetland Ratings

State and local agencies rate and categorize wetlands according to the functions the wetlands provide, their sensitivity to disturbance, and their relative rarity. WSDOT collected field data on the wetlands in the study area and categorized them according to the *Washington State Wetland Rating System for Western Washington 2014 Update* (Hruby 2014) as adopted by Cities of Bothell, Woodinville, and Kirkland. Hruby's rating system analyzes three major wetland functions: water quality improvement, flood and erosion control, and wildlife habitat. To accurately assess a wetland's function value, WSDOT assigned section scores based on entire wetland systems, when applicable, not just the delineated portion of the wetlands within the study area.

The wetlands found in the study area were assigned to Category II, III and IV. Category I wetlands are considered the highest functioning wetland category, none of which were found within the study area.

3.3.2 Streams and Aquatic Resources

WSDOT assessed aquatic habitat in the study area by reviewing publicly available information sources, performing field investigations, and working with resource agencies.

Review of Existing Information

Public data sources reviewed included stream health assessments from local jurisdictions (Bothell 2011; Steward and Associates 2004), habitat inventory and stream assessments from King County (King County 2002), and Washington Department of Fish and Wildlife (WDFW) fish passage and salmon presence maps (WDFW 2019a; WDFW 2019b; WDFW 2019c; WDFW 2019d).

Field Investigation

WSDOT conducted field investigations and delineated the ordinary high water mark (OHWM) of each stream. WSDOT also verified the local jurisdiction stream type for each stream within the study area during the field investigations. Between December 2018 and March 2019, WSDOT walked the entire study area and compared field observations to City of Bothell, City of Kirkland, and King County stream data to verify existing stream alignments and stream conditions. No streams were identified within the City of Woodinville.

Data collected during the stream survey included stream flow path and connectivity, riparian vegetation characterization, and documented fish use. Fish habitat components assessed during the field visits included bedform, stream bank stability, secondary channel habitat, substrate, vegetation cover, riparian buffer, and large woody material (LWM). LWM is defined as downed wood that intercepts the stream channel.

Coordination with Agencies and Tribes

In 2013, a federal permanent injunction was issued in the *United States et al. vs. Washington et al. No. C70-9213 Subproceeding No. 01-1* dated March 29, 2013 (Injunction), requiring the State of Washington to correct fish barriers in WRIAs 1 through 23. As part of the Injunction, WDFW surveyed areas within the Injunction's geographic boundaries to identify fish barriers that required correction, including within the study area. WDFW's survey identified 44 locations in the vicinity of the Project that required further investigation for fish use and to determine if they required correction under the Injunction. One additional location, unnamed tributary (UNT) to Par Creek (at approximately I-405 MP 24.0), was identified while conducting field surveys, for a total of 45 locations.

The Project is located within the tribal treaty rights for usual and accustomed fishing areas of the Muckleshoot Indian Tribe and the Yakama Nation; however, in this area the Yakama Nation defer to the Muckleshoot Indian Tribe (MIT) for consultation on fishing areas. After WDFW identified potential barriers with anadromous access, WSDOT initiated close coordination with WDFW and the Muckleshoot Indian Tribe Fisheries Division (MITFD) to identify barriers that

were within the Project boundaries, met the requirements of the Injunction, and would be corrected as part of the Project. WSDOT delivered an informational package for review by the MITFD in May 2019, which included information describing the streams and conveyances identified within the study area.

WSDOT facilitated two field meetings with WDFW and MITFD in May and July 2019. The objectives of these meetings were to gain consensus on WDFW's determinations on fish barriers, to measure and document bankfull widths, and to discuss conceptual designs for the fish barrier corrections.

3.3.3 Terrestrial Wildlife

To identify the types and existing conditions of upland vegetation and habitat ecosystems within the study area, WSDOT reviewed available literature, databases, and aerial imagery. WSDOT used the USFWS Information for Planning and Consultation database to review federally listed animal and plant species. WSDOT consulted the WDFW Priority Habitat and Species Program and Washington Department of Natural Resources Natural Heritage Program to review species and habitats of concern in Washington State. To assess potential suitable marbled murrelet *(Brachyramphus marmoratus)* habitat, WSDOT overlaid relevant geographic information systems (GIS) data such as marbled murrelet critical habitat, murrelet detection sections/sites, and murrelet potential habitat on the study area and conducted a site evaluation in June 2019.

3.4 Evaluation of Effects

3.4.1 Wetlands

WSDOT surveyed and mapped wetlands in the study area based on the boundaries identified in the field. Project engineers reviewed the mapped wetlands, compared them to the Project footprint, and calculated direct permanent and temporary impacts resulting from Project construction using computer-aided design and GIS software.

WSDOT calculated both permanent and temporary losses of wetlands resulting from Project operations and construction, and effects to regulated wetland buffers. In addition, WSDOT evaluated each affected wetland to determine whether the extent of the effects would alter their overall function and viability.

3.4.2 Streams and Aquatic Resources

WSDOT evaluated effects on aquatic resources by reviewing information gathered in the study area and by assessing Project design data and WSDOT construction practices. Based on the results of the stream survey conducted by WSDOT and field meetings with WDFW and MIT, WSDOT identified potential changes to the size and function of aquatic resources in the study area during and after Project construction. Similar to the wetland assessment, WSDOT calculated potential permanent and temporary effects to aquatic resources by overlaying the Project footprint with aquatic resource information for the study area. Using this information, WSDOT determined what aquatic habitat or species may be affected as a result of the Project. In

addition to permanent and temporary impacts, WSDOT also evaluated indirect effects from the Project, including shading from new or improved roadway structures and changes in stormwater flow.

