Appendix I

Biological Assessment

August 2016

Federal Way Link Extension

Final Biological Assessment

SOUNDTRANSIT

CENTRAL PUGET SOUND
REGIONAL TRANSIT AUTHORITY

SOUND TRANSIT

Federal Way Link Extension

Biological Assessment

Hydrologic Unit Code (HUC) 17110019 (Puget Sound) and 17110013 (Duwamish)

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August 2016

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Acronyms and Abbreviations

°F	degrees Fahrenheit
BA	Biological Assessment
BMP	best management practice
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
dBA	A-weighted decibels
DPS	Distinct Population Segment
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EIS	environmental impact statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FHWA	Federal Highway Administration
FR	Federal Register
FTA	Federal Transit Administration
FWLE	Federal Way Link Extension
HCT	high-capacity transit
HI-RUN	Highway Runoff Dilution and Loading Model
HPA	Hydraulic Project Approval
HRM	WSDOT *Highway Runoff Manual*
I-5	Interstate 5
IPaC	Information for Planning and Conservation (USFWS)
KCSWDM	King County *Surface Water Design Manual*
LWD	large woody debris
NE	No Effect
NEPA	National Environmental Policy Act
NLAA	Not Likely to Adversely Affect

NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OHWM	ordinary high water mark
PGIS	pollution-generating impervious surface
Sound Transit	Central Puget Sound Regional Transit Authority
SR	State Route
SWPPP	stormwater pollution prevention plan
TDA	threshold discharge area
TESC	temporary erosion and sediment control
TPSS	traction power substation
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

Executive Summary

The Federal Transit Administration and Sound Transit are proposing the Federal Way Link Extension (FWLE) to address growing transportation needs. The project would construct approximately 7.6 miles of light rail connecting the Angle Lake Station at S 200th Street in SeaTac with the Federal Way Transit Center in Federal Way. It would advance Sound Transit's Long-Range Plan's goals and objectives for high-quality regional transit service connecting major activity centers in King, Pierce, and Snohomish counties (Sound Transit, 2014). The FWLE would provide frequent and reliable high-capacity transit service and efficient alternative for travel to and from the corridor and other urban growth and activity centers in the region, with sufficient capacity to meet projected demand. The FWLE is expected to be used for approximately 36,500 trips per day in 2035, reducing vehicular traffic on the roadways in the region by 160,000 vehicle miles traveled and 10,000 vehicle hours traveled.

After evaluating alternatives in a Draft Environmental Impact Statement (Sound Transit, 2015), the Sound Transit Board identified an alignment for the FWLE along I-5 as the Preferred Alternative, which constitutes the proposed project that is evaluated in this document. This Biological Assessment evaluates the Preferred Alternative's potential effects on listed animal species that might occur in the action area based on information from the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) (Appendix A). The project includes guideways, stations, traction power substations, parking structures, and other associated structures to support the light-rail system. Aspects of the project with the potential to affect listed animal species include areas where the FWLE would cross forested areas, streams, and wetlands. No ESA-listed bird species are known to nest in the action area, and therefore breeding of these species would not be impacted. Transient individuals potentially could be disturbed by vegetation clearing and move to other nearby roosting areas outside of the action area. Listed aquatic species are not present in the portions of streams the FWLE would cross and impassable barriers and culverts downstream block access to these reaches. Habitat conditions are also not favorable for fish because the streams are dry during much of the year and lack pools and habitat structure.

Short-term construction effects include loss of upland forest habitat; construction noise; loss of wetland, riparian, and buffer vegetation; and potential turbidity and sedimentation in surface water. Clearing for construction of the FWLE as well as for access roads, equipment storage areas, and other necessary construction activities would temporarily impact vegetation and wildlife habitat. These effects would be avoided or minimized by using appropriate best management practices and minimization measures.

The majority of the project would be at-grade or in a trench, which would permanently convert existing vegetated land cover and wetland types to a developed condition in the project footprint. Long-term operational effects include permanent loss of forested, wetland, riparian, and buffer areas from placement of guideways. Vegetation under elevated guideway sections would also have permanent impacts from support columns and from the reduced sunlight and rainfall caused by the

guideway. Beneficial long-term effects include improvements to wetland, riparian, and buffer vegetation from removal of invasive species cleared for construction then replanted with native species. Invasive plant removal would improve habitat quality, connectivity, and species diversity. Improved stormwater treatment and reduced automobile traffic would also have long-term benefits.

Table ES-1 summarizes the effects determination for each species that has the potential to occur in the action area. No designated critical habitat exists in the project action area. The project was also evaluated for its effects on Essential Fish Habitat (EFH), and it was determined there would be no adverse effect on EFH for Pacific salmon, groundfish, or coastal pelagic species covered in the fisheries management plans applicable to this region.

TABLE ES-1
Endangered Species Act Listed Species, Designated Critical Habitat, and Effects Determinations

Species	Status	Federal Jurisdiction	Effects Determination	Critical Habitat
Oregon spotted frog	Threatened	USFWS	NE	NE
Marbled murrelet	Threatened	USFWS	NE	NE
Streaked horned lark	Threatened	USFWS	NLAA	NE
Western yellow-billed cuckoo	Threatened	USFWS	NLAA	NE

NE = No Effect; NLAA = Not Likely to Adversely Affect

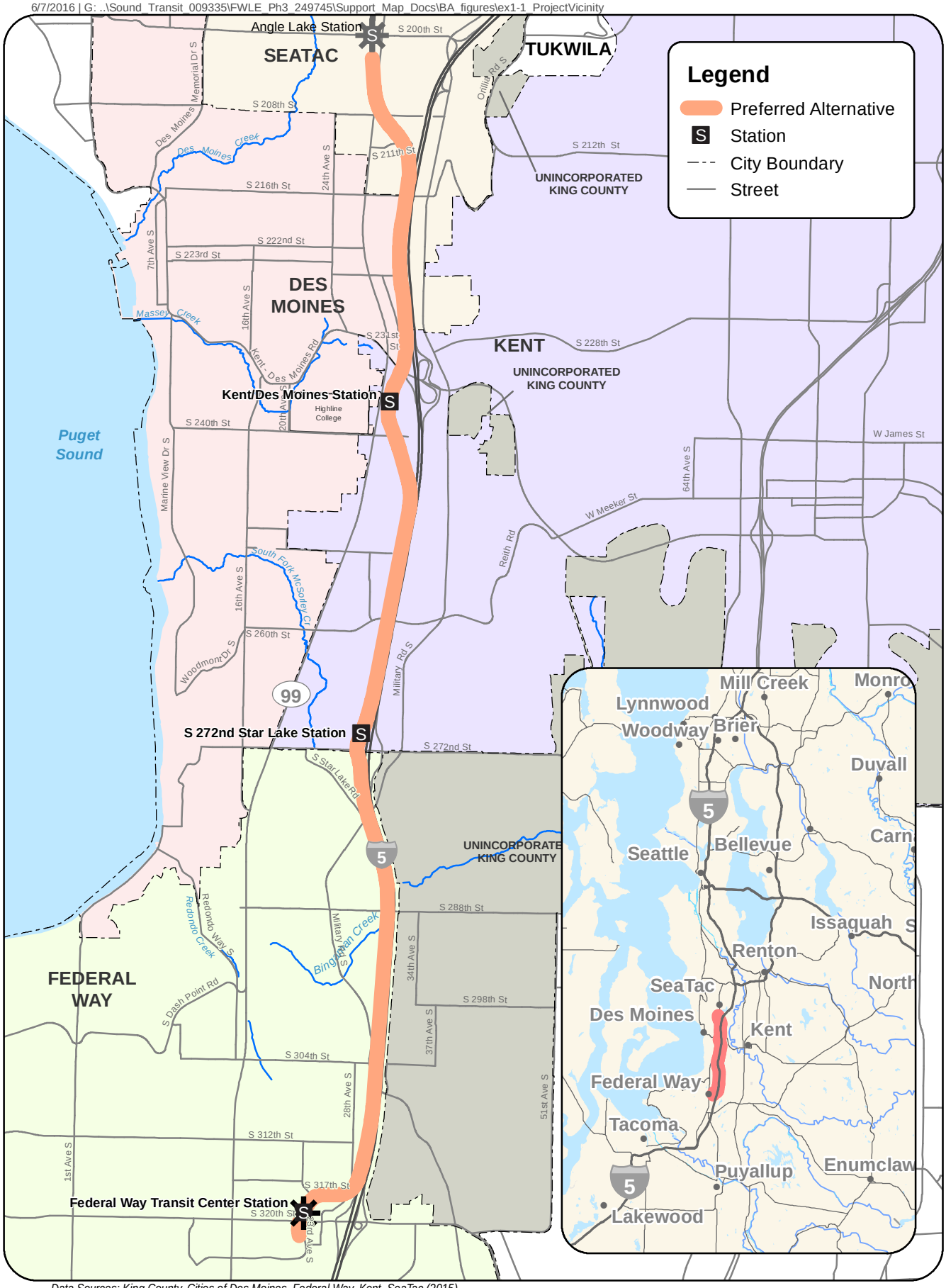
1.0 Introduction and Project Description

The Central Puget Sound Regional Transit Authority (Sound Transit) has prepared this Biological Assessment (BA) to facilitate consultation between the Federal Transit Administration (FTA) and the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) of 1973 (16 United States Code § 1531-1544). The primary federal nexus for this project is federal aid funding provided by FTA, although the Federal Highway Administration (FHWA) also must approve any modification to Interstate 5, which this project generally follows. This BA also supports ESA Section 7 compliance for the U.S. Army Corps of Engineers' (Corps) issuance of a permit under Section 404 of the Clean Water Act. The federal nexus of the project also triggers an Essential Fish Habitat (EFH) consultation requirement under the Magnuson-Stevens Fishery Conservation and Management Act as amended under U.S. Public Law 109-479. The EFH consultation is provided in Appendix B.

Sound Transit and FTA prepared a Draft Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) and State Environmental Policy Act evaluating build alternatives and a No Build Alternative for the Federal Way Link Extension (FWLE) (Sound Transit, 2015). After consideration of the Draft EIS and comments, the Sound Transit Board identified an alignment along I-5 as the Preferred Alternative, which constitutes the proposed project that is evaluated in this document. After completion of the Final EIS, the Sound Transit Board will consider the alternatives evaluated in the Final EIS and then select the project to build.

Section 7 of the ESA requires that any project requiring a federal permit, occurring on federally owned land, or receiving federal funding undergo consultation with appropriate federal agencies to ensure that the project would not result in avoidable harm to listed species or their habitats. This BA evaluates potential direct and indirect project-related effects of the FWLE on species that are listed, or proposed to be listed, as endangered or threatened under the ESA, that could occur in the project vicinity based on information from the USFWS and NMFS (Appendix A). Effects analyses address potential effects on individuals, habitat, and the foraging base for each species. The effects determinations are based on life history analysis, habitat requirements, literature review, agency consultation, and field reconnaissance studies.

The FWLE would construct approximately 7.6 miles of light rail connecting the Angle Lake Station at S 200th Street in SeaTac, Washington, with the Federal Way Transit Center in Federal Way, Washington. The project parallels Interstate 5 (I-5), and generally follows a topographic ridge between Puget Sound and the Green River Valley. Exhibit 1-1 shows the proposed route and vicinity. The project includes guideways, stations, traction power substations, parking structures, and other associated structures to support the light-rail system. The first part of this chapter describes common construction methods and proposed structure types. Section 1.4 describes activities where the project would intersect with sensitive areas that could potentially support ESA-listed species in the action area, and Section 1.5 describes proposed stormwater management actions and facilities.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

EXHIBT 1-1
Project Vicinity

N

0 0.5 1 2 Miles

Federal Way Link Extension

DRAFT: For internal discussion only. Not reviewed or approved on behalf of any party.

The action area is in Water Resources Inventory Area (WRIA) 9 (Duwamish – Green River Basin), with a small portion of the southern extent in WRIA 10 (Puyallup-White). The project is located in Hydrologic Unit Code numbers 17110019 (Puget Sound) and 17110013 (Duwamish).

The FWLE is part of the implementation of Puget Sound Regional Council's *VISION 2040* and Sound Transit's 2014 *Regional Transit Long-Range Plan*. The purpose of the FWLE is to expand the Sound Transit Link light rail system from the city of SeaTac to the cities of Des Moines, Kent, and Federal Way in King County. The project would:

- Provide a rapid, reliable, accessible, and efficient alternative for travel to and from the corridor and other urban growth and activity centers in the region, with sufficient capacity to meet projected demand.
- Expand mobility by improving connections to the regional multimodal transportation system with peak and off-peak transit service.
- Provide the high-capacity transit (HCT) infrastructure and service to support the adopted regional and local land use, transportation, and economic development plans. Plans such as Puget Sound Regional Council's VISION 2040 (Puget Sound Regional Council, 2009) call for growth to be concentrated in designated urban centers connected to each other by HCT. Land use plans for individual cities support this regional vision.
- Advance the Sound Transit Long-Range Plan's vision, goals, and objectives for high-quality regional transit service connecting major activity centers in King, Pierce, and Snohomish counties (Sound Transit, 2014).
- Implement a financially feasible HCT system to help preserve and promote a healthy environment.

1.1 General Construction Activities

Work would begin with site preparation, including clearing of vegetation and construction of access points and roadways. Grading would create a level surface for the at-grade track ballast or elevated guideway columns, with retaining walls constructed for retained cuts and fills. The final construction step is track and systems installation. This step includes placing track on the guideway and installing electrical, communication, and signaling systems. Much of this work would be completed from the side of the guideway or on the guideway.

Safety considerations require that vegetation be cleared near all guideways, necessitating a vegetation clear zone that extends up to 11 feet beyond the guideway footprint at the time of construction. After construction, low-growing vegetation such as native shrubs can be planted within the vegetation clear zone. Under elevated guideways, ground would typically be maintained to remain clear of vegetation, although areas within wetland and stream buffers would be replanted with low-height native grasses and shrubs.

The construction methods discussed below are based on the current preliminary level of engineering design. Specific construction methods will vary depending on site conditions and final design of the structures proposed. Typical construction activities include:

- Demolition (buildings, pavement)
- Clearing and vegetation removal
- Fill and excavation
- Installing drainage systems, electrical systems, and communication systems
- Elevated structure construction
- At-grade track construction
- Retained cut construction
- Cut-and-cover trench construction
- Station and park-and-ride construction
- Roadway construction, sidewalk construction, and landscaping
- Utility relocation
- Retaining wall construction
- Pile-driving or augering piles
- Deep shaft drilling
- Truck hauling and delivery of materials and equipment
- Dewatering
- Use of concrete batch plant
- Remediating any unexpected hazardous material areas
- Planting and revegetation

Typical construction equipment used to complete the project includes:

- Trucks (e.g., haul, service, delivery, and tractor trailers)
- Cranes
- Backhoes, loaders, compactors, and excavators
- Grading and paving equipment
- Vibratory equipment
- Drilling rigs and pile-driving equipment
- Forklifts and manlifts
- Jackhammers
- Pumps (e.g., concrete, dewatering)
- Compressors, generators, and welding equipment
- Demolition equipment

1.2 Construction Schedule

Construction would take about 1 to 4 years in any given portion of the corridor. It is anticipated that the project would be constructed in up to two phases, with the first phase being Angle Lake to

Kent/Des Moines, and the additional phase constructing from Kent/Des Moines to S 272nd Street and the Federal Way Transit Center. Construction of the FWLE to Kent/Des Moines is scheduled to be complete by 2023. In June 2016, the Sound Transit Board adopted the Sound Transit 3 (ST3) plan (Sound Transit, 2016h). If funding for the plan is approved by voters in November 2016, the project schedule would be adjusted accordingly. The ST3 plan calls for building the FWLE from Angle Lake to Federal Way Transit Center with service at all three stations opening concurrently in 2024. At the current stage of project design, the construction details have not been finalized and the design will likely be adjusted as Sound Transit obtains additional information in the next phases of the project. Site conditions, permit requirements, and market conditions at the time of construction, among other factors, affect how a project is built. Sound Transit will coordinate with each jurisdiction on land use approvals, right-of-way use and land disturbance permits, and other permits required for construction.

Sound Transit would develop a work-specific construction plan during final design to establish the various construction phases and construction contracts, their estimated schedules and durations, and appropriate sequencing. Where possible, Sound Transit would coordinate construction activities with other capital improvement projects being carried out by or permitted by local jurisdictions, to help minimize construction impacts. This could include coordinating construction activities with Washington State Department of Transportation (WSDOT) for the SR 509 Extension Project, a major freeway extension connecting the existing SR 509 terminus in SeaTac with I-5 at the northern end of the FWLE corridor.

Construction of linear projects such as light rail is typically done in segments, by construction activity (e.g., foundations, column placement, at-grade guideway construction, elevated guideway construction, retained-cut/fill sections, station platforms, or park-and-ride facilities). To reduce the overall project construction period, the contractor might use concurrent multiple work crews/work zones along the corridor.

Typical construction would occur between 7 a.m. and 10 p.m. in a 5- to 6-day workweek. Some locations (such as where street or freeway detours are involved and/or daytime construction periods need to be abbreviated to reduce impacts) may require additional shifts or all-week, nighttime, or 24-hour construction activities. Truck hauling would require loading areas, staging space for trucks awaiting loading, and provisions to prevent tracking soil on public streets. Truck haul routes would require approval by local jurisdictions. Truck hauling activities may be required to occur in off-peak or daytime periods to avoid peak traffic periods or to minimize potential impacts from noise on sensitive receptors such as residences.

1.3 Structure Types

The light rail guideway would be 30 to 40 feet wide, with two sets of tracks. This includes room for the poles and overhead catenary system (contact wire) needed to power the trains. Many sections would also contain space for emergency access, and walls or barriers to restrict other access.

The proposed route and station configurations vary in profile, sometimes constructed at-grade, in a retained cut or fill, or in an elevated configuration. Elevated structures would require support columns

or other bridging support structures. For at-grade guideway in areas with slopes, retaining walls might be needed where the alignment cuts into an adjacent hillside, or to support fill material below the guideway. In some places, sound walls would be added to the guideway or to retaining walls to reduce noise impacts. These structure types are described below.

1.3.1 At-Grade

The term "at-grade" means that the rail line is at the ground surface level. Construction methods and impacts for at-grade guideways would be similar to typical road construction and include:

- Building a temporary construction road in areas where access is not available from existing roads
- Demolishing existing structures in the project footprint and relocating conflicting utilities
- Performing shallow, near-surface excavations to construct the subgrade, track, and station platform slabs for at-grade segments
- Installing culverts or other permanent drainage structures and below-grade light rail infrastructure

1.3.2 Trench and Retained Fill

Construction of guideways built on retained fill or in trenches would be similar to construction of at-grade guideway sections, but are more intensive and of longer duration due to the need to construct retaining walls. Construction of the retained cut structures would consist of excavation of soil, sidewall stabilization, construction of the bottom grade and guideway, and building permanent retaining walls. Excavation depth is expected to vary based on topography of the area. Utilities must be temporarily or permanently diverted or supported across the excavation.