3.4.3 Terrestrial Wildlife

WSDOT evaluated the effects of the Project's temporary construction and permanent operations on terrestrial habitat and wildlife areas by conducting qualitative studies through site visits and online aerial information to determine the extent of existing upland vegetation in the study area. Based on the information gathered, WSDOT assessed how the Project would potentially affect terrestrial habitat and wildlife areas. In addition to permanent and temporary impacts, WSDOT evaluated indirect effects from the Project, including how noise and loss of tree canopy may affect these ecosystems.

SECTION 4 EXISTING CONDITIONS

Elements of ecosystems in the study area include wetlands, aquatic resources, and wildlife habitats in which specific plants or animals live, grow, and reproduce. These habitats provide the plants and animals in the study area with adequate food, water, shelter, and living space. Although a variety of plants and animals occupy the various habitats found in the study area, these habitats are typically degraded due to urbanization over the last 150 years.

4.1 Wetlands

WSDOT delineated a total of 52 wetlands covering approximately 17 acres within the study area. To accurately rate wetlands that had boundaries extending beyond the study area, WSDOT incorporated the entire wetland into the assessment. Total wetland acreage including these extended boundaries covers approximately 59 acres. Wetland ecosystems in the study area are generally degraded, especially the smaller wetlands adjacent to I-405. Most wetlands in the study area are adjacent to I-405, while others are associated with streams within the study area.

Of the 52 wetlands in the study area, the hydrogeomorphic (HGM) classifications include 29 depressional wetlands, 22 slope wetlands, and 1 riverine wetland. Most of the depressional wetlands are associated with roadside ditches and receive unidirectional flow from stormwater runoff. Several slope wetlands receive hydrology through high groundwater tables. The one riverine wetland primarily receives its hydrology from overbank flooding. The Cowardin classes present are primarily palustrine emergent, palustrine scrub-shrub, and palustrine forested (Cowardin 1979).

The study area includes 19 Category IV wetlands, 28 Category III wetlands, and 5 Category II wetlands. The wetlands with Category III and IV ratings have lower potential and value to provide habitat for wildlife and attenuate flood water.

Additional information regarding classifications and ratings, soils, vegetation, and hydrology of each of the wetlands within the study area can be found in Section 4.2 of Appendix L, *Draft Wetland and Stream Assessment Report*, of the Environmental Assessment (EA).

4.2 Streams and Aquatic Resources

The study area is located in the Lake Washington/Cedar/Sammamish watershed, Water Resource Inventory Area (WRIA) 8. The Lake Washington/Cedar/Sammamish watershed is located in western Washington (in King and Snohomish Counties) and drains approximately 692 square miles of land into the Puget Sound. It includes two major river systems (Cedar and Sammamish) and two large lakes (Washington and Sammamish).

The study area includes three basins within the Lake Washington/Cedar/Sammamish Watershed. From south to north, the basins are Juanita Creek, the Sammamish River, and North Creek. North Creek drains into the Sammamish River. Juanita Creek and the Sammamish River drain into Lake Washington. Streams in the study area are all part of the Lake Washington hydrologic system and are typically characterized as low-gradient systems that originate in

gently sloping upper basins and flow through narrow valleys. Stream flows in the study area are mostly fed by precipitation and groundwater.

Streams within the study area have been altered by the effects of urbanization in the watershed. Effects of urbanization include channel modification, clearing of riparian vegetation, water withdrawals, introduction of non-native species, rerouting of water for stormwater control, and addition of pollutants. Such changes affect habitat, hydrology, water quality, and ecology of the aquatic ecosystems. Development activities that have altered the aquatic environment include logging, vegetation clearing, addition of impervious surfaces, and piping of streams. Those activities have affected stream function and, in turn, aquatic habitat.

Despite altered habitat conditions, the streams identified within the study area still support various species and life history stages of fish. At least 16 fish species are documented to be present within the study area, including 6 anadromous and 10 resident fish species. The study area hosts a number of federal-listed, state-listed, and special-status fish species, including Chinook salmon, steelhead, bull trout, coho salmon, cutthroat trout, sockeye salmon, kokanee, and lamprey. In addition to fish, aquatic ecosystems within the study area may also provide habitat for macroinvertebrates, amphibians, and crayfish.

More detailed information on stream classifications and existing conditions is provided in Section 4.3 of Appendix L, *Draft Wetland and Stream Assessment* and Section 6.2 of Appendix N, *Biological Assessment*. Detailed descriptions of sensitive aquatic species occurrence in study area streams are provided in Section 7.2 of Appendix N, *Biological Assessment*.

4.2.1 Fish Barriers

As described in Section 3.3.2, WDFW evaluated potential fish barriers within the study area. Exhibit 4-1 summarizes the sites investigated and fish barrier corrections included in the Project. Of the 45 locations identified, further examination revealed:

- 20 locations that were stormwater only and non-fish bearing
- 8 locations that were non-fish bearing
- 17 locations with potential fish use, including:
    - Non-barriers – 7
    - Not WSDOT-owned barriers – 2
    - WSDOT-owned barriers within Project footprint that will be built as part of other funded I-405 projects – 2
    - WSDOT-owned barriers within Project footprint that will remain as a hydraulic crossing – 1
    - Barriers included in the Project – 5

Exhibit 4-1. Sites Investigated and Fish Barrier Corrections Included in the Project