Retained fills would require building retaining walls and placing fill for retained fills. Several types of retaining walls may be used including soil nail, secant pile, or soldier pile and lagging. Unless site conditions require otherwise, soil nail walls would be used because they are the most cost-effective and have the shortest construction time. Secant pile walls would be used in deeper excavations and when groundwater is present.

Construction under roads would use cut-and-cover tunnel construction methods, potentially with metal plates over the trench to maintain traffic flow. Cut-and-cover work also requires backfill following trench construction. This work requires the use of imported material or suitable material from the excavation.

Dewatering may be necessary based on the depth of the trench and groundwater conditions. Dewatering can be accomplished by a number of mechanical methods including sumps, pumps, and dewatering wells. These systems require that water generally be pumped to the surface and discharged, or stored, or recharged into the ground. The collected groundwater would be treated to remove sediment and reduce turbidity prior to discharge into the storm drainage system and would follow the National Pollutant Discharge Elimination System (NPDES) regulations through the Washington State Department of Ecology (Ecology).

Trucks would deliver fill material to the site for retained fills or haul away excess fill from trenches. Retained fill structures may require ground improvement, depending on the ability of existing soils to support the increased loads. Reconstruction of streets, sidewalks, and other existing facilities may also be necessary, depending on the final alignment and profile of the trench or retained fill. If Sound Transit uses sequential excavation method mining to avoid roadway disturbance, the trench would be dug out (mined) in small sections or bites using an excavator and cutting equipment.

1.3.3 Elevated

Elevated guideways and stations, similar to structures such as highway bridges, are constructed with reinforced concrete and steel. Elevated guideways are typically about 30 feet wide and can vary in height.

Construction would begin with the preparation work to build foundations such as shallow spread footings, deep-driven or augered piles, or drilled shafts. Driven piles would be installed by vibratory and/or impact pile-driving. Construction would vary with the type of foundation needed, which is based on soil conditions and the height of the structure. Spread footings require excavation, backfilling, and compaction, followed by installation of reinforcing steel and pouring of concrete. Drilled shafts are constructed using a vibratory or rotating drill rig to advance a permanent casing (steel or concrete) into the ground while soil from inside the casing is excavated. During excavation, a bentonite or synthetic polymer slurry is sometimes added to stabilize the walls of the shaft. When the shaft is of the desired depth, rebar reinforcement is placed in the shaft and concrete is poured with a tremie hose. Depending on location, dewatering of the shafts may be required before concrete is poured. With augered piles, an auger is used that has a hollow center for pumping concrete. The auger is driven to a specified depth, then as it is pulled back up, concrete is pumped into the void.

Once foundations are in place, concrete columns would be constructed. The elevated guideway structure is expected to be constructed using concrete segmental box girders, which are typically poured offsite and trucked to the project location to be placed by crane. The elevated superstructure could be steel, cast-in-place concrete, precast concrete, or segmental concrete. If steel and/or cast-in-place concrete is used, false-work could be required to support the superstructure. Falsework may consist of pile-supported work platforms, which in turn support scaffolding and concrete forms. Piles are required in areas with poor soils and would most likely be driven using track-mounted pile-driving rigs. Sound Transit would primarily use segmental construction to build the FWLE elevated guideway, which usually does not need false-work between the columns. Transitions between at-grade and elevated profiles are typically supported by compacted fill ramps.

1.3.4 Stations

The project includes three stations: Kent/Des Moines, S 272nd Star Lake, and Federal Way Transit Center. Stations are designed according to the profile of the guideway. A station platform is typically 400 feet long to accommodate a four-car train, but varies in width depending on the location of the platform, passenger volumes, vertical and horizontal circulation needs, and the track profile. The size of each station is determined by the site-specific access and parking requirements.

Construction staging for stations would be approximately 8 to 10 acres, including the area for the permanent parking lot or garage. Each station's parking allocation is based on the existing parking supply and use, surrounding land use characteristics, and expected level of use.

Station construction would be similar to that for the guideway in terms of sequencing (e.g., utility relocations, site preparation, and column construction for elevated stations) or trench construction (for trenched stations), but larger in terms of scale. Once the station structure itself is complete, station construction would include parking lots and parking structures, bus circulation areas, internal circulation facilities (stairways, escalators, and elevators), and other ancillary facilities, such as storage buildings and payment kiosks. Trench stations would require greater excavation than for the guideway due to a wider footprint.

Station construction would generally last 2 to 3 years for all phases at each station area.

1.3.5 Traction Power Substations

Electric power for the trains would be provided from the existing electrical grid through traction power substations (TPSSs) to boost power to the overhead catenary system. The TPSSs are enclosed small buildings, about 20 feet by 60 feet in size, with an additional 10 to 20 feet required around each unit and screened by wall or fence. When possible, they would be placed in the footprint of a light rail station or trackway or beneath the guideway. TPSSs would be located at the Kent/Des Moines, S 272nd Star Lake, and Federal Way Transit Center stations, and near S 221st Street and S 288th Street.

1.3.6 Staging Areas and Construction Easements

Construction staging areas are needed before, during, and for a short time after construction work, for access roads and crew parking, contractor trailers, equipment storage, construction materials delivery and storage, and demolition or spoils handling (in accordance with applicable regulations). At-grade, elevated, trench, and retained fill sections would all have construction staging areas along the alignment. Contractors would generally use the property the facility is being constructed on, property that Sound Transit acquired for right-of-way, or other properties as negotiated by the contractor.

Construction easements for temporary use of property during construction would be required in numerous locations along the alignment. In undeveloped areas, 50- to 100-foot-wide construction areas could be necessary to maneuver equipment and materials along the corridor during construction. Following construction, these easements would be restored to preconstruction conditions.

1.4 Description of Route and Project Activities

The FWLE would operate in exclusive right-of-way (referred to as light rail guideway) outside of traffic, to avoid operating and safety conflicts. The project would leave the Angle Lake Station and cross to the east side of SR 99 near the proposed WSDOT SR 509 Extension Project. The SR 509 Extension Project is a proposed major freeway extension connecting the existing SR 509 terminus in SeaTac with I-5 at the northern end of the FWLE corridor. It would continue in this future SR 509 right-of-way until it reaches I-5. From S 211th Street to S 231st Street, the alignment would be west of the WSDOT I-5 right-of-way

to allow for the planned future build-out of I-5. Between S 231st Street and S 317th Street, the alignment would be mostly in the I-5 right-of-way, except to access stations.

The profile in the I-5 right-of-way would be primarily at-grade, except for road crossings where it would be elevated or in a trench. In the places where the guideway would cross under existing roadways in a trench, cut-and-cover construction would be used. The FWLE would cross under S 216th Street, S 272nd Street, and S 317th Street, using a trench box construction that consists of temporary shoring walls installed across S 216th Street to support the excavation for the underground trench box and to provide a temporary span for S 216th Street. After the trench box is completed, the walls and temporary span would be removed and the roadway restored. A similar process would be followed for trench profiles under S 272nd Street and under S 317th Street.

For construction next to the McSorley Creek wetlands, a temporary work trestle would provide access for guideway construction. Steel pilings driven by pile hammers would support the work trestle. A work platform would be built on top of the pilings using steel pile caps, steel stringer beams, and timber. All guideway construction would be from the work trestle, which could accommodate all construction equipment. Once construction in this area is complete, the trestle would be removed.

Bingaman Creek west of I-5 parallels the project alignment. The guideway through this reach would be elevated to minimize impacts to the existing creek channel and avoid the existing culverts under I-5 and S 288th Street. Columns would span as much of the existing stream channel as possible. In places where the columns would be in the existing creek channel, the creek would be rerouted slightly to meander around the bases of the columns, maintaining an open channel.

The project includes three stations: Kent/Des Moines Station, South 272nd Star Lake Station, and Federal Way Transit Center Station. The Kent/Des Moines Station would be along the west side of 30th Avenue S, spanning a new S 236th Street that would extend between SR 99 and the I-5 right-of-way. It would have approximately 1,000 parking spaces (500 surface, 500 in a new garage) if used as an interim terminus. Parking could be reduced to 500 spaces when the system is extended south with additional parking at other stations.

The S 272nd Star Lake Station is a trench station at the Star Lake Park-and-Ride and would have approximately 1,240 parking spaces in a new parking garage, about 700 more than the existing parking. Its construction would require realigning 26th/28th Avenue S for approximately 350 feet. Access to the station and parking garage would be from 26th/28th Avenue S.

The Federal Way Transit Center station would be elevated and in a north-south orientation south of the existing Federal Way Transit Center, parallel to 23rd Avenue S and north of S 320th Street. The station would have a 400-space parking garage and a pedestrian connection to the existing 1,200-space Federal Way Transit Center parking garage. The transit center would be relocated south to the western side of the station to more directly link bus service and light rail. A roundabout would be added to the intersection of S 317th Street and 23rd Avenue S, along with a one-way transit-only road into the station area and transit center for more direct bus access.

1.5 Stormwater Management

Sound Transit will obtain a construction stormwater general permit under the National Pollutant Discharge Elimination System (NPDES) permit program to reduce or eliminate stormwater pollution and other impacts on surface waters. The project will also develop a construction stormwater pollution prevention plan (SWPPP) that implements best management practices (BMPs) for identifying, reducing, eliminating, or preventing sediment and erosion problems onsite. The construction SWPPP will include a temporary erosion and sediment control (TESC) plan; spill prevention, control, and countermeasures (SPCC) plan; concrete containment and disposal plan; dewatering plan; and fugitive dust plan.

Existing development has led to an extensive stormwater drainage system in the action area. Much of this system consists of ditches that drain either to local streams or to the drainage systems of the adjacent cities. Most of the WSDOT-operated drainage system serving I-5 was originally installed before the surrounding area was developed. A few detention ponds have been constructed to manage road runoff as part of highway improvements over the past several decades. WSDOT reports that there are no substantial flooding or local drainage problems associated with I-5 within the action area (A.L. Williams, personal communication, 2013).

Sound Transit used a conservative approach in developing drainage concepts for the project. It applied the Western Washington Hydrology Model, Version 3.0 (Ecology, 2006) to analyze project hydrology and to determine sizing of the facilities. Detention facilities were designed to achieve post-project stormwater flows equivalent to forested conditions, as required by Ecology. Most stormwater is expected to be discharged to existing city drainage facilities that discharge to water bodies from existing permitted municipal discharge locations.

Sound Transit would minimize impacts on water resources through project design and development in compliance with stormwater management regulations. Impacts would be controlled by minimizing the amount of impervious surface area, avoiding the placement of project elements in or near water resources where possible, and installing appropriate stormwater management facilities. Sound Transit's preliminary engineering for the FWLE includes development of a conceptual layout for major stormwater facilities that are sized to comply with Sound Transit's 2016 *Design Criteria Manual*, which requires stormwater facilities for Sound Transit projects to conform to the requirements of local jurisdictions.

1.5.1 Impervious Area

New impervious areas from the project include tracks and guideways, stations, park-and-ride lots, and relocated or modified roads associated with the project (Table 1-1). Where elevated track would overlie a relocated road, the underlying impervious area of the road was not counted in the impervious area numbers (to avoid double-counting). The existing impervious area of 43.8 acres in the project footprint was obtained from GIS analysis. The project would increase impervious surface by 35 acres (approximately 80 percent) over its 7.5-mile length. Much of the new impervious area results from the location of the guideway on or over vegetated pervious areas along the west side of I-5.

TABLE 1-1
Existing and Proposed Amounts of Total Impervious Surface (acres)

Existing Impervious Area	Proposed New Impervious Area	Proposed Replaced Impervious Area[a]	Net Change
43.8	41.5	37.3	+35

[a] Replaced" is existing impervious area that would be replaced with new impervious and treated. Note that some existing impervious area would be converted to new pervious area under the proposed project, and therefore would not need to be replaced and treated.

1.5.2 Pollution-Generating Impervious Surface

Project pollution-generating impervious surfaces (PGIS) are limited to the roadway improvements that would be exposed to frequent vehicle traffic. These areas include roadways, street ends, and parking areas. Maintenance and emergency access roads that would have controlled, limited access and receive infrequent use (no more than one vehicle per week) are not classified as PGIS because of the lack of vehicular traffic.

The light rail guideway has no motor vehicle traffic or other sources of pollution-generating activities and is therefore classified as non-PGIS. Small amounts of non-toxic lubricant may be used on sections of the light rail track in order to prevent operational noise from wheel squeal. Given the non-toxic nature of this product and small quantities anticipated to be used, track lubricant activities are not considered pollution-generating.

Table 1-2 summarizes existing and proposed PGIS in the delineated threshold discharge areas (TDAs) analyzed for the project. Since the guideways are considered non-PGIS, in areas where they would be built over existing PGIS there would be a reduction in the amount of PGIS. For the entire project there would be a net reduction of 5.7 acres of PGIS; 22.6 acres of existing PGIS would be replaced with new impervious surface and receive water quality treatment.

TABLE 1-2
Existing and Proposed Amounts of Total Pollution-Generating Impervious Surface (acres)

Existing PGIS	Proposed New	Proposed Replaced PGIS[a]	Net Change
32.8	4.5	22.6	-5.7

[a] "Replaced" is existing impervious area that would be replaced with new impervious and treated.

1.5.3 Stormwater Treatment and Detention

Stormwater management will meet the requirements of Ecology's *Western Washington Hydrology Model 2012 User Manual* (Ecology, 2014a) and the *Highway Runoff Manual* (WSDOT, 2016) and local jurisdiction requirements for stormwater management (Sound Transit, 2016b).

The proposed design was based on the following design criteria, standards and guidelines:

- WSDOT *Highway Runoff Manual* (HRM) M 31-16.04 (WSDOT, 2016)
- WSDOT *Hydraulics Manual* M23-03.04 (WSDOT, 2015c)
- Sound Transit *Design Criteria Manual*, Revision 4 (Sound Transit, 2016i)
- *Low Impact Development Technical Guidance Manual for Puget Sound* (Puget Sound Partnership, 2012)

Sound Transit would design the FWLE to comply with the latest King County *Surface Water Design Manual* (KCSWDM), which is expected to be the 2016 version based on the project schedule. All four cities in the project area have adopted the 2016 KCSWDM. The Draft 2016 KCSWDM will be used for design until the final version is available. Once the 2016 KCSWDM is adopted, the project will be required to meet the Enhanced Water Quality Treatment Standard as defined in the KCSWDM. The Enhanced Water Quality Treatment Standard requires the following pollutant reductions in the stormwater runoff from all new and replaced PGIS and new pollution-generating pervious surfaces:

- 80 percent removal of total suspended solids for flows or volumes up to and including the water quality design flow or volume for a typical rainfall year
- Greater than 30 percent reduction of dissolved copper
- Greater than 60 percent removal of dissolved zinc

Following Sound Transit's *Design Criteria Manual* (2016i), low-impact development will be employed wherever possible. To minimize the potential impacts of increased impervious surface, stormwater detention facilities will be constructed as part of the FWLE. Stormwater from all project-related impervious surface will receive appropriate flow control where required. Stormwater flow control techniques may include detention ponds, infiltration ponds, vaults, and dispersion. The volume detained will be sufficient to offset any increase in impervious surface area in each segment and peak flows are not expected to increase in any of the streams in the action area as a result of the project. Base flows will also be expected to remain similar to current conditions.

The stormwater runoff from at-grade or trench guideway surfaces would be collected by a guideway drainage system that includes drainage features such as ditches, underdrains, and piped drainage, and then conveyed to a stormwater detention facility. For elevated guideway, stormwater would remain on the structure until it drains through a downspout attached to a guideway column and then disperses into vegetated areas below the guideway using dispersion BMPs or is conveyed to a stormwater detention system.

Non-PGIS runoff from elevated guideways would be dispersed over permeable areas where infiltration could occur. This would help to reduce the volume of runoff to be detained and reduce the size of the detention facilities. Dispersion is practical in areas where permeable surface exists below the guideway and there is little human activity. Where non-PGIS and PGIS runoff is conveyed jointly, the stormwater management facility would be designed to detain the joint flow and to provide required treatment for the PGIS flow in accordance with Ecology standards.

The natural drainage system would be maintained as much as possible. Existing culverts or closed stormwater systems may be extended to accommodate the project improvements. The preliminary geotechnical findings indicate the soils in the action area are primarily hard-packed till with a high percentage of silt and other fine material, which is not conducive to infiltration. Energy-dissipation BMPs would be constructed where required to prevent erosion at the stormwater outfall location in accordance with Section 5-4 of the HRM.

The project corridor is in the cities of SeaTac, Des Moines, Kent, and Federal Way, and in portions of the WSDOT right-of-way in unincorporated King County. Consistent with the requirements of the HRM, TDAs were delineated in the analysis area. The following subsections summarize proposed stormwater facilities as presented in the *Federal Way Link Extension: Preliminary Drainage Report Interim Submittal* prepared for each jurisdiction (Sound Transit, 2016c, d, e, f, g). Analysis of discharge into these TDAs using the WSDOT Highway Runoff Dilution and Loading (HI-RUN) model is provided in Appendix C.

1.5.3.1 City of SeaTac

The portion of the project in the city of SeaTac is in the Des Moines Creek Basin. Project elements in the city limits include street improvements and guideway. The Des Moines Creek Basin has special flow-control requirements based on the Des Moines Creek Basin Plan (Des Moines Creek Basin Committee, 1997), which designates the basin as a Basic Flow-Control Area. Projects in the basin are required to provide flow control in accordance with the Level 1 (Basic) Flow-Control Standard in the KCSWDM.

The stormwater runoff from the action area drains to the existing drainage system, which comprises ditches, culverts and closed conveyance systems that are on public and private property. The portion of the project between SR 99 and S 216th Street would drain to the roadway drainage system that discharges to Des Moines Creek via the Executel Pond and the regional stormwater facility.

Stormwater runoff would be conveyed to a proposed detention pond on the south side of S 208th Street under the guideway for flow control. The elevated guideway areas classified as replaced impervious surface do not require flow control and would be connected to the local drainage system.

The project would realign 28th Avenue S and include a new drainage system to collect the stormwater runoff from the roadway and the vegetated hill side to the east. The new drainage system would connect to an existing drainage that conveys the stormwater to the regional stormwater facility. Stormwater that falls on the western side slope of 28th Avenue S would travel as overland flow to the west as it does in the existing condition. The side slope would be vegetated and designed to allow the runoff to flow from the site as dispersed flow.

The City of SeaTac code only requires water quality treatment of new and replaced PGIS surfaces associated with the roadway improvements. Those areas specifically include the improvements on 32nd Avenue S between S 212th Street and S 216th Street, and the proposed cul-de-sac at the new street end of S 211th Street. A bioretention swale along the south side of S 212th Street would provide the water quality treatment for the improvements in Subbasin 1 along 32nd Avenue S improvements. A compost-amended filter strip constructed on the north side of S 211th Street would provide the water quality treatment for the cul-de-sac improvements.