#	Milepost	Site ID	WSDOT Stream Name	WDFW Potential Fish Use	Injunction Barrier	WDFW Potential Habitat Gain (m)[a]	Barrier Correction in Project
I-405 Locations							
1	21.94	998602	Juanita Creek	Yes	Yes	399	No
2	22.09	933196	NA	No	No	NA	No
3	22.25	933195	Stream 22.25L	No	No	NA	No
4	22.57	NA	NA	No	No	NA	No
5	22.62	NA	NA	No	No	NA	No
6	22.74	934920	KL 14	No	No	NA	No
7	23.10	NA	NA	No	No	NA	No
8	23.20	999543	Stream 42	No	No	NA	No
9	23.51	998986	Sammamish River	Yes	No	NA	No
10	24.00	NA	UNT to Par Creek	Yes	No	NA	No
11	24.26	998984	North Creek	Yes	No	NA	No
12	24.44	934927	NA	No	No	NA	No
13	24.46	NA	NA	No	No	NA	No
14	24.72	NA	NA	No	No	NA	No
15	24.82	933197	UNT to Par Creek	No	No	NA	No
16	24.89	NA	NA	No	No	NA	No
17	24.97	934918	NA	No	No	NA	No
18	25.00	993104	Stream 25.0L	Yes	Yes	272	Yes
19	25.16	NA	NA	No	No	NA	No
20	25.19	934991	NA	No	No	NA	No
21	25.25	NA	NA	No	No	NA	No
22	25.29	993105	Stream 64	No	No	0	No

Exhibit 4-1. Sites Investigated and Fish Barrier Corrections Included in the Project

#	Milepost	Site ID	WSDOT Stream Name	WDFW Potential Fish Use	Injunction Barrier	WDFW Potential Habitat Gain (m)[a]	Barrier Correction in Project
23	25.35	993106	Stream 66	Yes	Yes	147[b]	No
24	25.50	NA	NA	No	No	NA	No
25	25.59	934219	Stream 70	No	No	NA	No
26	25.60	934218	Stream 70	No	No	NA	No
27	25.73	934158	Stream 75	No	No	NA	No
28	25.80	934159		No	No	NA	No
29	26.06	934912	Stream C-77	No	No	NA	No
30	26.10	934913		No	No	NA	No
31	26.35	102 N128	South Fork Perry Creek	Yes	No	NA	No
32	26.46	08.0070 A 0.25	North Fork Perry Creek	Yes	Yes	2,524	Yes
33	26.55	NA	NA	Yes	No	NA	No
34	26.74	934994	Crystal Creek	Yes	Yes	518	No
35	26.87	993109	Queensborough Creek	Yes	Yes	1,684	Yes
36	NA	102 N058		Yes	No	NA	No
SR 522 Locations							
37	trail	934490	North Creek	Yes	No	NA	No
38	11.08	998985		Yes	No	NA	No
39	11.31	993083	Par Creek	Yes	Yes	2,589	Yes
40	11.26	932654	Par Creek	Yes	No	NA	No
41	11.35	934930	NA	No	No	NA	No
42	11.17	934929	NA	No	No	NA	No
43	11.59	996910	NA	No	No	NA	No

Exhibit 4-1. Sites Investigated and Fish Barrier Corrections Included in the Project

#	Milepost	Site ID	WSDOT Stream Name	WDFW Potential Fish Use	Injunction Barrier	WDFW Potential Habitat Gain (m)[a]	Barrier Correction in Project
44	11.67	996911	NA	No	No	NA	No
SR 527 Locations							
45	2.78	993084	Queensborough Creek	Yes	Yes	2,031	Yes

m = meters; NA = not applicable; UNT = unnamed tributary. Bold rows indicate fish barriers proposed for correction as part of the Project.

a Potential habitat gain reflects data provided by WDFW on online map (WDFW 2019a).

b Potential habitat gain confirmed by WDFW; WDFW is in the process of updating online map to reflect this information.

4.3 Terrestrial Wildlife

The study area provides habitat for a variety of wildlife and plant species. Much of the land cover in the study area has been disturbed by development, and a portion of it is paved impervious surface. In general, there are four upland habitat types present within the study area: forested, shrub, grass, and maintained vegetation. Habitats provided by forested, shrub, and grass land cover have been fragmented, and many of the corridors between these resources have been reduced or diminished because of urbanization. Based on the habitat available in the study area, plant species in the study area are typical of those found in a highly disturbed urban setting. Due to high densities and occurrence of invasive species, such as reed canarygrass and Himalayan blackberry, and urban landscape plants, special status plants are unlikely to occur in the study area. No known federally listed plant species exist within the 0.25-mile study area for vegetation.

No federally listed terrestrial species or state priority species are known to inhabit the study area for wildlife. Common wildlife present within the study area include coyote (*Canis latrans*), raccoon (*Procyon lotor*), rock pigeon (*Columba livia*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), raptors such as the red-tailed hawk (*Buteo jamaicensis*), black-tailed deer (*Odocoileus hemionus columbianus*), and other mammal and bird species. Beaver activity has been observed within the study area, and great blue herons (*Ardea herodias*) are regularly observed at the University of Washington Bothell/Cascadia College mitigation site (eBird 2019). The study area also includes suitable habitat for pileated woodpecker (*Dryocpus pileatus*). Domestic and feral animals, including dogs, cats, and rabbits, are also likely to be present.