1.5.3.2 City of Des Moines

The portion of the project in the city of Des Moines falls in the Massey Creek and Lower Green River West basins. Approximately 7.4 acres of the project corridor drain to Massey Creek Basin, and approximately 6.8 acres drain to the Green River. The stormwater runoff from the action area drains to

the existing downstream roadway drainage systems, which comprise ditches, culverts, and closed conveyance systems that drain to either the Massey Creek Basin or the Lower Green River West Basin.

The Massey Creek and Lower Green River West basins are designated as Conservation Flow-Control Areas. All new and redevelopment projects in Conservation Flow-Control Areas are required to provide flow-control facilities that meet the Level 2 Flow-Control Standard for all targeted developed surfaces according to the KCSWDM. Two detention ponds would be constructed for the project. One would be between S 219th Street and S 220th Street on the west side of the proposed guideway, and the other on the east side of the guideway north of Kent-Des Moines Road. The existing system continues west crossing SR 99 to 24th Avenue S, where it heads south and then turns west on S 223rd Street, ultimately discharging to Barns Creek.

The City of Des Moines code requires water quality treatment for new and replaced PGIS surfaces associated with roadway improvements. The project roadway improvements include a section of S 216th Street that would be replaced to accommodate the guideway construction, and the proposed cul-de-sacs at the truncated street ends of S 220th Street, S 221st Street, and S 224th Street. The water quality treatment for S 216th Street would be provided as a manufactured BMP (i.e., Filterra, Contech StormFilter, Modular Wetland, or similar) on the south side of S 216th Street near the intersection of 31st Avenue S. Sound Transit would provide water quality treatment for the roadway improvements on S 220th Street, S 221st Street, and S 224th Street by bioretention or compost-amended filter strips adjacent to the improvements.

1.5.3.3 City of Kent

Project improvements in the city of Kent fall in the Massey Creek, Midway Creek, and McSorley Creek basins. Approximately 16.1 acres of the corridor falls in the Massey Creek Basin, 7.6 acres within the Midway Creek Basin, and 22.7 acres within the McSorley Creek Basin.

Massey and Midway Creeks are designated as Conservation Flow-Control Areas and McSorley Creek is designated as a Flood Problem Flow-Control Area. The City of Kent requires projects in Conservation Flow-Control Areas to provide flow-control facilities that meet the Level 2 Flow-Control Standard. Projects in a Flood Problem Flow-Control Area must provide flow-control facilities that meet the Level 3 Flow-Control Standard as defined in the KCSWDM for all new and replaced developed impervious and converted pervious surfaces that are not fully dispersed.

Project elements in Kent include guideway and the Kent/Des Moines and S 272nd Star Lake stations. Both stations include roadway improvements and surface and structured parking spaces (up to 1,000 spaces at Kent/Des Moines Station and approximately 1,240 spaces at the S 272nd Star Lake Station).

The required flow control would be provided by eight flow-control facilities (five detention ponds and three detention vaults). Three of the detention ponds would serve the guideway improvements outside the station areas. One pond is an existing WSDOT stormwater pond that provides flow control and water quality for a portion of I-5. Three of the proposed columns from the guideway would impact the pond, and the volume displaced by the columns would be compensated for by modifying the west side of the pond.

The City of Kent code requires water quality treatment of the new and replaced PGIS surfaces associated with the proposed roadway improvements and parking areas. Water quality treatment of these areas would be provided by a combination of bioretention in planter strips along the roadways and manufactured BMPs (i.e., Filterra, Contech StormFilter, Modular Wetland, or similar).

1.5.3.4 City of Federal Way

The portion of the project corridor in the city of Federal Way falls within four creek basins: McSorley Creek, Bingaman Creek, Mill Creek, and Hylebos Creek. These basins are in an area designated as a Conservation Flow-Control Area. The City of Federal Way requires projects within Conservation Flow-Control Areas to provide flow-control facilities that meet the Level 2 Flow-Control Standard, as defined in the KCSWDM. Bingaman Creek is the only stream that would be directly impacted by stormwater generated by the project. Stormwater from the project would drain to a new flow-control vault before discharging to an existing stormwater outfall located near the downstream end of the creek, approximately 580 feet north of S 288th Street. Stormwater quality treatment is not required for this TDA because it would not add or replace PGIS that requires water quality treatment (see Appendix C).

Project elements in the city of Federal Way include guideway, the Federal Way Transit Center Station, and roadway improvements on S 317th Street, S 320th Street, 23rd Avenue S, and 21st Avenue S. The station would include a new 400-space parking garage and a pedestrian connection to the existing 1,200-space Federal Way Transit Center Parking garage.

Three detention ponds and two detention vaults would provide flow control. The three detention ponds would discharge to drainage systems that are within the City of Federal Way jurisdiction. Construction of the guideway would disturb an existing private stormwater pond on the east side of the 31524 28th Avenue S, requiring it to be partially or fully replaced. The guideway would also impact an existing water quality vault on the south side of the S 320th Street right-of-way, likely requiring it to be relocated.

The City of Federal Way code requires water quality treatment of new and replaced PGIS surfaces, including the roadway and parking areas associated with the Federal Way Transit Center Station and the roadway improvements associated with the proposed cut-and-cover tunnel under the S 317th Street roundabout. The water quality treatment for improvements in and around the proposed station would be provided as a manufactured BMP (i.e., Filterra, Contech StormFilter, Modular Wetland, or similar). The project would replace existing roadway PGIS area at the S 317th Street roundabout. It would not increase the amount of new PGIS area, allowing continued use of the existing water quality facilities to meet water quality treatment requirements.

1.5.3.5 WSDOT Right-of-Way

Although portions of the project would be within the WSDOT right-of-way, in many cases the proposed stormwater facilities discharge to downstream systems that are under the jurisdiction of the adjacent cities (SeaTac, Des Moines, Kent, or Federal Way).

The proposed drainage system would have three indirect (through piped conveyance systems) discharges to existing wetlands. The drainage system would be designed to protect the wetlands in

accordance with the requirements in the HRM. Stormwater drainage in the FWLE area adjacent to the future SR 509 Extension Project near S 208th to S 216th Streets would discharge to existing I-5 ditches. The areas north of S 216th Street would discharge to an I-5 ditch that flows north to the Des Moines Creek Basin, and the area south of S 216th Street would discharge to a ditch that flows south to the Midway Creek Basin.

To accommodate the guideway between the north end of the Midway Landfill and S 268th Place, Sound Transit would construct a new detention pond and modify an existing stormwater pond. A detention pond would be constructed on the north side of Kent-Des Moines Road and west of the southbound I-5 off-ramp. A portion of the pond (the eastern pond berm) would be constructed in the WSDOT right-of-way. The new pond and modified pond would both drain to the drainage system on the north side of Kent-Des Moines Road, as the existing stormwater pond currently does.

Flow-control facilities in the WSDOT right-of-way that discharge to drainage systems under WSDOT's jurisdiction are a vault that discharges to Bingaman Creek and a pond that discharges to a drainage system that is part of the Hylebos Creek Basin.

PGIS replaced from cut-and-cover construction of the trench under the existing S 317th Street roundabout for the guideway requires water quality treatment in the WSDOT right-of-way. The PGIS that would be replaced was constructed as part of the S 317th Street HOV Direct Access Project and the FWLE would continue to use the water quality BMPs constructed for that project.

2.0 Best Management Practices and Minimization Measures

According to NEPA (40 Code of Federal Regulations [CFR] 1508.20), mitigation for ecosystems impacts is based on a hierarchy of first avoiding the impact; then minimizing the impact by limiting the degree or magnitude of the action; then rectifying the impact by restoring, repairing, or rehabilitating the affected environment, reducing or eliminating the impact over time; and finally compensating for any remaining unavoidable adverse impacts by providing substitute resources or environments.

Sound Transit will use appropriate construction BMPs and comply with all local, state, and federal permits received for the FWLE. Construction BMPs will be implemented that apply to all work in or around valued habitats and sensitive areas such as woodlands, streams, riparian areas, and wetlands.

2.1 General BMPs for Construction Near All Sensitive Areas

General BMPs for construction to avoid and/or minimize potential impacts on sensitive areas include:

- Complying with all local, state, and federal permits received for the project.
- Minimizing the amount of cleared area at a construction site.
- Delineating work limits with high-visibility perimeter fencing and signage prior to construction to prevent unintended impacts to riparian vegetation, wetlands, woodlands, and other sensitive sites outside construction limits.
- Installing temporary ditches to route runoff around or through construction sites, with periodic straw bales or rock check dams to slow and settle runoff.
- Using straw wattles to reduce the length of unbroken slopes and minimize runoff concentration.
- Using temporary erosion-control blankets or mulch on exposed steep slopes to minimize erosion before vegetation is established.
- Preventing erosion by high water or storm runoff of soil or rock stockpiles, excavated materials, and excess soil materials into sensitive habitats, including water channels, wetlands, and riparian areas outside of the construction limits.
- Constructing temporary sedimentation ponds to remove solids from concentrated runoff.
- Conducting vehicle fueling and maintenance activities no closer than 100 feet from a water body or ditch.
- Revegetating construction easements and other areas either during construction or immediately after the project is completed. All disturbed riparian vegetation will be replanted using native species. Trees will be planted when consistent with light rail safety standards.

- Controlling construction noise by using movable noise barriers, acoustic enclosures, shields, or shrouds for equipment and facilities.
- Prohibiting nighttime jack-hammering and impact pile-driving.
- Installing high-grade engine exhaust silencers and engine casing sound insulation.
- Implementing noise-deadening measures for truck loading and operations.
- Spraying exposed soil with a dust-control agent as necessary to reduce emission and deposition of particulate matter.
- Covering all transported loads of soil and wet materials before transport, or providing adequate freeboard (i.e., space from the top of the material to the top of the truck) to reduce emission and deposition of particulate matter during transport.
- Using well maintained equipment to reduce carbon monoxide and nitrogen oxides emissions.

2.2 Water Quality BMPs During Construction

General BMPs for construction to avoid and/or minimize potential water quality impacts include:

- Conducting all work below the ordinary high water mark (OHWM) of any water bodies in accordance with the Hydraulic Project Approval (HPA) issued by Washington Department of Fish and Wildlife (WDFW) and by the Clean Water Act Section 404 permit issued by the Corps. Such permits typically include seasonal restrictions and/or other measures intended to minimize the risk of adverse effects on fish.
- Operating heavy equipment above the OHWM wherever possible.
- Restoring any stream beds and stream banks affected by construction after in-water work is complete.
- Covering temporarily stored materials with plastic or other impervious material during rain events to prevent sediments from being washed from the storage area to surface waters.
- Inspecting all temporary and permanent erosion and sedimentation control measures on a regular basis, and maintaining and repairing them as needed to ensure continued performance of their intended function.
- Preventing the discharge of turbid water to streams and wetlands. Turbid wastewater may be routed to temporary or permanent detention facilities, or to upland areas that provide adequate infiltration.
- Cleaning and inspecting all equipment to be used for construction activities prior to arriving at the project site to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly. Should a leak be detected on heavy equipment used for the project, the equipment would be repaired before use. Construction equipment and vehicles will be maintained to prevent them from leaking fuel or lubricants.

- Preventing contact of uncured concrete and/or concrete byproducts with streams or water conveyed directly to streams during construction in accordance with Washington Administrative Code (WAC) 220-110-270(3). A concrete truck chute cleanout area or equally effective BMP will be established to properly contain wet concrete.
- Requiring the contractor to adhere to water quality standards as stated in the 401 Water Quality Certificate and NPDES permit issued for the project.

Sound Transit will implement a SWPPP to assure that turbidity plumes and pollutants from equipment and runoff will not enter streams and wetlands. If discharge of treated construction or process water to a sanitary sewer were proposed, approval will be obtained from the King County Industrial Waste Division and the local jurisdiction. For construction in and over streams or other water bodies, an HPA will be obtained from the WDFW before work begins. Through compliance with these requirements, an approved construction SWPPP will be developed and implemented for the project. The SWPPP will describe overall procedural and structural pollution-prevention and flow-control BMPs, including location, size, maintenance requirements, and monitoring. In addition, the SWPPP will include each of the following plans:

- TESC Plan – This plan will outline the design and construction specifications for BMPs to be used to identify, reduce, eliminate, or prevent sediment and erosion problems.
- SPCC Plan – This plan will outline requirements for and implementation of spill prevention, inspection protocols, equipment and material containment measures, and spill response procedures.
- Concrete Containment and Disposal Plan – This plan will outline the management, containment, and disposal of concrete debris, slurry, and dust, and will discuss BMPs to be used to contain, collect, and dispose of residue and slurry.
- Dewatering Plan – This plan will outline procedures for pumping groundwater away from the construction area and for storing (as necessary), testing, treating (as necessary), and discharging or disposing of the dewatering water.
- Fugitive Dust Plan – This plan will outline measures to prevent the generation of fugitive dust from exposed soil, construction traffic, and material stockpiles.

2.3 Mitigation for Wetland, Stream, and Buffer Impacts

To the extent that impacts cannot be avoided, Sound Transit will provide compensatory mitigation to achieve no net loss of ecosystem function and acreage as follows:

- Mitigation for impacts to Bingaman Creek will be implemented onsite where the creek channel will meander around the guideway columns and the realigned channel will be restored with stream bed gravel and native groundcover and shrubs planted along the banks.
- Sound Transit will mitigate long-term impacts on wetlands and wetland buffers by replacing resources through available approved wetland mitigation banks, the King County in-lieu fee

program, advance mitigation, or project-specific mitigation developed by Sound Transit and based on a watershed approach. These measures may be used for stream and stream buffer impacts if onsite mitigation is not found to be sufficient.

- Sound Transit will implement a monitoring and adaptive management plan for replanting sensitive areas and buffers. The plans will verify 90 percent survival of all installed native trees and shrubs 1 year after installation. The performance criteria will be met if all dead plants are replaced at the end of the first year. Native woody species (planted and volunteer) will typically maintain a minimum density of four plants per 100 square feet in each plant community by the end of a 5-year period. Specific plant communities will be identified in the mitigation plan during permitting.
- Sound Transit will mitigate for impacts on forested vegetation using applicable state and local policies and regulations. Tree removal within the I-5 corridor will be mitigated according to the WSDOT *Roadside Policy Manual* (WSDOT, 2015a). Tree removal outside of WSDOT right-of-way will be mitigated to comply with local jurisdictions' tree replacement requirements.
- Sound Transit is working with resource and regulatory agencies to identify mitigation sites and develop a mitigation plan to offset the impacts of construction and operational effects on wetland and riparian habitat and buffers. Mitigation for wetland buffer and Bingaman Creek buffer impacts will be identified once the project enters final design and construction.

2.4 Design and Operation Best Management Practices

Sound Transit will avoid or minimize adverse long-term effects of the FWLE on upland forest habitat, wetlands, and streams through design, to the greatest extent practicable. Design aspects that will be incorporated into the project include elevated guideways, siting support columns and other elevated guideway features to span and avoid direct impacts on wetlands and streams, and using retaining walls to reduce the footprint of at-grade guideway sections, thus reducing the extent of fill in wetlands. The FWLE will be designed to avoid impacts on any culverts on fish-bearing or potentially fish-bearing streams, and to accommodate future modifications or replacement of culverts to improve fish passage.

Sound Transit will mitigate unavoidable impacts on streams and stream buffers that are protected under federal, state, and local regulations. With the exception of Bingaman Creek, the project design will avoid direct impacts on existing streams. Some unavoidable impacts on stream riparian areas will be mitigated by improving stream habitat and riparian function by replanting affected areas with native vegetation. In addition, the following measures and best management practices will be implemented:

- Sound Transit will design permanent stormwater treatment facilities and flow-control measures to minimize impacts on stream water quality and flow to meet the requirements of the 2016 King County Surface Water Design Manual.
- The proposed stormwater management for the FWLE follows the Sound Transit *Design Criteria Manual*, Revision 4 (Sound Transit, 2016i), which requires stormwater design for Sound Transit projects to conform to the requirements of the local jurisdictions.

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- Runoff treatment BMPs that are best suited to the site conditions and best capable of achieving the required levels of treatment will be selected, designed, and installed. These may include natural or engineered dispersion BMPs; biofiltration BMPs such as vegetated filter strips, rain gardens, biofiltration swales, or media filters; wet-pool BMPs; and infiltration BMPs.
- Water discharged from dewatering activities will be settled to reduce sediments before release. Discharge of dewatering water to a sanitary sewer may also be an option, if permission can be secured from the local sewer utility. Dewatering of trenched sections could temporarily depress groundwater levels during the trench construction, but they would be expected to recover to pre-project levels following construction.

2.5 Weed Control

Per federal, state, and local requirements and guidance, Sound Transit will implement appropriate measures to minimize risk of introduction and spread of noxious and invasive species. Sound Transit will apply pesticide in accordance with current Ecology water quality agreements to minimize the impact on aquatic and terrestrial environments. To minimize use of herbicide and fertilizers, restoration of disturbed areas will include the use of mulching, ground cover, and other planting strategies that discourage growth of undesirable species.

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3.0 Action Area

The action area is defined as the potential area to be affected directly or indirectly by the project action. The project activities and physical site conditions were evaluated to establish baseline conditions from which to evaluate potential effects of the project. Project components that pose potential effects include construction noise, turbidity and sedimentation from construction, and potential stormwater discharges to water bodies in the action area. Exhibit 3-1 illustrates the action area for the project.

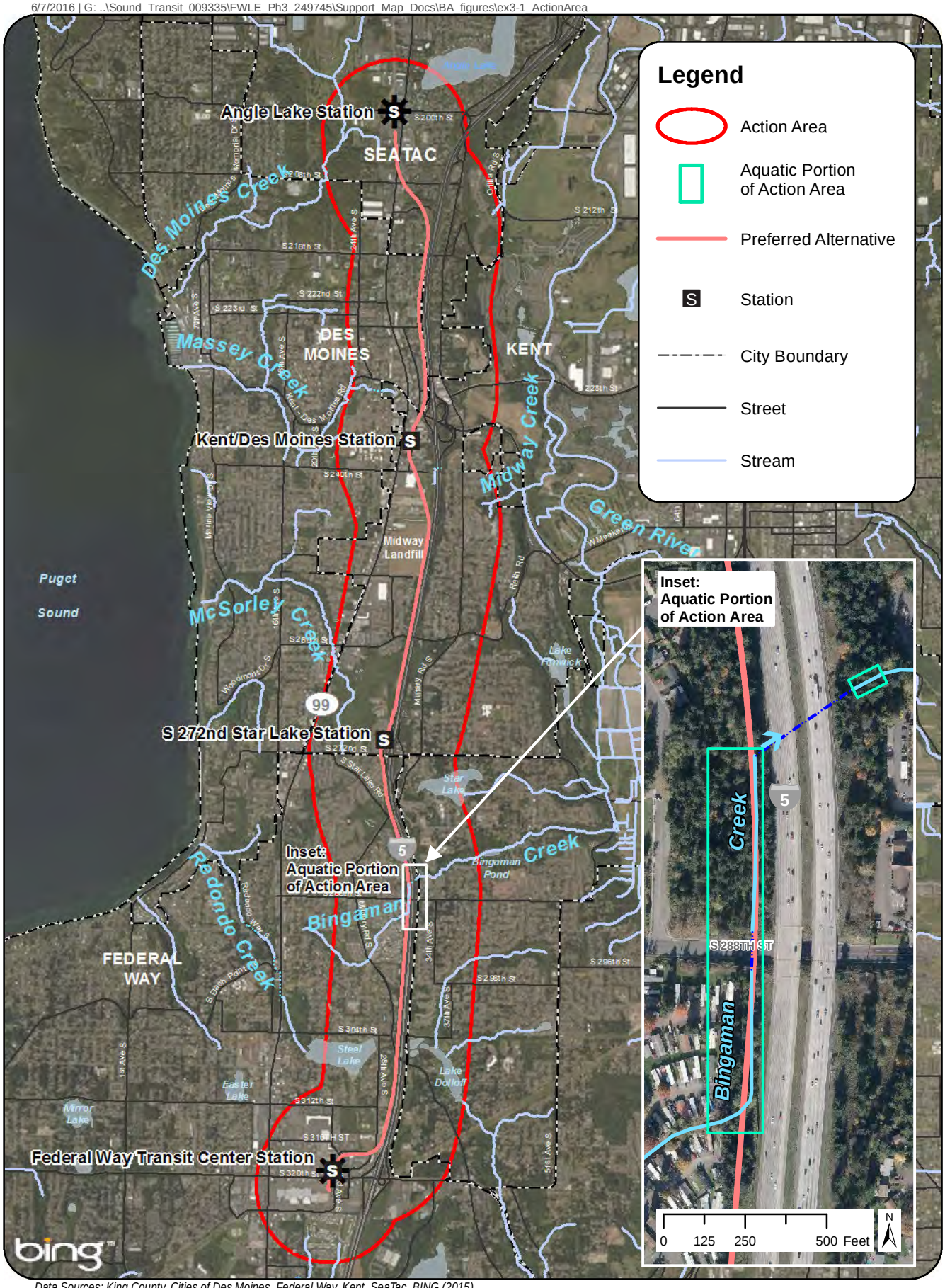
3.1 Terrestrial Portion of the Action Area

Construction noise would be the primary source of project impacts on terrestrial species. Therefore, the terrestrial portion of the action area was defined based on the extent of construction noise, which would extend beyond the construction footprint and exceed operational noise effects from the light rail. Sound measurements are often recorded in A-weighted decibels (dBA) because those units reflect human perception of noise. Sound begins to disturb birds at 80 to 85 dBA, and a flight response is triggered in raptors at approximately 95 dBA (Awbrey and Bowles, 1990). Humans rarely detect a sound level difference of 3 dBA or less (WSDOT, 2015b).

Noise attenuates as the distance from the source of the noise increases. A general equation shows noise propagation loss as 6 decibels for each doubling distance in areas of hard ground cover (WSDOT, 2015b). In areas where landscape features and vegetation exist, noise can attenuate up to 7.5 decibels per doubling of distance from the source (WSDOT, 2015b).

Construction point-source noise is commonly measured by maximum decibel level (Lmax), or the highest value of a sound pressure over a stated time interval (WSDOT, 2015b). The loudest construction activity for this project would be impact pile-driving that may be implemented at various locations in the project construction footprint, where trestles or sheet pile may be installed. The pile installation methods and locations have not been determined at this stage of design for the project. Therefore, a conservative assumption is that impact pile-driving on land could be required at multiple locations along the corridor. Based on this assumption, the three loudest pieces of equipment for construction activities would be an impact pile-driver (105 to 110 dBA), followed by an auger drill (82 to 86 dBA) and an excavator (80 to 86 dBA). The maximum potential noise level would be 110 dBA measured at 50 feet from the pile-driver.

The Noise and Vibration Technical Report prepared for this project (Appendix G3 of the Final EIS, Sound Transit, 2016) indicates noise levels measured around I-5 at monitoring sites throughout the length of the project corridor range from 57 dBA to 75 dBA with an average of 66 dBA. This is slightly louder than general background noise levels attributed to populated urban environments (WSDOT, 2015b), with the biggest noise contribution from traffic on I-5.



Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac, BING (2015).

EXHIBIT 3-1
Action Area

Federal Way Link Extension

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The action area is based on a conservative assumption that the loudest construction noise that could occur would be 110 dBA. Pile-driving would only be required in limited areas of the corridor such as some trenched sections and wetland areas where work trestles would be required and would be conducted over relatively short periods of time.

Based on the WSDOT model for point-source noise attenuation and the average background noise levels around the site, the loudest construction noise would attenuate to background levels at a distance of approximately 1/2 mile from the construction area. The majority of construction activities would produce lower noise levels (in the 75- to 85-dBA range), and consequently extend to a shorter distance. In areas where the highest background noise levels from I-5 were measured (about 75 dBA), construction noise from impact pile-driving would attenuate to these background levels in as little as 1/4 mile. For the purposes of this biological assessment, the 1/2-mile extent for construction noise was used as the geographical extent of the terrestrial portion of the action area (Exhibit 3-1).

3.2 Aquatic Portion of the Action Area

Project components that could affect the aquatic environment and that define the in-water portion of the action area include construction activities in or adjacent to streams and wetlands, and stormwater discharges to water bodies. No pile-driving would occur in water or next to any waterbodies, so underwater noise would not be a project impact.

Project activities in or adjacent to streams and wetlands have the potential to introduce and transport sediment into the aquatic environment at and downstream of the immediate construction or work area. Any areas where in-water work may occur and surface water is present would be isolated using a coffer dam or similar system to prevent suspended sediment or pollutants from leaving the work area. Sedimentation levels would also be minimized by use of conservation measures described in Chapter 2. In addition, Sound Transit must comply with water quality mixing zones set by Ecology (WAC 173-201A-200-1). The only stream directly impacted by the project is Bingaman Creek, and as a result of work site isolation and BMPs, potential impacts on surface water would be restricted to a potential mixing zone of less than 100 feet (WAC 173-201A-200-1(e)) from the downstream exit of the I-5 culvert. Stormwater from the project would be treated through detention ponds, bioretention swales, and filter strips, and would be discharged into existing city drainage facilities that discharge to water bodies from existing permitted municipal discharge locations. For these reasons, the aquatic portion of the action area encompasses the reach of Bingaman Creek alongside I-5 within the project footprint and 100 feet downstream of the I-5 culvert exit as the extent of potential construction-related increases in turbidity.

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4.0 Environmental Baseline

The FWLE corridor is on the broad, relatively flat terrace between Puget Sound and the Green River Valley. The plateau includes landforms such as depressions, slope and seep areas, and stream valleys that may support wetlands. Much of this area was developed during and after the 1960s following construction of I-5 and ongoing development at Seattle-Tacoma International Airport. The current land uses in the project vicinity include a mixture of commercial and office uses (primarily along the major roadways), and single- and multi-family residential. Parks and open-space parcels are distributed across the area.

Most of the project corridor and vicinity is urbanized. All of the stream basins in the area are highly modified and exhibit high stream flows during storm events, typical of developed basins. Urbanization has changed base flows and increased seasonal flow fluctuations from predevelopment conditions. Development in the area has also filled and urbanized areas that used to be wetlands. As a result, most wetlands in the area represent fragments of larger historic wetland systems. Some could be recently formed wetlands that resulted from changes in land use and surface water drainage patterns. The McSorley Creek wetlands are the largest undisturbed wetland complex in the FWLE corridor and the only one in the action area larger than 5 acres.

Because the action area is heavily developed, most of the vegetation reflects landscaping practices for urban and suburban areas, with remnant tree canopy retained for shade or aesthetics. The largest remnant of native forest in the action area is in the McSorley Creek riparian corridor and wetland between SR 99 and I-5.

This section describes potentially affected upland forested habitat and wildlife resources, wetlands, and water bodies within the project corridor.

4.1 Upland Vegetation and Wildlife Habitat

The FWLE corridor is within the western hemlock (*Tsuga heterophylla*) forest zone (Franklin and Dyrness, 1988). Western hemlock and western red cedar (*Thuja plicata*) are the dominant forest species in this zone, although Douglas-fir (*Pseudotsuga menziesii*) is also very common. Deciduous species occur primarily in disturbed areas and along rivers and streams.

Due to the heavily developed nature of the project corridor, much of the vegetation in the action area reflects landscaping practices for urban and suburban areas, with remnant tree canopy retained for shade or aesthetics. Within the maintained road rights-of-way, the vegetation includes a mixture of trees at the rights-of-way margins, native and non-native shrubs, landscaped areas, mowed grasses, and disturbance-tolerant forbs. Most vegetated areas in the project vicinity are on parcels that are either unsuitable or marginal for development for various reasons (such as steep slopes, presence of wetlands). Vegetation on these parcels typically includes a mixture of native and introduced species.

Most upland forested areas in the I-5 corridor have moderate wildlife habitat value. Forest canopy cover and large conifers are prevalent, and an abundant shrub layer and relatively few invasive species characterize many of these areas. However, much of this habitat is configured in a linear strip that parallels the freeway, creating a large amount of edge habitat. The interior core area that is less susceptible to negative edge effects is much smaller than the total area of the forest. Relatively round forest tracts with small edge-to-interior ratios are more secure for wildlife, whereas thin, elongated forests (such as those along I-5) have very little or no core area and are highly vulnerable to edge effects. Human-modified areas surrounding a forest fragment are usually altered into younger stands of small trees, saplings, and shrubs. These edge areas are attractive to pioneering species that invade several hundred meters into the adjacent forest fragment and alter the plant species composition and relative abundance, which in turn affects the suitability of the habitat for various wildlife species.

In urban environments such as the project vicinity, where natural habitats are fragmented and isolated, habitat reserves consist of designated areas, such as wildlife refuges, and undesignated areas, such as parks and open spaces. Wildlife habitat corridors may be vegetated slopes, riparian corridors, or fence rows. Patches of native vegetation, such as riparian areas, canyons, cliffs, and lake edges, are often left undeveloped within urban zones. Wildlife corridors are remnant habitat, regenerated habitat, or artificially created habitat that links larger areas of wildlife habitat. Corridors provide opportunity for animals to move between larger areas that they inhabit by providing patches or pathways of vegetation cover and habitat through which animals can move within otherwise developed and urbanized areas. Throughout the length of the action area, I-5 poses an impediment to wildlife movements between the Green River Valley in the east and natural areas to the west, including McSorley Creek. SR 99, west of I-5, also poses an impediment to wildlife movements from McSorley Creek wetlands and forested areas westward to the Puget Sound shoreline.

The three largest patches of contiguous forest cover along the west side of I-5 in the project corridor (Exhibit 4-1) include an area extending from Military Road/Star Lake Road to S 288th Street; one extending from approximately S 292nd Street to S 301st Street; and one extending from Military Road near S 304th Street to approximately S 311th Street. The McSorley Creek riparian and wetland area between SR 99 and I-5 has the largest tract of forested habitat in the action area. This area contains a relatively large amount of established undeveloped habitats that support small mammals, reptiles, amphibians, and birds in greater abundance than typically found in highly urbanized areas. The FWLE is in the Pacific Flyway, a migratory corridor consisting of the western coastal areas of South, Central, and North America. The McSorley Creek forested wetland is a large area with varied tree species and shrubs, and likely provides nesting habitat for some bird species, primarily songbirds.

The forested areas along the west side of I-5 in the project corridor also provide some north-south movement of wildlife along the west side of I-5. Although intersected by cross streets, the forested strip along I-5 can connect larger areas of natural cover such as around Military Road and the McSorley Creek forested areas. These forested slopes would mostly be used by migratory birds and small mammals. The elevated noise levels from I-5 traffic in these areas limit their suitability for birds.

4.2 Wetlands

Sound Transit identified 27 wetlands within 300 feet of the project footprint, as described in the *Ecosystems Technical Report* for the FWLE Final EIS (Sound Transit, 2016). Wetlands vary in size from less than 0.1 acre to over 108 acres. Wetlands initially identified in the Draft EIS (prior to January 1, 2015) were rated using Ecology's 2004 wetland rating system. Wetlands identified for the Final EIS were rated using Ecology's 2014 rating system. None of the wetlands met Ecology's criteria for wetlands with special characteristics. The wetlands in the action area are shown in Table 4-1 and on Exhibit 4-1.

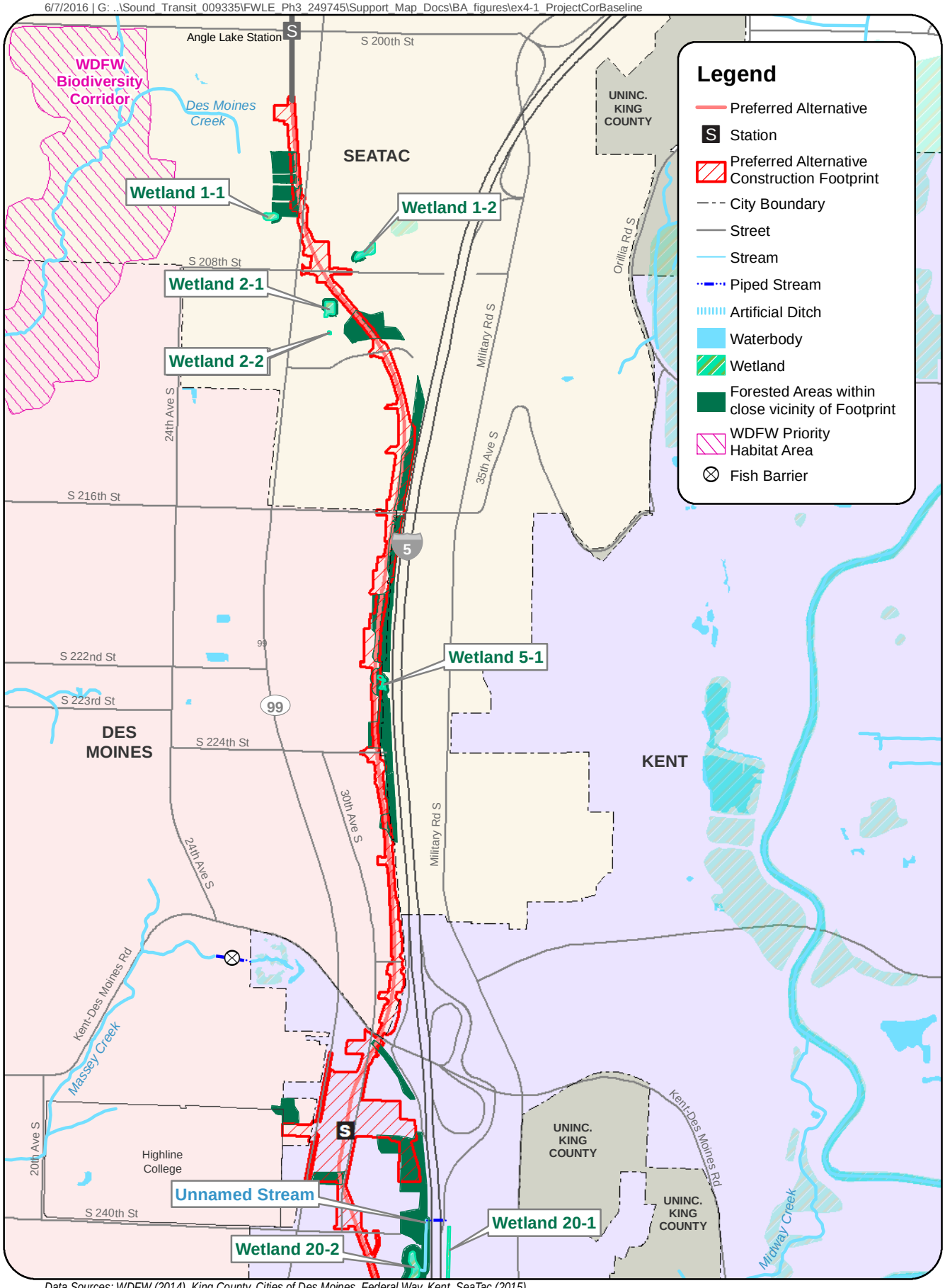
TABLE 4-1
Wetlands in the Action Area

Wetland Name	Hydrogeomorphic Classification	Cowardin Classification[a]	Approximate Wetland Acreage in Action Area (Total Wetland Acreage)	Ecology/ Local Wetland Rating	Jurisdiction	Buffer Width (feet)
1-1	Slope	PSS	0.3 (0.3)	IV/III	City of SeaTac	35
1-2	Depressional	PFO/POW	0.3 (0.6)	III	City of SeaTac	35
2-1	Depressional	PEM	0.4 (0.4)	III	City of SeaTac	35
2-2	Depressional	PEM	<0.1 (<0.1)	III	City of SeaTac	35
5-1	Depressional	PSS	0.1 (0.1)	III	City of Des Moines/City of SeaTac	80/35
12-1	Depressional	PFO/SS	12.5 (108.6)	II	City of Kent	125
12-4	Depressional	PFO	0.1 (0.6)	III	City of Kent	75
20-1	Depressional	PEM/PSS	2.2 (2.5)	IV	City of Kent	50
20-2	Depressional	PSS/PEM	0.6 (0.6)	III	City of Kent	75
20-3	Depressional	PSS	<0.1 (<0.1)	III	City of Kent	75
23-1	Depressional	PFO/PSS	<0.1 (1.2)	III	City of Kent	75
24-2	Depressional	PFO/PSS	0.1 (0.1)	III	City of Kent	75
25-1	Depressional	PFO	0.6 (4.4)	III	City of Federal Way	60
25-2	Depressional	PFO	0.7 (0.7)	III	City of Federal Way	60
25-2a	Depressional	PSS	0.1 (0.1)	IV	City of Federal Way	40
25-4	Depressional	PFO	<0.1 (4.0)	III	City of Federal Way/ Unincorporated King County	75/75

TABLE 4-1
Wetlands in the Action Area

Wetland Name	Hydrogeomorphic Classification	Cowardin Classification[a]	Approximate Wetland Acreage in Action Area (Total Wetland Acreage)	Ecology/ Local Wetland Rating	Jurisdiction	Buffer Width (feet)
25-5	Depressional	PEM	0.41 (0.41)	IV	City of Federal Way	40
26-1	Depressional	PEM/PSS	0.26 (0.26)	III	City of Federal Way	60
27-1	Depressional	PFO	0.3 (0.3)	III	City of Federal Way	60
27-2	Depressional	PSS`	<0.1 (<0.1)	III	City of Federal Way	60
27-3	Slope	PEM	0.5 (0.5)	IV	City of Federal Way	40
28-1	Lake fringe	PFO/PSS/PEM/ POW	0.2 (11.6)	II	Unincorporated King County/ City of Federal Way	125/105
28-2	Slope	PSS/PFO	<0.1 (<0.1)	IV	City of Federal Way	40
28-3	Depressional	PEM/PSS	0.6 (0.6)	III	City of Federal Way	60
28-4	Depressional	PFO	<0.1 (0.1)	III	City of Federal Way	60
29-2	Riverine	PEM	<0.1 (<0.1)	III	City of Federal Way	60
30-3	Depressional	PFO	0.1 (0.1)	III	City of Federal Way	60