Swallows, including cliff swallows (*Petrochelidon pyrrhonota*), barn swallows (*Hirundo rustica*), and violet-green swallows (*Tachycineta thalassina*) have been seen nesting on the I-405 bridges and ramps spanning the Sammamish River, which are protected under the Migratory Bird Treaty Act. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act. Bald eagles have been seen soaring and perched near the Sammamish River, North Creek, and other water bodies in the study area

(eBird 2019). There are no known golden eagle nests in the study area and the most recent documented siting was a soaring golden eagle in October 2017 (eBird 2019).

SECTION 5 PROJECT EFFECTS

This section compares the Project operational (permanent) and construction (temporary) effects using the evaluation criteria described in Section 3, Study Approach, for the No Build Alternative and Build Alternative (with the Project).

5.1 No Build Alternative

With the No Build Alternative, only routine activities such as road maintenance, repair, and safety performance improvements would take place. There would be no construction effects on wetlands, aquatic habitat, and terrestrial habitat. However, conditions for natural resources would not be improved. Because of anticipated increases in traffic volumes and congestion, the amount of untreated stormwater entering the nearby water bodies from I-405 could affect water quality and aquatic habitat over time. The water quality and quantity retrofit proposed as a part of the Project would not be implemented, and those benefits would not be realized. Correcting the identified fish barriers would likely be delayed in the No Build Alternative along with any anticipated hydrologic and habitat benefits.

5.2 Build Alternative

5.2.1 Wetlands

Operational Effects

The Project, as proposed, would result in permanent impacts to a total of 21 wetlands and associated buffers. Fourteen wetlands would be partially filled, and 7 wetlands would be completely filled. In addition, some wetland buffer areas would be converted into new roadway facilities.

The Project would permanently impact up to 6 acres of wetlands (up to 1 acre of Category IV wetlands, up to 4.5 acres of Category III wetlands, and 0.5 acres of Category II wetlands). Additionally, the Project would result in up to 1 acre of permanent indirect wetland impacts as a result of the relocation of Stream 25.0L. Up to 4 acres of wetland buffers would be permanently affected. All permanently impacted wetlands and their associated buffers are located within and regulated by the City of Bothell and will be mitigated in accordance with federal, state, and the City of Bothell regulations. Section 6 provides further discussion on mitigation.

Where feasible, design modifications were made to the Project footprint to avoid or minimize permanent effects on wetlands and wetland buffers. When a wetland appeared to be located within the Project footprint, WSDOT changed the footprint to avoid the wetland or, if the wetland could not be avoided, WSDOT determined how much direct wetland and buffer area would be affected due to Project construction. Once the effects to wetlands and wetland buffers were quantified, this information was used to determine the type and amount of wetland mitigation that will be needed to offset the wetland effects from the Project. Filling a portion of a

wetland or altering its vegetation can reduce the wetland's capacity to store stormwater, filter pollutants, protect stream banks from erosion, and provide wildlife habitat.

Construction Effects

The Project would temporarily affect 12 of 52 wetlands in the study area, all of which are located in and regulated by the City of Bothell. Up to 0.25 acre of wetland would be temporarily impacted. Up to 1 acre of wetland buffer would be temporarily affected.

Some construction activities would occur outside of the permanent Project footprint, including clearing of wetland and upland vegetation. WSDOT may need to temporarily fill in wetlands and wetland buffers to allow adequate room for construction activities. These construction disturbances would result in a short-term loss of wetland functions. Erosion and sedimentation caused by construction activities would increase the amount of sediment settling within a wetland and reduce the quality of habitat available for invertebrate life and habitat for plants. Additionally, loose sediment would reduce the potential water quality and quantity benefits provided by those wetlands.

After the Project is complete, these temporarily disturbed areas will be restored and replanted with appropriate native vegetation, but habitat functions will be temporarily diminished while the planted trees, shrubs, and emergent plants become established. Wetlands where vegetation is cleared or trimmed would still retain some water quality and quantity function, although at a diminished level until the wetlands are completely reestablished.

5.2.2 Streams and Aquatic Resources

Operational Effects

Permanent Removal of Bridge Piers in the Sammamish River

The Project would demolish and remove four existing bridge piers in the Sammamish River. Removing the piers would benefit aquatic habitat and species that reside in the river, as well as aquatic species that use the river for migration.

Overwater Shading

The Project would construct three new bridges spanning the Sammamish River and would remove two existing bridges, which would increase overwater shading by approximately 13,000 square feet (0.3 acre). The placement of the new overwater structures would alter the intensities and pattern of in-water shading. Shade effectively creates a different habitat type that contrasts with the adjacent aquatic environment where no shade is present. The transition between light and shade (edge effect) is considered a potential influence on fish behavior and habitat selection.

This permanent shading could result in reduced aquatic vegetation density; however, limited aquatic vegetation is present in the Sammamish River where the new bridges will be constructed. The Sammamish River is listed on the Washington State Department of Ecology's the 303(d) list with impaired water quality for exceeding allowable levels of temperature, bacteria, and dissolved oxygen (Ecology 2019). Temperature is one of the limiting factors for

salmonids in the Sammamish River. Overwater shading may potentially provide beneficial effects by reducing the temperature of the Sammamish River. As a result, the shading effects on aquatic vegetation and aquatic species are considered negligible.

Fish Barrier Correction and Other Improvements

WSDOT proposes to replace five WSDOT-owned fish barriers with restored stream crossings at Par Creek (SR 522 MP 11.31), Stream 25.0L (I-405 MP 25.00), North Fork of Perry Creek (I-405 MP 26.46), and two crossings at Queensborough Creek (I-405 MP 26.87 and SR 527 MP 2.78).