[a] PEM = palustrine emergent; PFO = palustrine forested; POW = open water; PSS = palustrine scrub-shrub; SS = scrub-shrub (Cowardin et al., 1979)
NA = not applicable



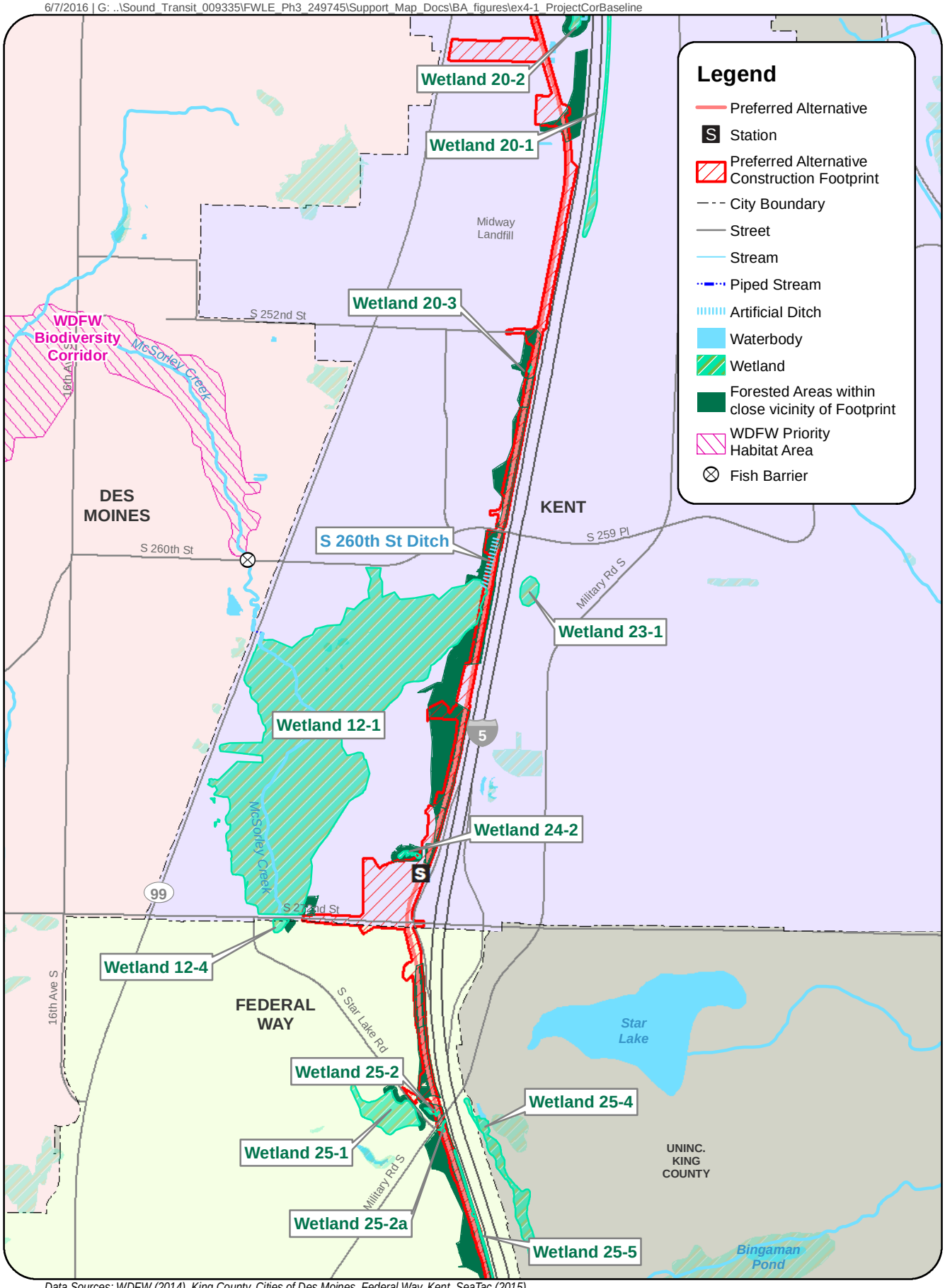
Data Sources: WDFW (2014), King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N

0 0.25 0.5 Miles

EXHIBIT 4-1
Sheet 1
Project Corridor Environmental Baseline
Federal Way Link Extension

DRAFT: For internal discussion only. Not reviewed or approved on behalf of any party.



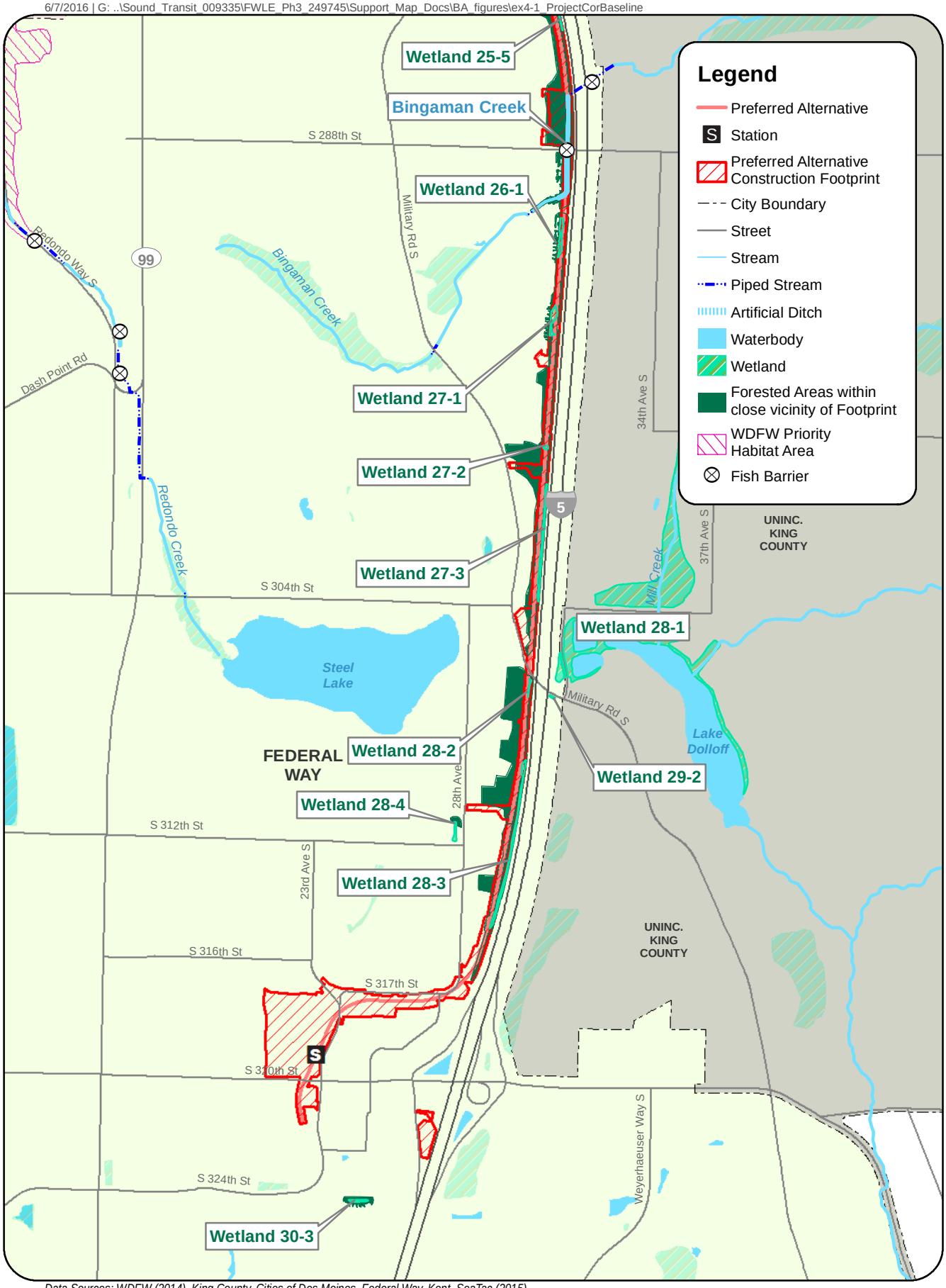
Data Sources: WDFW (2014), King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N

0 0.25 0.5 Miles

EXHIBIT 4-1
Sheet 2
Project Corridor Environmental Baseline
Federal Way Link Extension

DRAFT: For internal discussion only. Not reviewed or approved on behalf of any party.



Data Sources: WDFW (2014), King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2015).

N

0 0.25 0.5 Miles

EXHIBIT 4-1
Sheet 3
Project Corridor Environmental Baseline
Federal Way Link Extension

DRAFT: For internal discussion only. Not reviewed or approved on behalf of any party.

All wetlands in the project corridor are on the broad, flat terrace between Puget Sound and the Green River Valley. Plateau landforms on the terrace, such as depressions, slope and seep areas, and stream valleys, may support wetlands. Some of the wetlands present in the action area are fragments of larger historical wetland systems; others formed more recently through changes in land use and surface water drainage patterns over the last half-century.

Wetland 12-1 (McSorley Creek Wetland) is the major wetland in the action area with a total size of 108.6 acres, 6.5 acres of which fall within 300 feet of the Preferred Alternative. Other wetlands are generally small, isolated features adjoining I-5. Vegetation present in these wetlands varies, but most of the wetlands consist of one vegetation community type. Most wetlands are deciduous forested and scrub-shrub wetlands dominated by red alder (*Alnus rubra*) trees and saplings, salmonberry (*Rubus spectabilis*) and willows (*Salix* spp.). Emergent wetlands are predominantly vegetated by non-native invasive reed canarygrass (*Phalaris arundinacea*).

According to ratings assigned to the wetlands using the Ecology rating system, Wetlands 12-1, 25-4, and 28-1 are Category II wetlands due to their larger size, mature vegetation, habitat structure, and greater connectivity and support to other habitats. Five wetlands fall into the lower functioning (Category IV) group, and the remaining 16 wetlands provide low to moderate functional scores in between Category II and Category IV, and were rated Category III.

Wetland 12-1 forms the headwaters of McSorley Creek, which supports ESA-listed fish at the confluence with Puget Sound nearly a mile downstream from the project. None of the other wetlands in the project corridor have a surface water connection to streams that support ESA-listed fish. Collectively, however, the ecological functions of these wetlands (e.g., water quality maintenance, stormwater detention, groundwater recharge, and organic material production and export) likely contribute to the maintenance of habitat in fish-bearing streams in the Green River and Puget Sound watersheds.

4.3 Water Bodies

The FWLE corridor is primarily in Water Resource Inventory Area (WRIA) 9 (Duwamish – Green River Basin), with a small portion of the southern extent in WRIA 10 (Puyallup-White). The portion in WRIA 10 is south of Steel Lake in Federal Way and has no surface water streams that intersect the project corridor. The FWLE corridor is between two major drainages, the Green River Basin to the east and the Puget Sound Basin to the west. Puget Sound and the Green River support Pacific Northwest salmonid species, including stocks that are listed under the ESA.

In general, the small creeks throughout the project vicinity are low-gradient streams typical of Puget Sound lowland drainages that receive their flow from springs, seeps, lake outlets, rainfall, and groundwater runoff. Habitat degradation from industrial development and/or urbanization has occurred, and much of the area is covered with impervious surfaces (Kerwin and Nelson, 2000). The limited quantity of riparian area and the lack of large trees can effectively limit the supply of organic matter and terrestrial insects delivered to the stream system (Kerwin and Nelson, 2000). The short- and long-term potential for large woody debris (LWD) recruitment in these small stream drainages is

poor because land use activities effectively preclude the maturation of riparian stands. The riparian habitat in the action area is generally limited and confined by urban development.

Roadways and development in the area have resulted in Bingaman Creek and other small streams being conveyed through culverts and pipes for at least some portion of their length. This alters flow patterns and natural stream processes, and can pose passage barriers for fish. Impaired passage to larger, more productive streams due to extensive culverts and stormwater connections is another major limiting factor affecting these small streams' capacity to support fish populations in the project vicinity.

Ecology periodically assesses state-wide water quality to develop the 303(d) Impaired Waters List of water bodies that do not meet water quality standards. Bacteria and dissolved oxygen are the two parameters in the action area that most commonly do not meet Ecology's water quality standards. Water quality violations are also shown for copper in Des Moines Creek. Bingaman Creek is not on the Ecology 303(d) list of streams with impaired water quality (Category 5) (Ecology, 2016).

In addition to the creeks, several small unnamed drainages are in the project action area, including a drainage ditch south of S 260th Street. This ditch is a riprap and spall lined channel that runs along an old gravel road bed to the west of the I-5 embankment (Exhibit 4-1, Sheet 2). The ditch conveys drainage from stormwater infrastructure along I-5 north of S 260th Street to where it dissipates into the northern edge of the McSorley Creek wetlands. Several other small drainage ditches are part of the stormwater system alongside I-5, including a culvert channel in wetlands 25-2 and 25-1 along Military Road S. These I-5 drainages are part of piped stormwater systems and do not constitute fish habitat and do not support fish passage.

4.3.1 Unnamed Stream in I-5 Right-of-Way (South of Kent-Des Moines Road)

There is a small, manmade stream channel that originates in Wetland 20-2 on the west side of I-5 just south of the Kent-Des Moines Road southbound on-ramp (Exhibit 4-1, Sheet 1). This small, unnamed channel flows north alongside I-5 for approximately 600 feet, then through a 24-inch-diameter metal culvert that conveys it east under I-5.

The channel is low gradient at less than 1 percent slope, and flow is very slow. There is a small area near the culvert entrance where the gradient slightly increases and the streambed is composed of small gravel, but the rest of the channel bed is composed of a thick layer of silt and organic material. Some aquatic vegetation is also present throughout the channel because this reach is slow-moving. The channel is 5 to 7 feet wide at the OHWM and there was 3 to 8 inches of water in the channel during a field visit in March 2015. The banks are 6 to 14 inches high and are engineered on the east side from the highway embankment materials and where recently cleared of vegetation. This channel has been at least partially excavated and routed to make a 90-degree turn to follow the edge of the I-5 road prism. Two small pipes convey water under a small berm that crosses the channel approximately 75 feet south of the culvert, which impede flow. This channel does not provide suitable habitat for salmonids and other fish and is isolated from streams that are known to contain fish.

4.3.2 Bingaman Creek

Bingaman Creek flows roughly northeast from wetlands west of Military Road and south of S 288th Street, then bends north along the west side of I-5, passes under I-5, and continues east to Bingaman Pond (Exhibit 3-1). Downstream of Bingaman Pond, the creek continues down into the Green River Valley, where it flows under S 277th Street and continues north to enter the Green River north of Kent-Des Moines Road (SR 516).

The reach of the creek in the project corridor is upstream of several manmade fish passage barriers and is over 1.5 miles upstream of known fish use. It enters the action area from a mobile home park approximately 500 feet south of S 288th Street, and then runs north along the western edge of the I-5 right-of-way between the mobile home park and a sound wall. It passes through a trash rack and then under S 288th Street in a siphon culvert and continues north along the I-5 right-of-way for approximately 540 feet, where it enters a culvert under I-5 (Exhibit 4-1, Sheet 2). Both of these culverts are considered barriers to fish passage by WSDOT and WDFW.

4.3.2.1 Habitat

Habitat quality in the stream reach on the south side of S 288th Street is much more degraded than the reach on the north side due to the eroding banks, silt and mud substrate, the proximity of a residential mobile home park and frequent human disturbance, and the presence of accumulated trash in the stream channel. The channel banks in the area between the mobile home park and the sound wall are eroding. The left bank is vegetated and 10 to 15 feet high, while the right bank is much lower and slopes up to the base of the concrete sound wall. The stream channel is approximately 15 feet wide at its downstream end near the trash rack and culvert entrance, and narrows upstream to 8 to 10 feet wide at bankfull. The substrate of the channel in this reach is silt and sand with organic debris, and the stream flow is very slow with a 1 percent slope or less. The stream flows through a trash rack structure approximately 10 feet wide before crossing through a siphon culvert under S 288th Street. This culvert poses a complete barrier to fish passage. During a field visit in December 2015, when flows were relatively high, the trash rack at the culvert entrance was partially clogged with woody debris and trash, causing backwatering in the creek channel upstream.

On the north side of S 288th Street, Bingaman Creek flows north alongside the I-5 road embankment. The channel substrate is gravel and cobble. The banks are approximately 18 inches high to the OHWM, are steep and vegetated, and have some low scour. The water depth at the time of the field visit in March 2015 was 4 to 5 inches, but the channel was almost dry during an initial visit in January 2014, and was completely dry during a subsequent visit in September 2015. During a final field visit in December 2015 after a prolonged period of rain, the creek in this reach had relatively high flows to around the OHWM level and depths of 8 to 18 inches or more. The channel is fairly straight and uniform, and ranges from 7 to 9 feet wide at the OHWM. The stream gradient is low at around 1 percent with some small riffle areas approximately half way along the reach where the slope changes to approximately 2 percent. Approximately 540 feet north of S 288th Street, the creek flows east through a 3-foot-diameter concrete culvert under I-5. From survey data of the entrance and exit

structures, it was determined that the culvert under I-5 has a slope of approximately 6 percent and poses a complete barrier to fish passage.

Riparian habitat along this reach consists of mature coniferous forest with some shrub understory, and the forested corridor perpendicular to the stream is roughly 300 feet wide, covering the property between 30th Avenue S and I-5. This vegetation provides cover and shade to the stream channel, as well as LWD input. The natural gravel stream bed, vegetated banks, and mature riparian cover provide good fish habitat in this reach. The channel is fairly uniform and seems to have been artificially straightened to run alongside the base of the I-5 road prism.

The channel downstream of the I-5 culvert passes through a wooded area on property occupied by an apartment complex. The channel in this reach is 4 to 8 feet wide with gravel and some cobble in the substrate. It was completely dry at the time of the field visit in September 2015. The channel widens as it progresses downstream to the Bingaman Pond Natural Area, a conservation area owned and managed by King County. Scour and bank erosion in this reach indicate that fast flows pass through this section of the creek channel during high flow periods. Stormwater inputs add to the flow downstream of the apartment driveway and parking area.

4.3.2.2 Fish Use

As noted above, the Bingaman Creek culvert under I-5 has been documented as a complete barrier to fish passage. The inverted siphon culvert crossing under S 288th Street is also a fish passage barrier because the elevation of the bottom of the culvert is approximately 10 feet below the elevation of the stream bed on each side. Downstream (east) of I-5, a culvert in poor condition under a private drive in an apartment complex poses a partial barrier to fish passage. Farther downstream, another partial barrier occurs in a narrow, steep reach where several successive 3- to 4-foot drops have been scoured out during high flow periods. These drops would be impassable to juvenile and small fish attempting to move upstream into the action area. This feature is not classified as a natural barrier to all fish passage as it does not meet the criteria in the WAC (WAC 222-16-031) and in the WDFW fish passage barrier assessment (WDFW, 2009). Culverts in reaches farther downstream of I-5 are also in poor condition and pose at least partial barriers to fish passage.

The connection of Bingaman Creek to Bingaman Pond on the upstream (west) side of the pond is tenuous with respect to fish passage, with no defined channel and heavy vegetation in a large wetland. The channel dissipates into small braids in the forested area to the west of the pond that may provide some passage during periods of high flow. During a field visit in December 2015, flow was observed in the channel throughout its length and several branches of the creek were observed flowing through shallow channels in the forested area west of the Bingaman Pond wetland. Downstream of Bingaman pond, flows are more persistent. The culvert under 46th Avenue discharges to a steep boulder/rip rap section that exceeds 20 percent gradient and likely poses a barrier to fish passage under most flow conditions.

Although habitat features in the creek create the potential for fish to occur, lack of fish-passable connectivity to perennial and fish-inhabited reaches in the watershed currently preclude the use of the reach within the action area at the west side of I-5 from being used by fish. WDFW Priority Habitat and

Species (PHS) data (WDFW, 2015) show cutthroat trout presence in Bingaman Creek, including the action area. WDFW Salmonscape (2016) and Kerwin and Nelson (2000) report Bingaman Creek as having the potential to support coho salmon if barriers downstream of Bingaman Pond connecting to reaches in the Green River Valley were not present.

Because Bingaman Creek goes completely dry during summer and downstream connectivity to wet areas (i.e., Bingaman Pond) are lacking, fish that may inhabit the pond are currently unable to return to the creek channel upstream during periods of flow. In addition, because the culvert under I-5 is currently a passage barrier, it precludes fish from moving upstream into the action area. Therefore, although fish likely inhabit areas of Bingaman Creek downstream, they are not present in the reach in the action area.

4.4 Mitigation Sites

To the extent that impacts cannot be avoided, Sound Transit would provide compensatory mitigation to achieve no net loss of ecosystem function and acreage. Compensatory mitigation for wetland impacts would be implemented in accordance with applicable federal, state, and local requirements and guidelines. Compensatory mitigation would be provided for construction impacts lasting more than one growing season, and for permanent conversion of wetlands from one vegetation type to another (e.g., forested wetland to emergent or scrub-shrub wetland). Sound Transit would mitigate long-term impacts on wetlands and wetland buffers by replacing resources through one or more of the following methods:

- Approved wetland mitigation banks
- King County in-lieu fee program
- Advance offsite compensatory mitigation
- Project-specific mitigation developed by Sound Transit and approved by appropriate regulatory agencies

Opportunities for project-specific wetland mitigation may occur in the action area and within the greater project vicinity. Site selection would emphasize locating mitigation within the same watershed as where impacts occur. Publicly or privately owned portions of the McSorley Creek wetlands may provide opportunities for mitigation through enhancing or reestablishing acreage and function by removing fill material along the perimeter of the wetland. Sound Transit would determine final wetland mitigation actions during final design and permitting.

Sound Transit would provide mitigation for unavoidable impacts on streams, stream buffers, vegetation, and wildlife habitat protected under federal, state, and local regulations. With the exception of Bingaman Creek, the project would avoid direct impacts on existing streams. Improving stream habitat and riparian function by replanting affected areas with native vegetation would mitigate some unavoidable impacts on stream riparian areas.

5.0 Species and Critical Habitat Status and Occurrence

Species lists from the USFWS and NMFS were obtained in January 2016 from the agencies' websites and the USFWS Information for Planning and Conservation (IPaC) system and are provided in Appendix A. Area biologists from the USFWS were also interviewed in March 2016 regarding the current and historic presence of each species within the action area and vicinity. Table 5-1 provides the ESA listed species that are documented to occur in the vicinity of the FWLE. None of these species is known to inhabit the action area.

TABLE 5-1
ESA Listed Species and Critical Habitat that Potentially Occur in the Action Area

Species	ESU/DPS	Status	Federal Jurisdiction	Critical Habitat in Action Area
Canada lynx (*Lynx canadensis*)	NA	Threatened	USFWS	None in action area
Chinook salmon (*Oncorhynchus tshawytscha*)	Puget Sound ESU	Threatened	NMFS	None in action area
Steelhead trout (*Oncorhynchus mykiss*)	Puget Sound DPS	Threatened	NMFS	None in action area
Bull trout (*Salvelinus confluentus*)	NA	Threatened	USFWS	None in action area
Golden paintbrush (*Castilleja levisecta*)	NA	Threatened	USFWS	None designated
Oregon spotted frog (*Rana pretiosa*)	NA	Threatened	USFWS	None in action area
Marbled murrelet (*Brachyramphus marmoratus*)	NA	Threatened	USFWS	None in action area
Streaked horned lark (*Eremophila alpestris strigata*)	NA	Threatened	USFWS	None in action area
Yellow-billed cuckoo (*Coccyzus americanus*)	Western U.S. DPS	Threatened	USFWS	None in action area

ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment; NA = not applicable
Source: USFWS IPaC.

Salmonid species in the region listed as threatened include Puget Sound Chinook (*Oncorhynchus tshawytscha*), Puget Sound steelhead (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*). These species inhabit the Green River and Puget Sound, and juvenile Chinook salmon utilize nearshore habitat of Puget Sound. Steelhead are also documented to occur in the downstream reach of Bingaman Creek at its confluence with the Green River and have the potential to occur in Midway Creek, although they have not been documented there (WDFW, 2016).

Cutthroat trout and coho salmon are also documented to occur in the Green River (WDFW, 2015). Coho salmon, a federal species of concern, is known to inhabit the Green River, Des Moines Creek, and the lower reaches of McSorley Creek, as well as the downstream reaches of Bingaman Creek where it enters the Green River, outside the action area. The reach of Bingaman Creek in the aquatic portion of

the action area is over 2,000 feet upstream of Bingaman Pond and associated surrounding wetlands. Any water quality impacts potentially occurring from the project would dissipate by the time they reached Bingaman Pond and its associated wetlands, nearly a mile upstream from known fish use.

No ESA-listed or state-listed fish species and no critical habitat occur in the aquatic portion of the action area or vicinity (WDFW, 2015 and 2016; Kerwin and Nelson, 2000). The culvert under I-5 is a complete passage barrier to fish, and four additional culvert barriers under roadways downstream of the action area preclude fish from moving upstream from the lower reaches in the Green River Valley.

The Magnuson-Stevens Fishery Conservation and Management Act protects EFH for federally managed species of Pacific salmon, specifically Chinook, pink (*Oncorhynchus gorbuscha*), and coho salmon. EFH includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (Magnuson-Stevens Act, 16 United States Code §1855(b)(2)). These species are not present in the action area; however, EFH also includes historic distribution and waters formerly accessible to salmon. Coho were potentially present in Bingaman Creek and McSorley Creek in the action area before development. Consequently, these water bodies are included in the EFH analysis (see Appendix B).

The western toad (*Bufo boreas*) is a federal species of concern that is found in Lake Washington and other water bodies in the area, but is unlikely to occur in the action area due to lack of suitable habitat. The McSorley Creek wetlands may, however, have some potential to provide suitable breeding habitat for western toad.

5.1 Species Excluded from Analysis Due to Lack of Occurrence in the Action Area

Although listed as potentially occurring within the wider surrounding area based on agency and county lists, several species can be considered as highly unlikely to occur in the action area and therefore do not warrant analysis of potential project impacts. The following subsections describe the distributions and habitat requirements of these species, and explains their lack of occurrence in the action area and why they are therefore excluded from further analysis in this assessment.

5.1.1 Canada Lynx

The Canada lynx (*Lynx Canadensis*) was listed as threatened under the ESA in 2000 (65 Federal Register [FR] 16053). Historically, the lynx was found from Alaska across Canada and into the northern U.S. states. It inhabits boreal coniferous forests and subalpine forests in the northwestern U.S. The lower elevation range for lynx in Washington is typically 4,000 feet above mean sea level (Johnson and Cassidy, 1997). The action area is in a highly urbanized environment and alongside I-5. Although it contains small amounts of forested habitat, the surrounding areas are highly urbanized and the elevation of the site is well below the elevation preferred by lynx. WDFW PHS data obtained for the action area do not document the presence of lynx or suitable habitat in the action area. On February 28, 2009, the USFWS revised designated critical habitat for the Canada lynx (74 FR 8616). The action area is not included in, or within several hundred miles of, areas included in the revised designated

critical habitat. Based on this information, Canada lynx are extremely unlikely to occur in the action area and are therefore not discussed further.

5.1.2 Golden Paintbrush

Golden paintbrush (*Castilleja levisecta*) was listed as threatened in 1997 and no critical habitat has been designated for this species. Historically, golden paintbrush has been reported from more than 30 sites in the Puget Trough of Washington, in western British Columbia, and as far south as the Willamette Valley of Oregon. Many populations have been extirpated due to agricultural, residential, and commercial development. Currently, nine populations are known to exist in Washington; more than half of these occur on Whidbey Island and the San Juan Islands. Golden paintbrush is not documented in the action area (Washington Natural Heritage Program, 2015). Suitable habitat for golden paintbrush (open grasslands in glacial outwash prairies) is not present at any locations where project–related actions would occur. For these reasons, the proposed project has no potential to affect this species.

5.1.3 Chinook Salmon

Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) were listed as threatened by NMFS on August 2, 1999 (64 FR 41835). The Puget Sound ESU comprises all naturally spawned populations from rivers and streams flowing into Puget Sound. Critical habitat for Puget Sound Chinook salmon was designated in September 2005 to include sites that are essential to supporting one or more life stages of the ESU and which contain physical or biological features essential to the conservation of the ESU. The Green River is part of designated critical habitat for this species, but Bingaman Creek is not included in designated critical habitat.

Adult Puget Sound Chinook return to freshwater spawning tributaries from March through September (Wydoski and Whitney, 2003). Juvenile Puget Sound spring Chinook salmon can rear in freshwater streams and rivers year-round with outmigration taking place between late April and mid-July. Summer- and fall-run Puget Sound Chinook salmon have essentially the same life history timing. Adults of both runs migrate upstream from July through mid-October. Spawning takes place from mid-September through mid-November. Summer- and fall-run juveniles do not rear year-round in streams, but outmigrate between late April and mid-July.

Puget Sound Chinook presence is documented in the Green River (WDFW, 2016; StreamNet, 2016, Kerwin and Nelson, 2000) but not in Bingaman Creek. Due to its small size, lack of pools and habitat structure, and intermittent flow conditions, Bingaman Creek does not provide suitable habitat for Chinook salmon. Impassable barriers and culverts downstream block fish from accessing the reaches in or near the action area. Potential project impacts on Bingaman Creek occur well upstream of the Green River Valley. Any Chinook salmon that may be in the Green River would be far outside the action area and would not be impacted by the proposed project; therefore, Puget Sound Chinook are not discussed further.

5.1.4 Steelhead Trout

NMFS listed Puget Sound steelhead trout (*Oncorhynchus mykiss*) as threatened under the ESA in 2007 (72 FR 26722). This DPS of steelhead includes all naturally spawned winter- and summer-run steelhead populations in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River and to the north by the Nooksack River and Dakota Creek. Critical habitat for Puget Sound steelhead was designated on March 25, 2016 (81 FR 9252). Designated critical habitat includes the Green River, but Bingaman Creek is not designated as part of steelhead critical habitat.

Both winter-run and summer-run steelhead are documented in the Green River (WDFW, 2016). Adult winter-run Puget Sound steelhead return to the Puget Sound Basin from December through April, and spawn from January to mid-June, with peak spawning from mid-April through May. Summer-run steelhead generally return to fresh water from May or June to October, with spawning taking place from January to April (Wydoski and Whitney, 2003). Juveniles rear for up to 3 years in fresh water streams and rivers, and out-migrate from mid-April through May. The winter run of steelhead is the predominant run timing in Puget Sound, in part because there are relatively few basins in the Puget Sound Steelhead DPS with the geomorphological and hydrological characteristics necessary to maintain the summer-run life history.

Puget Sound steelhead are documented to occur in the Green River and in the lower reach of Bingaman Creek in the Green River Valley downstream of S 277th Street well outside the project action area (WDFW, 2016; StreamNet, 2016; Kerwin and Nelson, 2000). Impassable barriers and culverts downstream block fish from accessing the reaches in or near the action area. Potential project impacts on Bingaman Creek occur well upstream of the Green River Valley. Any steelhead that may be in the Green River would be far outside the project action area and would not be impacted by the proposed project; therefore, Puget Sound steelhead are not discussed further in this document.

5.1.5 Bull Trout

In November 1999, the USFWS defined one DPS for all bull trout (*Salvelinus confluentus*) in the conterminous United States, and listed that DPS as threatened under the ESA (64 FR 58910). The Coastal-Puget Sound bull trout population includes individuals that occur in all Pacific coast drainages in western Washington, including Puget Sound, with the exception of the Columbia River. Critical habitat for bull trout was revised in a final rule on November 17, 2010, (75 FR 63898) and includes the Green River and the Puget Sound shoreline. Bingaman Creek is not included in designated critical habitat for Coastal-Puget Sound bull trout.

Migration of spawning adults begins as early as May in western Washington and continues into September. They spawn from September through November. Bull trout require very cold water for spawning (46°F) and egg incubation (below 40°F). High-quality spawning and rearing habitat is typically characterized by cold temperatures; abundant cover in the form of large wood, undercut banks, and boulders; clean substrate for spawning; intergravel spaces large enough to conceal juveniles; and stable channels (USFWS, 1998). Bull trout appear to be more sensitive than other salmonid species to degraded water quality.

Bull trout presence has been documented in the Green River (WDFW, 2016; StreamNet, 2016; Kerwin and Nelson, 2000) but not in Bingaman Creek. Due to its small size, lack of pools and habitat structure, and intermittent flow conditions, Bingaman Creek does not provide suitable habitat for bull trout. Impassable barriers and culverts downstream block fish from accessing the reaches in or near the action area. Potential project impacts on Bingaman Creek occur well upstream of the Green River Valley. Any bull trout that may be in the Green River would be far outside the action area and would not be impacted by the proposed project; therefore, bull trout are not discussed further.

5.2 Species Included as Having Potential to Occur in the Action Area

Although their presence is unlikely, the species described in this section have the potential to occur in the action area based on occupation of surrounding areas and/or the presence of potentially suitable habitat.

5.2.1 Oregon Spotted Frog

The Oregon spotted frog (*Rana pretiosa*) was formally listed as threatened under the ESA in August 2014 (79 FR 51658). Critical habitat for the species was designated in May 2016 and includes river basins in Skagit and Whatcom counties to the north, and Thurston county to the south, but none is in the action area or vicinity (81 FR 29335).

The Oregon spotted frog is the most aquatic of the native frog species in the Pacific Northwest (USFWS, 2014). It is associated with emergent wetland in forested landscapes as well as large, shallow wetland systems connected to perennial bodies of water. Given this association with perennial water bodies, Oregon spotted frogs tend to avoid dry uplands (NatureServe, 2015; USFWS, 2014). Characteristics of suitable habitat for this species include (USFWS, 2014):

- The presence of good breeding and over-wintering sites connected by year-round water
- Reliable water levels that maintain depth throughout the period between egg laying and metamorphosis
- The absence of introduced predators, especially warm-water game fish and bullfrogs

In Washington, dispersal is limited to aquatic corridors (Hallock, 2013), and overland movements are very rare (NatureServe, 2015; USFWS, 2014). The size of ponds where Oregon spotted frogs have been observed typically ranges from 2.5 acres to 9 acres, and can be as large as 4,915 acres (Hayes, 1994; Pearl and Hayes, 2004).

Documented threats to Oregon spotted frog include loss of habitat, nonnative plant invasions, and the introduction of exotic predators. The species has been extirpated from at least 78 percent of its former range (USFWS, 2014). The majority of Oregon spotted frog populations are small and isolated, which makes them more vulnerable to random, naturally occurring events such as drought, disease, and predation (USFWS, 2014).

Washington counties with known occurrences include Clark, King, Klickitat, Pierce, Skagit, Snohomish, and Thurston (USFWS, 2014). Species occurrence used to be widespread in King County, but not much is known about current populations. The project intersects the western headwaters of the Green River

watershed in Kent, which is one of the watersheds that the Oregon spotted frog is considered to occupy or potentially occupy (WSDOT, 2015b). Oregon spotted frogs are likely limited to relatively intact wetlands in the Green River Valley and have a limited elevation range of up to 10 feet from breeding habitat (Teal Waterstrat, USFWS, personal communication, March 2016). The project area within the Green River watershed does not provide suitable habitat for the Oregon Spotted frog. The Bingaman Creek wetlands are at least 300 feet above the Green River watershed so would not be reachable. The McSorley Creek wetlands are outside the Green River watershed and are also unlikely to provide suitable habitat for Oregon spotted frog. The wetland lacks extensive emergent habitat with sun exposure suitable for egg-laying, and it lies in a highly urbanized watershed (Germaine and Cosentino, 2004).

5.2.2 Marbled Murrelet

The USFWS designated marbled murrelet (*Brachyramphus marmoratus*) as a threatened species under the ESA in Washington, Oregon, and California in 1992 (57 FR 45328). Critical habitat has been designated for the marbled murrelet and revised in October 2011 (76 FR 61599), and includes forested areas around Puget Sound. The preservation of both marine foraging habitat and terrestrial nesting habitat is important to the recovery of the species; however, only terrestrial nesting habitat has been designated as critical habitat and includes forested stands with trees generally more than 32 inches in diameter that have potential nesting platforms at least 33 feet above the forest floor (USFWS, 1997). No marbled murrelet critical habitat is in the action area or vicinity.

The marbled murrelet is a small, diving seabird that spends most of its time on the ocean (more than 90 percent) resting and feeding, but flies inland to nest in old-growth forest stands. The range of the marbled murrelet is defined by breeding and wintering areas that extend from the northern terminus of Bristol Bay, Alaska, to the southern terminus of Monterey Bay in central California. In Washington, marbled murrelets occur in the greatest numbers in Puget Sound and the Strait of Juan de Fuca. Historical records and observations indicate that they were common and regularly seen along Washington and Oregon coastlines (USFWS, 1997). Marbled murrelets forage just beyond the breaker-line and along the sides of river mouths where greater upwelling and less turbulence occurs. At these locations they feed on invertebrates and small fish such as anchovy, herring, and sand lance (Marshall, 1988). Murrelets fly between foraging areas off the coast and inland nesting habitat.