Removing these fish barriers would increase the potential for salmonids to return to their natal streams. Reintroduction of the salmonids to these streams would greatly benefit riparian tree growth from the nutrients received after spawning salmon die off (Quinn et al. 2018). In turn, increased riparian growth may improve spawning and rearing habitat through shading via increased canopy cover, bank stabilization, and production of large woody material (LWM) (Helfield and Naiman 2001). With healthier spawning and rearing systems and more access to natal streams, the Puget Sound may see increased numbers of salmon returning to spawn – the staple diet of resident orca pods and a contributor to the local economy.

The proposed correction of the five identified fish barriers would restore full anadromous fish access to approximately 24,330 linear feet of upstream habitat, per WDFW's designation for potential habitat gain.

The Project would result in up to 16,600 square feet of permanent stream impacts and up to 15,900 square feet of permanent stream buffer impacts. Any construction activities that result in altering channel substrates are considered permanent stream impacts, and all of the permanent stream impacts would be associated with the fish barrier corrections. The Project's permanent stream buffer impacts would result from fish barrier corrections, roadway widening, and installation of bridge abutments and retaining walls.

Exhibit 5-1 summarizes the permanent impacts by stream. Streams not listed in the exhibit are not anticipated to have any operational effects. None of the road widening or barrier corrections would result in a net loss of in-stream habitat due to the improved access to upstream habitat.

Exhibit 5-1. Summary of Permanent Stream Impacts

Stream	Permanent Stream Impacts (square feet)
Par Creek	1,700
Stream 25.0L	2,300
Stream 70	400
North Fork of Perry Creek	3,800
Queensborough Creek	8,400
Total	16,600

Three additional WSDOT-owned crossings with potential fish use are not proposed as part of the Project for the following reasons:

- 998602, Juanita Creek at I-405 MP 21.94 – The identified barrier is located within the Project limits; however, the only Project activity that will occur at this crossing is restriping of the existing pavement and installing signage. As a result, this barrier will not be corrected as part of this Project, but it will be considered as part of a currently funded project on the I-405 corridor.
- 993106, Stream 66 at MP 25.35 – Barriers located at Stream 66 and Stream 25.0L are in close proximity to each other. Coordination with the Muckleshoot Indian Tribe is ongoing to develop an alternate solution for the barrier at Stream 66 by restoring the connection between Stream 25.0L and North Creek to provide greater fisheries and fish habitat benefits than the minimum design required by the Injunction. This more comprehensive restoration of Stream 25.0L would provide greater benefits for fisheries resources than the standard barrier correction at Stream 66. Therefore, WSDOT proposes to meet the Stream 66 Injunction obligation by addressing the downstream portion of Stream 25.0L, which is outside of state-owned property and thus not required to be corrected under the Injunction.
- 934994, Crystal Creek at I-405 MP 26.74 – The identified barrier is located within the Project limits; however, this barrier will be corrected as part of a separate project, so that WSDOT can develop an improved stream connection that better aligns with its historical connection to Crystal Creek and provides equivalent or better fish passage and fisheries habitat benefits. Construction of the fish barrier correction at Crystal Creek is expected in the same timeframe as the Project.

Stormwater Input

Within the study area, the total area of existing pollution-generating impervious surfaces (PGIS) is approximately 132 acres. Currently, just over 44 acres of that PGIS receives a combination of basic and enhanced stormwater treatment. The proposed Project would provide enhanced treatment for an area equivalent to 100 percent of new PGIS (approximately 24 acres). In addition, about 23 acres of the existing PGIS would be retrofitted to provide enhanced stormwater treatment that complies with current requirements. Once the proposed Project is built, about 91 acres of PGIS would be treated. See Section 5.1.2 of Appendix J, *Water Resources Discipline Report*, of this EA for details regarding surface water treatment plans. In addition, three new outfalls would be constructed as described in the next section.

The effects of stormwater discharges on aquatic species associated with the changes to stormwater management with the Project have been evaluated in accordance with the 2009 Memorandum of Agreement between WSDOT, the Federal Highway Administration (FHWA), National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), and U.S. Fish and Wildlife Service (USFWS), which includes the use of the Western Washington Highway Runoff Dilution and Loading Stormwater (HI-RUN) Model. In general, the Project would reduce the pollutant loads and concentrations by constructing multiple stormwater

treatment facilities. Water quality conditions are expected to improve because an additional 23 acres of PGIS would receive treatment compared to existing conditions.

For water quantity, the Project is expected to reduce peak flows from I-405 into streams, except for the Sammamish River. The Project would keep the existing detention facilities to detain flows from the existing PGIS, and proposed detention facilities would detain runoff from the new PGIS in threshold discharge areas (TDAs) where flow controls are required. The Project proposes to provide detention for stormwater discharges to North Creek, Par Creek, North Fork Perry Creek, and Queensborough Creek. After construction of detention facilities and fish barrier corrections, the Project would reduce the "flashiness" of stormwater discharged to streams in the study area, which was historically mitigated by pervious soils and dense vegetation.

WSDOT manages stormwater that runs off state transportation facilities to protect ecosystem functions and the beneficial uses of receiving waters as well as meeting the current regulatory requirements. WSDOT recognizes that stormwater runoff is the major threat to coho's prespawn mortality (Spromberg and Schotlz 2011; Chow 2019). WSDOT would adapt future stormwater treatment methods to provide higher levels of treatment as they become available to be incorporated into the design manual.