Marbled murrelets nest in old-growth trees within 50 miles of the coast in forests that are generally characterized by large trees with large branches or deformities for use as nest platforms. Murrelets nest in mixed conifer stands varying in size from several acres to thousands of acres, with large unfragmented stands of old growth comprising the highest quality habitat. During the nesting season (May through August), marbled murrelets fly inland from the coast, often using waterways as flight corridors to nesting areas. Nesting platforms can be composed of a wide bare branch, moss or lichen covering a branch, mistletoe, or witches' brooms or other deformities (Evans Mack et al., 2003).

The principal threats to marbled murrelet populations are the loss and modification of nesting habitats by commercial timber harvest of older forests, along with effects of coastal oil spills and gill-net fishing operations off the Washington coast (USFWS, 1997). Predation of marbled murrelet adults, chicks, and

eggs by various avian predators, including great horned owls, Steller's jays, ravens, and other corvids and raptors, also inhibit their recovery.

There is very limited mature forest in the project corridor or surrounding urban environment, and therefore the type of habitat required by marbled murrelets is lacking in the action area. Although there are some mature conifers in forest patches within the action area, these are in proximity to urban areas and particularly I-5 and do not provide suitable habitat for marbled murrelets. The WDFW PHS data (2016) also indicate that there are no marbled murrelets or their habitat in the action area. There is a single murrelet presence detection documented from 1974 at the southern end of the action area near Federal Way. Given the project location between Puget Sound and inland nesting areas in the Cascades to the east, there is the potential that a few marbled murrelets could fly over the action area while transiting between marine foraging areas and inland nesting sites. However, noise and activity associated with project construction is not expected to affect murrelets that may fly over while transiting between nest sites and marine waters (Vince Hark, USFWS, personal communication, March 2016).

5.2.3 Streaked Horned Lark

On October 3, 2013, the streaked horned lark (*Eremophila alpestris strigata*) was listed as threatened throughout its range under the ESA (78 FR 61451). Concurrent with the listing, the USFWS designated 4,629 acres of critical habitat in Grays Harbor, Pacific, and Wahkiakum counties in Washington, and in Clatsop, Columbia, Marion, Polk, and Benton counties in Oregon (78 FR 61505). There is no designated critical habitat in or near the action area.

The streaked horned lark is a rare subspecies of horned lark that occurs in Oregon and Washington. The historical breeding range for streaked horned lark included British Columbia, the San Juan Islands, the northern Puget Trough, the Washington coast north of Grays Harbor, the Oregon coast, and the Rogue and Umpqua Valley in southwestern Oregon. However, the streaked horned lark has been extirpated as a breeding species throughout much of this historical range (USFWS, 2012).

In Washington, the streaked horned lark nests on grasslands and sparsely vegetated areas at airports, sandy islands, and coastal spits (USFWS 2013a; Anderson and Pearson, 2015). The current range of streaked horned lark in Washington is limited to south Puget Sound, the Pacific coast, and lower Columbia River islands (Anderson and Pearson, 2015). In the south Puget Sound area, about 150 to 170 streaked horned larks are known to breed at six sites in Mason, Pierce, and Thurston counties (USFWS, 2013a). Four of the sites are on Joint Base Lewis-McChord. The two other known sites comprise small populations at the Olympia Regional Airport and the Port of Shelton's Sanderson Field.

Nesting begins in March or April and continues into June. Adult horned larks create a depression on the ground in which the top portion of the eggs are level with the ground (USFWS, 2008). Usually two broods are produced each breeding season and the young fledge about 2 weeks after hatching. Breeding is complete in late July or early August (Pearson and Hopey, 2004). The diet of the streaked horned lark varies according to season. During the spring and summer, its diet consists primarily of

insects and spiders. During the fall and winter, seeds from grasses, forbs, and waste grain form the majority of its diet.

Although most horned lark subspecies migrate south to wintering locations, most streaked horned larks are found in Oregon and Washington year-round, with the largest concentrations present in the mid-Willamette Valley and the historical floodplain of the Columbia River (USFWS, 2008; Robinson and Moore, 2005). Wintering sites commonly consist of a relatively large percentage of bare ground as well as sites with low, sparse vegetation such as perennial rye grass fields (Robinson and Moore, 2005).

The prairies of south Puget Sound are part of one of the rarest ecosystems in the United States; less than 10 percent of the original prairie persists, and only 3 percent remains dominated by native vegetation (USFWS, 2008). Where larks inhabit human-created habitats similar in structure to native prairies (such as airports, military reservations, agricultural fields, and dredge-formed islands), or where they occur adjacent to human habitation, they are subjected to a variety of unintentional human disturbances such as mowing, recreational and military activities, plowing, flooding, and dredge spoil dumping during the nesting season (USFWS, 2013a; Center for Biological Diversity, 2002).

The only area of potential suitable streaked horned lark habitat in the project corridor is at the Midway Landfill site, which consists of about 70 acres of open grassy land cover. Although typical habitat patches for streaked horned lark are considered to be 300 or more acres, they have been known to occupy smaller areas less than 100 acres (Anderson and Pearson, 2015). Streaked horned larks have not been documented at the landfill or in surveys at Seattle-Tacoma International Airport north of the action area (Martha Jensen, USFWS, personal communication, March 2016) and their presence in the action area is unlikely.

5.2.4 Yellow-Billed Cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) is a medium-sized neotropical migrant, found throughout North America. The breeding range of the species formerly included most of North America from southeastern and western Canada to the Greater Antilles and northern Mexico (USFWS, 2013b). The western DPS of the yellow-billed cuckoo was designated as threatened on October 3, 2014 (79 FR 59991). The western DPS includes populations in portions of 12 western states west of the crest of the Rocky Mountains, with the Canadian and Mexican borders constituting the northern and southern boundaries, respectively (USFWS, 2013b). Critical habitat was proposed on December 2, 2014, (78 FR 78321) and includes sections of Arizona, California, Colorado, Idaho, New Mexico, Nevada, Texas, Utah, and Wyoming. No proposed yellow-billed cuckoo critical habitat is in the action area or vicinity.

Western yellow-billed cuckoos breed in large blocks of riparian habitat, particularly woodlands with cottonwoods and willows (USFWS, 2013b). The subspecies' preferred habitat contains a combination of a dense willow understory for nesting and a cottonwood overstory for foraging (Gaines and Laymon, 1984). Most nesting in the western region occurs between June and early August, but can extend from late May until late September (Hughes, 1999). Nests are usually loose platforms of twigs lined with leaves or finer materials and, in the West, are often placed in willows, cottonwoods, and shrubs

(Gaines and Laymon 1984). Clutch size ranges from one to five eggs, but is typically two to three (Hughes, 1999). Two clutches may be laid in years of good food supply. Although yellow-billed cuckoos usually raise their own young, they are facultative brood parasites, occasionally laying eggs in the nests of other yellow-billed cuckoos or of other bird species (Hughes, 1999).

The primary threat affecting the western DPS is habitat loss from conversion to agricultural uses, such as crops and livestock grazing, and modification and degradation of riparian habitat from dam construction and operations, water diversions, river flow management, and stream channelization and stabilization (USFWS 2013b; Center for Biological Diversity, 1998). Habitat loss has also occurred from urban and transportation infrastructure and increased incidence of wildfire. Other threats include habitat rarity and small and isolated population sizes that cause the remaining yellow-billed cuckoo populations to be increasingly susceptible to further declines through lack of immigration, reduced populations of prey species, pesticides, and collisions with tall vertical structures during migration (Center for Biological Diversity, 1998). The serious and ongoing threat of small population size, which is the result of other threats in combination, leads to an increased chance of local extirpations. Also, the overall rarity of yellow-billed cuckoos may preclude immigration to areas of unoccupied suitable habitat.

Based on historical accounts, the western yellow-billed cuckoo was widespread and locally common in portions of Oregon and Washington (USFWS, 2013b), including the willow bottoms along the Willamette and Columbia rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington (USFWS, 2013b). In Washington, the last confirmed breeding records of yellow-billed cuckoos are from the 1930s (USFWS, 2013b), and the western yellow-billed cuckoo is considered extirpated from most of its historic range. The species used to be widespread in King County, but the latest detection was in the late 1990s when a dead yellow-billed cuckoo was detected in a peregrine falcon nest on the Washington Mutual Tower in Seattle (Emily Teachout, USFWS, personal communication, March 2016). The WDFW PHS database has no record of yellow-billed cuckoo in the action area (WDFW, 2015). However, potential migratory habitat, which includes secondary growth woodland and hedgerows (Hughes, 1999), is present. Additionally, migrating yellow-billed cuckoo may shelter or feed in urbanized settings, so the urbanized surroundings and the presence of the highway does not preclude them from using forests along I-5 (Emily Teachout, USFWS, personal communication, March 2016). Therefore, although their presence is unlikely, there is the potential that yellow-billed cuckoo may transit or rest in the action area during their migratory season.

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6.0 Effects Analysis and Effects Determinations

6.1 Direct Effects

Direct effects are defined as direct or immediate effects of the project on the species or its habitat. Potential direct effects of the FWLE include short-term construction impacts and long-term permanent effects from operation of the light rail system.

6.1.1 Direct Effects from Construction Activities

Potential direct effects on listed species from construction of the FWLE include noise and temporary loss of vegetation from ground disturbance, material deposition, and excavation. Construction effects would be short-term and habitat functions would be restored after construction is complete. Potential sedimentation in surface water would not occur in any water bodies where listed fish species occur.

6.1.1.1 Construction Noise

No in-water pile-driving is anticipated for the project, and construction noise would not impact aquatic species. Temporary construction noise exceeding the existing traffic noise could affect listed terrestrial species. No listed terrestrial species are known to occur in the action area. The action area is dominated by existing highways and heavy traffic noise. Marbled murrelets can occur in Puget Sound to the west of the project outside the action area (Birdweb.org, 2015). The action area is landward to the east of the murrelet occurrence. As murrelets fly between nesting and roosting areas inland to the coast for foraging, there is potential for a murrelet to be transiting the action area during construction activities. However, construction noise is not expected to affect any individual murrelets that may be flying overhead, particularly due to the urban characteristics of the action area and in existing noise and activity on I-5. The presence of streaked horned larks has not been documented in the action area, and suitable habitat is lacking. The Midway Landfill site could provide potential streaked horned lark habitat, but it has not been surveyed and their presence there is currently unknown. Although their presence is unlikely in the action area, streaked horned lark could transit the area and they could therefore potentially be temporarily disturbed by construction activities. Potential migratory habitat for yellow-billed cuckoos occurs in the action area and consequently there is the potential for a yellow-billed cuckoo to transit the area. Pile-driving or other loud construction noise could therefore temporarily disturb any cuckoos that may be in the vicinity.

6.1.1.2 Temporary Loss of Upland Vegetation

Clearing for construction of the FWLE as well as for access roads, equipment storage areas, and other necessary construction activities would temporarily impact vegetation and wildlife habitat. Wildlife species near the project corridor could be impacted by construction noise, vibration, dust, dirt, light, and the clearing and grubbing of the landscape along the alignment. No ESA-listed bird species are known to nest in the action area, and therefore breeding of these species would not be impacted.

Transient individuals potentially could be disturbed by vegetation clearing and move to other nearby roosting areas outside of the action area.

Vegetation clearing would also increase the potential of introducing or contributing to the spread of noxious or invasive weed species. This risk would be low and minimized by replanting and by implementing BMPs during project construction to avoid, reduce, and control new infestations of noxious weeds.

After construction, vegetation outside the permanent project footprint would be replanted and reestablished with native species. Areas adjacent to the guideway in the vegetation clear zone would be replanted with non-tree species of limited height to maintain proper clearance.

6.1.1.3 Temporary Loss of Riparian and Wetland Vegetation

Riparian vegetation along Bingaman Creek would be cleared for site access to construct the guideway. Short-term clearing may reduce shading, causing higher stream temperatures during the construction period. Vegetation removal along the stream banks would increase the erosion hazard for the stream bank and result in the temporary loss of potential LWD recruitment until vegetation becomes reestablished. LWD can maintain stream sinuosity and channel depth, and create pools and riffles (Keeley and Slaney, 1996). In addition, LWD can provide instream cover from predators as well as improve substrate habitat and nutrient sources for the rearing of aquatic invertebrates, an important source of food for salmonid fishes (Schuett-Hames et al., 1999; Angermeier and Karr, 1984). Removal of trees along Bingaman Creek would remove existing LWD and reduce potential future LWD input where the realigned creek channel passes through the guideway vegetation clear zone. Planting of native vegetation and bank and substrate improvements particularly in the reach south of S 288th Street would improve stream habitat in the impacted areas after construction.

The project would temporarily impact 4.5 acres of wetland buffer and 1.0 acre of wetland habitat. These areas would be cleared to access and construct support column foundations. The construction footprint would be minimized to the extent possible. Temporary fill may be placed for equipment access, and would be removed when construction is complete. All cleared areas would be revegetated after construction. There are many riparian and wetland areas that are currently vegetated by invasive species, especially Himalayan blackberry and reed canarygrass. Where the guideway would be elevated over these areas, they would be cleared of invasive species and replanted with native vegetation after construction. Sound Transit anticipates that replanted vegetation would improve habitat function where invasive species are replaced with native plants.

6.1.1.4 Temporary Impacts on Water Resources

No shorelines of the state, shorelines of statewide significance, or designated floodplains lie within 200 feet of the project. Therefore, these resources would not be impacted.

Construction-related Sedimentation, Turbidity, and Pollutants

Construction activities that could potentially affect water resources include over-water work, storm drainage utility work, concrete work and paving, and construction equipment leaks or spills. Sound Transit must comply with water quality mixing zones set by Ecology (WAC 173-201A-200-1). Clearing,

grading, excavation, and other earthwork in the action area could increase turbidity in runoff entering streams and other water bodies. Construction at stream crossings can pose a direct risk to water quality from pollutant spills such as fuel or hydraulic fluids, sediment transport, and/or wind deposition of stockpiled materials. Runoff that comes in contact with process water or slurry from concrete work or curing concrete can increase the pH in surface water to levels harmful to fish and wildlife. Equipment leaks or spills can affect water quality in nearby water resources. Construction-related pollutants can increase turbidity and affect other water quality parameters, such as oils and grease, pH levels, and/or the amount of available oxygen in the water.

Sound Transit would minimize the potential for adverse impacts on aquatic species and habitat by ensuring that work conditions and activities comply with the required project permits to avoid or minimize the delivery of construction-related sediment and contaminants to streams. Impacts on water resources and wetlands from construction-related activities would be minimized by the regulations and best management practices required by the project NPDES General Stormwater Construction Permit.

Soil exposed in sloped excavations or fills is especially susceptible to local erosion until vegetation is established. Wind can erode dry, exposed soil. Water or wind can carry loose soil into adjacent stormwater drains and streams. Construction vehicle tires can carry soil onto roadways, where the soil could wash into ditches or streams during storms. Sound Transit would use a variety of BMPs, as described in Chapter 2, to avoid or minimize erosion and other water quality impacts during construction. BMPs could include stabilized construction site entrances, silt fencing, and the mulching or covering of stockpiles and other disturbed sites.

Where drilled shafts are used to support elevated guideways, shafts may need to be dewatered before concrete is poured. Drilling spoils may also need to be dewatered. Water recovered during the dewatering process can cause increased turbidity in receiving waters if it is not properly detained and treated. Recovered water would be treated to meet the appropriate permit requirements before being discharged.

Bingaman Creek in the project footprint would be temporarily bypassed during construction to convey any flow around the work site and prevent erosion and sedimentation during construction activities from entering the water. The unnamed stream channel south of Kent-Des Moines Road lies outside the project footprint and would avoid erosion or sedimentation impacts from construction. The construction contractor would develop and implement a Construction SWPPP that would include a TESC Plan, SPCC Plan, Concrete Containment and Disposal Plan, Dewatering Plan, and Fugitive Dust Plan.

In-Water Work

No in-water work is proposed in streams where ESA-listed species are known or expected to occur. Some work would occur below the OHWM of Bingaman Creek. When flows are present in Bingaman Creek, they are generally small, with the exception of large storm events after which flows soon dissipate. Where possible, work would occur during the summer months when the creek channel is dry. It is unlikely that construction would be complete within a single seasonally dry period, in which

case a temporary piped bypass would convey any flows in Bingaman Creek around the construction site and into the existing I-5 culvert to continue downstream. Bypassing the construction area would prevent introduction of sediments into the creek flow, avoiding effects on water quality downstream. The I-5 culvert that drains the affected reach is just over 1.5 miles upstream of any stream reaches that are known or expected to support ESA-listed fish. Bingaman Pond and surrounding wetlands are between the reach of the creek in the project action area and the reach in the Green River Valley where fish are documented to occur. As described in Chapter 3, several passage barriers prevent fish from moving upstream of the pond into the action area. Therefore, any sediment and turbidity effects from the project would dissipate in the channel downstream of I-5 and in the wetlands and pond, preventing impacts on waters where listed fish occur.

All work below the OHWM of any water bodies would be conducted in accordance with the HPA issued by WDFW and the Clean Water Act Section 404 permit issued by the Corps. Such permits typically include seasonal restrictions and/or other measures intended to minimize the risk of adverse effects on fish.

6.1.2 Permanent Direct Effects

Permanent effects include long-term effects for which habitat functions would not be restored over time. They can include permanent new impervious area, reduced sunlight and rainfall underneath elevated structures, and loss of vegetation.

The project's permanent footprint includes the guideway, station areas (including parking), roadway improvements, storm drainage ponds, and other ancillary features. In addition, an up to 11-foot-wide vegetation clear zone would be maintained on either side of the guideway to prevent damage to catenary wires from falling vegetation. The project would primarily be at-grade or in a trench, with the exception of elevated guideway structures to cross major arterials and the portion of Bingaman Creek north and south of 288th Street. The at-grade profile would permanently convert existing vegetated land cover and wetland types to a developed condition in the project footprint.

6.1.2.1 Permanent Impacts on Upland Vegetation

Permanent impacts on vegetation and wildlife habitat would vary, depending on the land cover type in the project footprint. For example, little vegetation is present in areas classified as urban environment. The replacement of existing impervious surface and man-made structures with the FWLE would constitute a minimal change in the vegetation characteristics or their ability to support wildlife.

The project would remove approximately 39.7 acres of upland forest habitat adjacent to I-5. Much of the FWLE would be at-grade or in a trench, and therefore would result in long-term vegetation loss in the project footprint. The vegetation clear zone that extends 11 feet beyond the guideway would also have a long-term impact on forested vegetation and forested wildlife habitat. Trees would be cleared and would not regenerate in the vegetation clear zone, but lower-growing shrubs and ground vegetation would be replanted. Some hazard trees beyond the 11-foot vegetation clear zone may also need to be removed to protect light rail safety and reliability. Removal of such hazard trees may continue as a maintenance activity throughout the operational life of project.

Potential adverse impacts from the project include habitat loss and disturbance to wildlife. Some remnant forested areas along I-5 and particularly along Bingaman Creek and the edge of the McSorley Creek wetlands provide patches of habitat that are relatively large compared to what remains in the surrounding areas. At-grade and trench profiles would have greater impacts on vegetation and wildlife due to vegetated ground cover loss and impediments to movements of animals. Elevated profiles would allow ground-dwelling animals and birds to pass underneath the guideway. Removing trees, snags, and understory vegetation for the project would result in the loss of nesting and foraging sites for many species of birds.

Impacts common to all undeveloped vegetation communities include an increased potential of introducing or spreading invasive species. Loss of habitat in forested riparian areas, such as McSorley Creek wetlands and Bingaman Creek, can reduce their value in providing connectivity for transiting wildlife that inhabit remnant patches of undeveloped habitat.

6.1.2.2 Permanent Riparian and Wetland Impacts

The FWLE would permanently impact riparian and wetland habitat. Sound Transit conducted a wetland impact analysis that assumes a complete loss of wetland or buffer in the permanent footprint of the guideway regardless of its profile. Wetlands under the elevated guideway would not be permanently filled, but may experience long-term effects from shading, depending on the wetland width and height. Several locations were observed along Sound Transit's Central Link route where vegetation in buffers under the elevated guideway had difficulty reestablishing due to limited summertime water and/or light. Estimating this impact is complicated and depends on multiple variables, such as slope, aspect, soil conditions, and stormwater dispersion from the elevated guideway.

The project would have 0.7 acre of permanent impacts on eleven wetlands, including the McSorley Creek Wetland and ten smaller, lower-quality wetlands. It would also permanently impact 5.8 acres of seven wetland buffers. The project would permanently impact 1,015 feet of Bingaman Creek and 2.3 acres of forested riparian buffer area along this reach.

During the permitting phase, Sound Transit would reevaluate these assumptions to provide a more detailed assessment of long-term impacts. Approximately 100 square feet of vegetation would be permanently lost for each column footing placed in wetland or buffer areas. Trees in the footprint of the guideway would be removed for safety of operations. Where the guideway is elevated within a wetland or stream buffer, these trees would be replaced with lower-growing native shrubs or trees.

Riparian trees under and alongside the guideway adjoining Bingaman Creek would be cleared and the stream channel would be realigned around the support columns. The small unnamed stream south of Kent-Des Moines Road lies outside the project footprint (Exhibit 4-1, Sheet 1), and the project would not impact the stream channel and its riparian buffer.

6.1.2.3 Permanent Impacts on Water Resources

Streams

Operation of the FWLE guideways, stations, and ancillary features would not directly impact stream habitat. New impervious areas would include guideways, stations, park-and-ride lots, and roads.

Increased impervious surface could increase stormwater runoff rates and volumes that can lead to higher peak flows and flashiness. This could potentially degrade water quality by increasing erosion and altering sediment and substrate distributions. The project's stormwater facilities will be designed to comply with the current Ecology Stormwater Manual (currently 2014; Ecology, 2014b) and local stormwater requirements. The elevated alignment would generally have less new impervious surface area than new at-grade alignment because most of the pervious ground beneath it would be retained. The guideway and stations would be non-pollution-generating because they would not carry motor vehicles or other sources of potential pollution. All stormwater flow from impervious surfaces would be fully dispersed or have flow controls; runoff from project-related PGIS (roadways, park-and-ride lots) would be discharged into existing treatment facilities or detention ponds. The combination of these measures would avoid or minimize to negligible levels any potential impacts to runoff rates and volumes, erosion, and degradation in water quality from increased impervious surface.

The small unnamed stream south of Kent-Des Moines Road is outside the project footprint and would not be affected. An artificial drainage ditch on the north side of the McSorley Creek wetlands lies parallel to the I-5 corridor, but also would not be directly impacted by the project.

The project would permanently impact Bingaman Creek along the west side of I-5. North of S 288th Street, Bingaman Creek flows north parallel to and west of I-5 within a wooded area approximately 300 feet wide (Exhibit 4-1, Sheet 2). The project would be directly over the creek, permanently impacting about 540 feet of the stream channel and 1.9 acres of the riparian forest buffer along this reach. South of S 288th Street, Bingaman Creek lies between an I-5 sound wall to the east and a narrow band (up to 50 feet wide) of forested area to the west next to a mobile home park. The project would permanently impact about 475 feet of stream channel and 0.4 acre of riparian buffer in this reach. Sound Transit would place columns to span as much of the existing stream channel as possible and would realign portions of the creek channel around the columns to minimize impacts by maintaining an open channel throughout with replanted native riparian vegetation. Substrate and bank conditions in the realigned channel south of S 288th Street would be improved from existing conditions. Trees in the vegetation clear zone alongside the guideway would be permanently removed, and therefore riparian tree cover and LWD recruitment would be reduced where the realigned creek channel passes under and alongside the guideway. The guideway would provide some stream shading as well as a native shrub layer that would be planted on the restored creek banks.

Stormwater

Impervious surfaces can increase stormwater runoff rates, volumes, and pollutant loads. Without design measures such as detention and treatment facilities, these can cause higher flows and degraded water quality in storm sewers and streams. Project impervious areas include guideways, stations, parking lots, maintenance facilities, and new or relocated roads. Project-related parking lots and road realignments are subject to motor vehicle traffic and are considered to be PGIS. The guideway and stations would not be subject to motor vehicle traffic or other sources of potential pollution and are therefore classified as non-PGIS. Emergency access and maintenance roads are also considered non-PGIS because of infrequent use. All stormwater from impervious surfaces that is not fully dispersed

would have flow controls, and stormwater from project-related PGIS would be treated through detention ponds or discharged into existing facilities.

The HI-RUN model was used to assess the potential for project-related changes in PGIS to affect water quality in streams were ESA-listed fish may be present. The project corridor is in the cities of SeaTac, Des Moines, Kent, and Federal Way, and in portions of the WSDOT right-of-way in unincorporated King County. Consistent with WSDOT's *Highway Runoff Manual*, TDAs were delineated in the analysis area. All of these TDAs have outfalls to streams and other water bodies that eventually discharge to either the Green River or Puget Sound where ESA-listed species may be present. In total, the action area contains 16 TDAs. The results of the model (presented in Appendix C) show all but three TDAs would have a decrease in pollutant loading compared to current conditions. The three TDAs that had potential for a very small increase in pollutant loading each discharge into wetlands that include the head of Massey Creek, McSorley Creek wetlands, and a large forested wetland at the head of Midway Creek (Appendix C). These wetlands act as biofiltration sites, and any pollutant loadings would be retained in the wetland and vegetation and would not continue downstream. Based on these results, the potential for stormwater runoff from the FWLE to result in adverse effects on ESA-listed fish would be insignificant and discountable.

6.2 Indirect Effects

Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR § 402.02). Indirect impacts on vegetation, wildlife, and wildlife habitat could include disturbance from increased human activity near retained forested habitat in the vicinity of the project.

The FWLE is projected to be used for approximately 36,500 person-trips per day in 2035, reducing vehicular traffic on the roadways in the region by 160,000 vehicle miles traveled and 10,000 vehicle hours traveled. Approximately 25 percent of this reduction would occur in the action area. This would reduce greenhouse gas emissions, energy consumption, and contaminated stormwater runoff from roadways. The FWLE may contribute to existing market forces that can increase the potential for transit-oriented development. The experience of other U.S. communities has shown that, although light rail transit may not by itself create new development, with transit-supporting plans and policies in place, it can influence where development would occur and the types of development that occur. The FWLE would provide mobility options that could help achieve higher land use densities, thereby encouraging reduction of land development area in ways that are consistent with regional and local plans and policies. Densities would increase without light rail; however, light rail would help achieve goals that encourage high-density, transit-oriented development.

The FWLE would not interfere with future projects that may provide habitat improvements, such as the replacement of culverts under I-5 and roadways in the project corridor that are currently fish barriers, or projects that may enhance vegetated and wetland areas. Further design and evaluation of compatibility with future WSDOT culvert replacement projects would occur during permitting.

6.3 Interrelated/Interdependent Actions

Interrelated actions are defined as actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR § 402.02). The FWLE is part of a regional transportation improvement plan, but it does not depend on any other portion of the plan for its justification. The Angle Lake Extension is the only action the FWLE project would be dependent on to link the project to existing light rail service. This project is near completion and planned to open in the fall of 2016. The FWLE is a stand-alone project that has independent utility, and no other proposed actions depend upon it for their utility.

6.4 Effect Determinations

Table 6-1 summarizes effect determinations for each species and critical habitat considered in this biological assessment. The rationale for each effect determination is described in the following sections.

TABLE 6-1
Endangered Species Act Listed Species, Designated Critical Habitat, and Effects Determinations

Species/Habitat	Status	Federal Jurisdiction	Effects Determination	Critical Habitat
Oregon spotted frog	Threatened	USFWS	NE	Not present in action area
Marbled murrelet	Threatened	USFWS	NE	Not present in action area
Streaked horned lark	Threatened	USFWS	NLAA	Not present in action area
Western yellow-billed cuckoo	Threatened	USFWS	NLAA	Not present in action area

NE = No Effect
NLAA = Not Likely to Adversely Affect

6.4.1 Oregon Spotted Frog

The project will have no effect on Oregon spotted frog for the following reasons:

- The project will not impact any wetland areas known to be inhabited by Oregon spotted frogs, and suitable habitat is not present in the action area.
- Wetlands in the action area have no connectivity to wetlands in the Green River Valley where Oregon spotted frog habitat occurs (WSDOT, 2015b).
- Designated critical habitat is over 40 miles away in the Black River watershed, well outside the action area.

Because of these considerations, FTA and Sound Transit determine that the proposed action will have **no effect** on Oregon spotted frog.

6.4.2 Marbled Murrelet

The project will have no effect on marbled murrelets for the following reasons:

- Loss of large, mature conifers along the I-5 corridor would not impact any nesting and roosting habitat, and the project corridor is not in or near foraging or nesting areas used by marbled murrelets.
- The existing environment in the action area is highly urbanized and parallels I-5, and is not used by marbled murrelets.
- Project construction noise and activity are not expected to affect murrelets that may fly over the project while transiting between nest sites and marine waters.

Because of these considerations, FTA and Sound Transit determine that the proposed action will have **no effect** on marbled murrelets.

The nearest critical habitat for marbled murrelets is over 30 miles from the project corridor, well outside the action area. For this reason, the project will have **no effect** on marbled murrelet critical habitat.

6.4.3 Streaked Horned Lark

Project activities with the potential to affect streaked horned lark include noise disturbance from construction activities.

The project may affect streaked horned larks for the following reasons:

- The Midway Landfill site, which consists of a large open area with grass cover and no trees or tall shrubs, contains potentially suitable habitat and occupancy is currently unknown.
- Streaked horned larks inhabit areas south of the project corridor and there is potential for individuals to transit the action area.

The proposed action is not likely to adversely affect streaked horned larks for the following reasons:

- With the possible exception of the Midway Landfill site, habitat in the action area is unsuitable for streaked horned lark, as it is urbanized areas with interspersed natural areas that consist of forest and shrub cover.
- Streaked horned lark presence is not documented in the vicinity of the project corridor. The closest recorded observations of streaked horned lark occupancy is at Joint Base Lewis-McChord approximately 18 miles south of the project.

Because of these considerations, FTA and Sound Transit determine that the proposed action **may affect, but is not likely to adversely affect**, streaked horned lark.

The nearest critical habitat for streaked horned lark is in southwestern counties of Washington, far outside the action area. For this reason, the project will have **no effect** on streaked horned lark critical habitat.

6.4.4 Western Yellow-Billed Cuckoo

Project activities with the potential to affect streaked horned lark include noise disturbance from construction activities and removal of a few cottonwoods from mixed deciduous stands in the project corridor.

The project may affect the western yellow-billed cuckoo for the following reasons:

- If migrant individuals should occur near the construction area, increased levels of noise and activity may cause them to avoid the area.

The proposed action is not likely to adversely affect the western yellow-billed cuckoo for the following reasons:

- Suitable habitat does not occur in the action area.
- Western yellow-billed cuckoos are very rare in Washington and presence of any individuals in the project vicinity is very unlikely.
- Any cuckoos that could potentially occur in the action area would be migrants, and consequently no breeding birds would be affected.

Because of these considerations, FTA and Sound Transit determine that the project **may affect, but is not likely to adversely affect**, the western yellow-billed cuckoo.

Critical habitat for the cuckoo is currently proposed, but none would be in Washington, and therefore the project will have **no effect** on proposed critical habitat for the western yellow-billed cuckoo.

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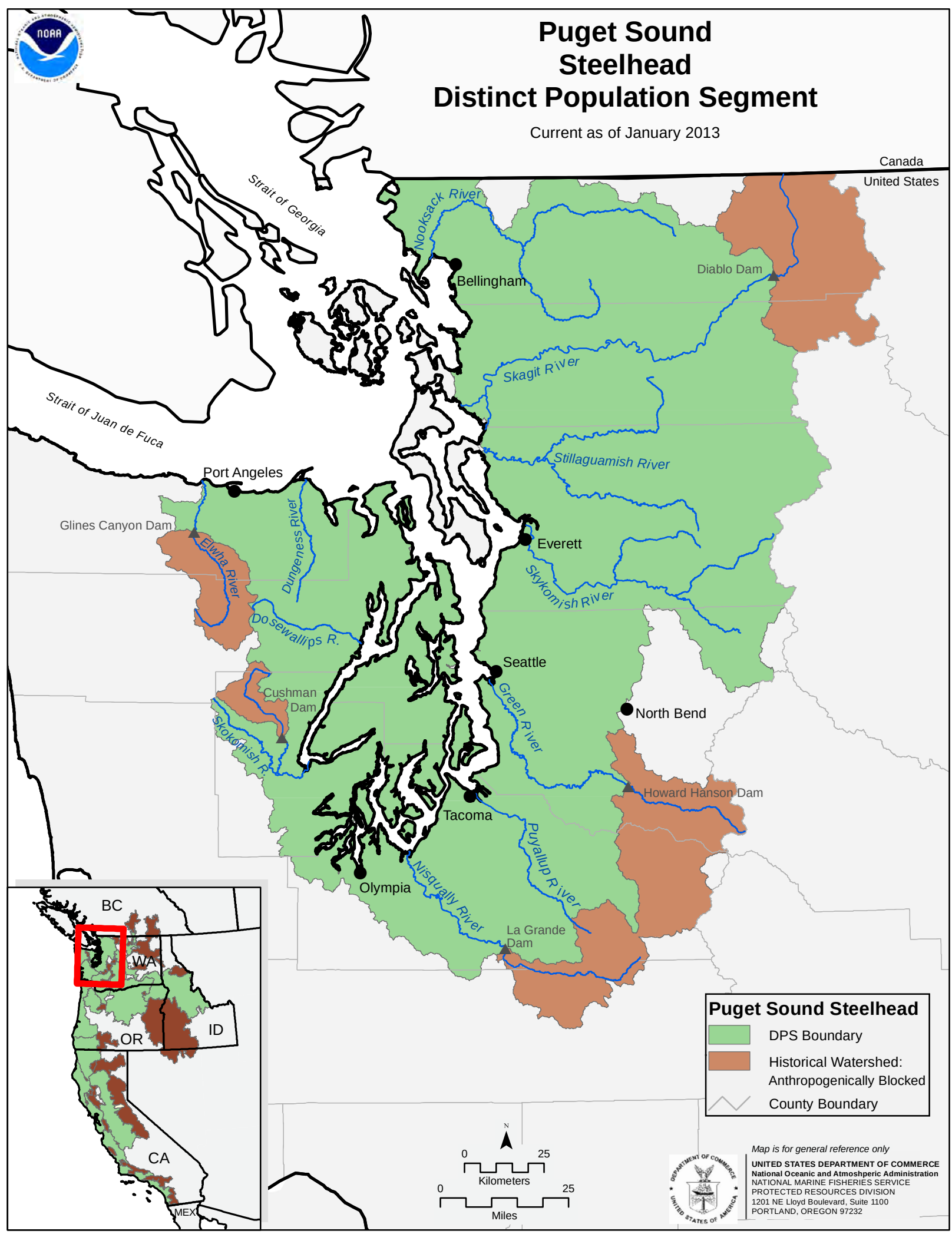
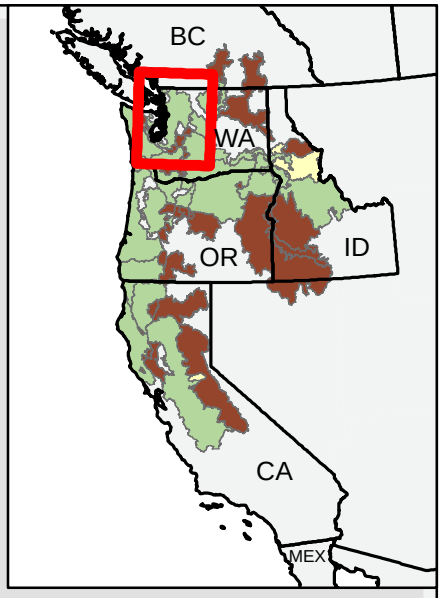
Appendix A

ESA Species Lists


Puget Sound
Steelhead
Distinct Population Segment
Current as of January 2013
Canada
United States
Strait of Georgia
Strait of Juan de Fuca
Nooksack River
Bellingham
Diablo Dam
Skagit River
Stillaguamish River
Port Angeles
Glines Canyon Dam
Elwha River
Dungeness River
Everett
Skykomish River
Dosewallips R.
Seattle
Cushman Dam
Skokomish R.
Green River
North Bend
Howard Hanson Dam
Tacoma
Puyallup River
Olympia
Nisqually River
La Grande Dam
BC
WA
OR
ID
CA
MEX
Puget Sound Steelhead
DPS Boundary
Historical Watershed: Anthropogenically Blocked
County Boundary
N
0
25
Kilometers
0
25
Miles
Map is for general reference only
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmoshperic Administration
NATIONAL MARINE FISHERIES SERVICE
PROTECTED RESOURCES DIVISION
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232

Puget Sound Chinook Salmon Evolutionarily Significant Unit

Current as of January 2015



Nooksack River
North Fork Nooksack River
Bellingham
Skagit River
North Fork Stillaguamish River
South Fork Stillaguamish River
Port Angeles
Glines Canyon Dam
Dungeness River
Elwha River
Everett
Sultan River
Snohomish R.
North Fork Skykomish River
Skykomish River
Dosewallips River
Seattle
Cushman Dam
SF Skokomish R.
North Bend
Green River
Howard Hanson Dam
Tacoma
Puyallup River
Olympia
Nisqually River
La Grande Dam

County Boundary

Class

ESU Boundary

Historical Watershed: Anthropogenically Blocked

N

0 22.5 Kilometers

0 22.5 Miles

Map is for general reference only

UNITED STATES DEPARTMENT OF COMMERCE
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