Outfalls

The proposed Project would build three new stormwater outfalls: one at the Sammamish River and two at the North Fork of Perry Creek. All stormwater runoff created as a result of the Project would be treated before being discharged into its associated water body. At the Sammamish River, the new outfall would be located on the north bank of the river under the new ramp from northbound I-405 to eastbound SR 522. Stormwater runoff generated from northbound I-405 and SR 522 at the interchange would be routed through compost-amended biofiltration swales (CABS) or other enhanced stormwater treatment best management practices (BMPs) prior to discharging into the Sammamish River. At the outfall location above the ordinary high water mark (OHWM), the bank would be stabilized with riprap to prevent bank erosion. No in-water work is anticipated, and no trees would be removed for installation of the Sammamish River outfall.

At North Fork Perry Creek, one outfall would be located west of I-405, on the left bank of the realigned channel upstream of the proposed culvert. Stormwater runoff generated from southbound I-405 would go through a CABS and a detention facility or other enhanced stormwater treatment BMPs prior to discharging into North Fork Perry Creek. The second outfall would be located on east of I-405, on the right bank of the realigned stream channel, downstream of the proposed culvert. Similar to the west side, stormwater runoff generated from northbound I-405 would go through a series of treatment and detention facilities, including stormwater ponds and CABS, prior to discharging into North Fork Perry Creek.

Constructed banks for the North Fork Perry Creek outfalls would be stabilized with riprap to prevent bank erosion. No in-water work would occur for installation of the outfalls along North Fork Perry Creek as both outfalls would be constructed on the new channel.

Riparian Buffer Vegetation Removal

The Project would result in the permanent removal of up to 15,900 square feet (0.36 acre) of stream buffers. Disturbance of riparian areas could potentially cause some localized alteration of the adjacent aquatic habitat, including changes in shading patterns, reduction of LWM recruitment, and changes in organic material input. Riparian vegetation removal at the Sammamish River would be limited to the removal of non-native invasive vegetation along the streambanks near the in-water work area. The banks are primarily dominated by Himalayan blackberry, and trees are absent. Some tree removal may be required for construction access at fish barrier correction locations; however, the streambanks at these locations will be replanted with native species once the new culverts are in place.

Non-native invasive vegetation inhibits regeneration of native woody species interrupts LWM recruitment, and limits canopy cover along the streams. Restoration of temporarily disturbed areas along the Sammamish River and fish barrier correction locations after construction of the Project will improve riparian habitat by replacing non-native species with native woody species. This restoration work would include planting native woody species near the wetland located between Stream 25.0L and North Creek.

Construction Effects

Bridge Demolition

The Project would temporarily affect Sammamish River in-water habitat during the demolition of existing bridge piers. Each of the existing bridges includes two piers (for a total of four piers) within the Sammamish River OHWM. All three new bridges would include spans over the Sammamish River but would have bridge piers placed outside of the OHWM.

The installation of a cofferdam in the Sammamish River would dewater and temporarily displace streambed habitat. Although this effect would be temporary, an impact to prey species (invertebrates) is likely to occur. The physical disturbance of instream habitat would primarily occur at the Sammamish River during the 16 weeks of pier removal work. A total of up to 0.08 acre of the channel would be temporarily affected in the Sammamish River. In addition, anchoring the temporary barge, if used, could potentially disturb existing benthic habitat. Barge use would occur for no more than 16 weeks. No spawning habitat for listed fish is present within the Sammamish River where the temporary barge would be anchored. Instream isolation could result in an immediate and direct loss of benthic productivity from the dewatered construction zone. However, substrates at the pier removal work and bridge demolition in the Sammamish River are mostly silt and clay and exhibit limited benthic habitat. Additionally, temporarily affected areas are expected to recover relatively quickly by recolonization and recruitment from nearby undisturbed areas; therefore, displacement of benthic habitat from dewatering is expected to be limited in severity, extent, and duration.

Resident fish would likely need to be excluded or handled during bridge demolition in the Sammamish River. Potential effects would be in the form of harassment or harm associated with fish removal operations. When fish handling is necessary, WSDOT will follow the approved protocols listed in Section 6.2.2.

Overwater Shading

The Project could build temporary work bridges during bridge demolition work, which would have approximately 0.18 acre of overwater shading adjacent to the existing bridges for up to 16 weeks over the 3 to 4 years of construction. If a barge is used during demolition, it is estimated that the barge would be in the Sammamish River up to 8 weeks per bridge. The barge would be trucked in to the demolition site and would be placed near the existing bridges. This temporary shading could result in reduced aquatic vegetation density; however, limited aquatic vegetation is present in the Sammamish River where the new bridges would be constructed. As a result, the shading effects on aquatic vegetation are considered negligible. No temporary columns would be installed below the OHWM at the Sammamish River.

Fish Barrier Correction and Other Improvements

Project construction would result in up to 5,700 square feet of temporary stream impacts and up to 143,400 square feet of temporary stream buffer impacts. The Project's temporary stream and stream buffer impacts would result from the five proposed restored stream connections, channel regrading, and construction related activities associated with roadway widening, installation of bridge abutments and retaining walls. Exhibit 5-2 details the temporary impacts by stream. Streams not listed in the exhibit are not anticipated to have any construction effects.

Exhibit 5-2. Summary of Temporary Stream Impacts

Stream	Temporary Stream Impacts (square feet)
Sammamish River	3,500
UNT to Par Creek	2,200
Total	5,700

UNT = unnamed tributary

Construction of the various Project elements, including the roadway, in-water work, retaining walls, and stormwater treatment facilities, could temporarily introduce fine sediments and turbidity into the streams of the action area through erosion and sedimentation. Elevated turbidity has been reported to cause physiological stress, reduce growth, and adversely affect survival of Endangered Species Act (ESA)-listed fish. However, these effects would be short-term and localized in nature, and turbidity levels are not expected to exceed levels associated with effects on ESA-listed species. As a result, temporary increases in sediment and turbidity levels are not expected to cause any long-term effects to ESA-listed fish or other species. Construction BMPs listed in Section 6 will also be implemented to limit construction-related turbidity from the Project site.

The installation of a cofferdam at the fish barrier correction locations would occur as needed and would dewater and temporarily displace streambed habitat. Although this effect would be temporary, an impact to prey species (invertebrates) is likely to occur where fish species currently inhabit streams in the study area. In-stream isolation could result in an immediate and direct loss of benthic productivity from the dewatered construction zone. Temporarily affected

areas are expected to recover relatively quickly by recolonization and recruitment from nearby undisturbed areas; therefore, displacement of benthic habitat from dewatering is expected to be limited in severity, extent, and duration.

Resident fish would likely need to be excluded or handled at fish barrier correction sites where fish presence is documented. At fish barrier correction locations, the in-water work area is estimated to be minor, as most of the channels are narrow, and the majority of the work would occur outside of the existing channel as channels would be realigned at the crossings outside of the OHWM. Potential effects at the fish barrier correction sites would be in the form of harassment or harm associated with fish removal operations. When fish handling is necessary, WSDOT will follow the fish handling and fish salvage protocols (WSDOT 2016).

Riparian Buffer Vegetation Removal

The Project would temporarily disturb up to 4 acres of stream buffers because of fish barrier corrections and site access needs. Most of the temporary stream impacts will be mitigated on site by installing restored stream crossings and restoring native riparian vegetation wherever possible. Disturbance of the streambed and banks would be limited to those necessary to construct new outfalls.

Underwater Noise

Temporary noise impacts would occur during Project construction due to the use of a vibratory hammer for installation of the sheet piles around the four piers in the Sammamish River during the approved in-water work window. No impact pile driving is anticipated to occur as a result of the Project. Noise impacts are expected to take approximately 80 hours over a single construction season. In-water work would only occur during the approved in-water work window.

The underwater sound for installation of the sheet piles is unlikely to result in injury to juvenile anadromous salmonids as they are less likely to be present in the Sammamish River during the in-water work window. In addition, vibratory hammers avoid the abrupt over and under pressure changes exhibited by impact hammers. As a result, impacts on fishes or other aquatic organisms have not been observed in association with vibratory hammers (WSDOT 2019a; NOAA Fisheries 2012).

5.2.3 Terrestrial Wildlife

Operational Effects

Study area noise levels for wildlife species would be similar to the No Build Alternative, though with proposed noise mitigation, fewer receivers would be affected with the Build Alternative. For the study area overall, Build Alternative noise levels with the proposed noise walls in place are predicted to increase up to 3 dBA and decrease up to 10 dBA when compared with No Build Alternative noise levels. Decreases in noise levels would occur because of redistribution of traffic and addition of concrete safety barriers and noise walls with the proposed design. Increases in noise levels would occur because of roadways shifting closer to some receivers—including homes, apartments, and other land uses with noise sensitive areas of frequent

outdoor human use—as well as a general increase in traffic volumes. Areas experiencing increased noise levels would be adjacent to the existing roadway.

Areas with a continued increase in noise could but are unlikely to adversely affect wildlife within the study area. Some wildlife living within these areas have adjusted to the existing roadway noises and would likely remain minimally affected by the projected decibel increase. Animals have shown signs of adaptive behavior through measures such as avoiding the noisiest times of day or changing vocal behavior (Berger-Tal et al. 2019). Other wildlife would likely continue to experience adverse effects from increased ambient noise levels. Research shows that anthropogenic noise can cause increased stress levels and increase predation risk in bird species by masking predatory sounds among other impacts (Blickley and Patricelli 2010; Kleist N. J. et al. 2018).

Up to 15.5 acres of trees and associated shrubs and grasses are proposed for permanent removal. Most of the proposed tree removal sites are located along I-405, SR 527, or 17th Avenue SE. Some of the trees are ornamental trees that have been planted recently. These trees and vegetated areas do not currently provide suitable habitat for any threatened or endangered species addressed in Section 4.3. Trees will be replaced in accordance with the WSDOT *Roadside Policy Manual* (WSDOT 2015), which aims to replant trees within the Project limits where feasible and uses a ratio that considers the existing size of the trees.

Construction Effects

Temporary upland impacts would be minimized or avoided as much as practicable. Construction would require temporary clearing of approximately 8.5 acres of vegetation. Temporary impacts would be limited to areas that provide access where needed to complete the Project. Any temporarily cleared areas would be restored with native species appropriate to the area, reducing the effects of the disturbance to when revegetation has become established. Trees will be replaced in accordance with the WSDOT *Roadside Policy Manual* (WSDOT 2015), which aims to replant trees within the Project limits where feasible and uses a ratio that considers the existing size of the trees.

Temporary increased noise in the study area would occur because of construction activities and construction equipment moving to and from the Project site. Noise generated from construction equipment would extend approximately 1.9 miles over land before attenuating to ambient noise levels. The increased noise levels may adversely impact adjacent wildlife.

SECTION 6 MEASURES TO AVOID OR MINIMIZE EFFECTS

The Project will avoid, minimize, or mitigate effects during and after construction using the strategies described in this section.

6.1 Operational Mitigation

- Prepare and implement a revegetation plan in accordance with WSDOT's *Roadside Policy Manual* (WSDOT 2015) and minimize the amount of vegetation clearing to retain as many trees as practicable to minimize impacts. Replant temporary impacts with appropriate native species, including grasses, forbs, and shrubs adjacent to the roadway, and trees where a suitable setback from the roadway exists.

6.1.1 Wetlands

- Design the Project to avoid and minimize operational impacts to wetlands and their buffers pursuant to regulations outlined in the Clean Water Act (CWA).
- Conduct ongoing maintenance of stormwater treatment and detention facilities.
- Meet local, state, and federal permit requirements to mitigate any permanently affected wetlands and their buffers.

6.1.2 Streams and Aquatic Resources

- Correct the fish barrier at Crystal Creek (ID 934994). WSDOT intends to construct this correction in the same timeframe as the overall Project.
- Direct lighting away from streams and waterbodies wherever possible.
- Prioritize cultural and mechanical control methods for vegetation management as part of ongoing WSDOT highway maintenance after construction. Biological and chemical methods would be considered only as a last resort.

6.1.3 Terrestrial Wildlife

- Implement WSDOT's Integrated Vegetation Management (IVM) of the right of way to minimize the spread of non-native species as part of ongoing WSDOT highway maintenance after construction.

6.2 Construction Mitigation

- Prepare and implement a revegetation plan in accordance with WSDOT's *Roadside Policy Manual* (WSDOT 2015) and minimize the amount of vegetation clearing to retain as many trees as practicable to minimize impacts. Replant temporary impacts with appropriate native species, including grasses, forbs, and shrubs adjacent to the roadway, and trees where a suitable setback from the roadway exists.

6.2.1 Wetlands

- Design the Project to avoid and minimize construction impacts to wetlands and their buffers pursuant to regulations outlined in the CWA.
- Follow construction Best Management Practices (BMPs) specified in the current *Highway Runoff Manual* (HRM).
- Develop and implement a Temporary Erosion and Sediment Control (TESC) plan and a Spill Prevention Control and Countermeasures (SPCC) plan to avoid effects to wetlands.
- Restore temporary construction impacts in accordance with federal and state laws and regulations and local critical area ordinances.

6.2.2 Streams and Aquatic Resources

- Follow construction BMPs specified in the current HRM. WSDOT will adhere to requirements outlined in the Project's Hydraulic Project Approval (HPA) issued by the Washington Department of Fish and Wildlife (WDFW), the Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC), and regulations outlined in the CWA.
- Develop and implement a TESC plan and an SPCC plan to prevent sediment from entering aquatic areas. Additionally, staging and stockpiling areas will be located away from streams to avoid spills and prevent sediment from entering streams or stream buffers.
- Limit construction lighting for this project, in particular at night, to the amount necessary to complete the work. The lighting will be directed away from the streams and waterbodies whenever possible.
- Adhere to conditions identified in the US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries Biological Opinions and agency concurrence letters.
- Prohibit in-water work except during seasonal work windows established as a condition in the HPA. Follow permit requirements for in-water work as required by local, state, and federal permits.
- Direct anthropogenic debris from bridge demolition toward storage areas on land or barges and support vessels. Bridge demolition will include sectioning the structure to the extent possible to provide for safer disposal and to minimize debris falling into surface waters.
- Remove all fish species from the work area prior to any in-water work activities. Fish exclusion activities will follow the most recent WSDOT protocol that has been approved by NOAA Fisheries and USFWS.
- Isolate work areas of the Sammamish River with sheet piles or cofferdams as needed prior to pier removal.

- Minimize disturbance to riparian vegetation from the operation of heavy equipment as practicable by straddling it with heavy equipment or by pruning it without damaging the roots. Existing riparian vegetation outside of the work area will not be removed or disturbed.
- Mitigate permanent buffer impacts through enhancement of degraded sensitive areas within the Project vicinity, focusing on increasing native plant diversity and habitat value.
- Control all Class A noxious weeds, and additional nuisance weeds throughout the life of the Project using WSDOT's IVM.

6.2.3 Terrestrial Wildlife

- Develop and implement a TESC plan to minimize impacts to terrestrial habitat and preserve topsoil.
- Adhere to conditions identified in the BO and agency concurrence letters.
- Minimize the amount of vegetation clearing to retain as many trees as practicable and prepare and implement a revegetation plan with appropriate native species.
- Position exclusion devices and remove nest material before the beginning of the nesting season to prevent Migratory Bird Treaty Act-protected bird species from nesting on the bridge during demolition and construction of bridges.

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ATTACHMENT A ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
BMP	best management practice
CABS	compost-amended biofiltration swales
Corps	United States Army Corps of Engineers
CWA	Clean Water Act
DO	dissolved oxygen
DPS	Distinct Population Segment
EA	Environmental Assessment
ESA	Endangered Species Act
ETL	express toll lane
FHWA	Federal Highway Administration
GIS	geographic information systems
HGM	hydrogeomorphic
HI-RUN	Western Washington Highway Runoff Dilution and Loading Stormwater
HRM	Highway Runoff Manual
HOV	high occupancy vehicle
HPA	Hydraulic Project Approval
I-405	Interstate 405
IVM	Integrated Vegetation Management
LWM	large woody material
MP	milepost
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries Service
OHWM	Ordinary high water mark
PGIS	pollution-generating impervious surface
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
TESC	Temporary Erosion and Sediment Control

Acronym	Meaning
TDA	threshold discharge area
UNT	Unnamed Tributary
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation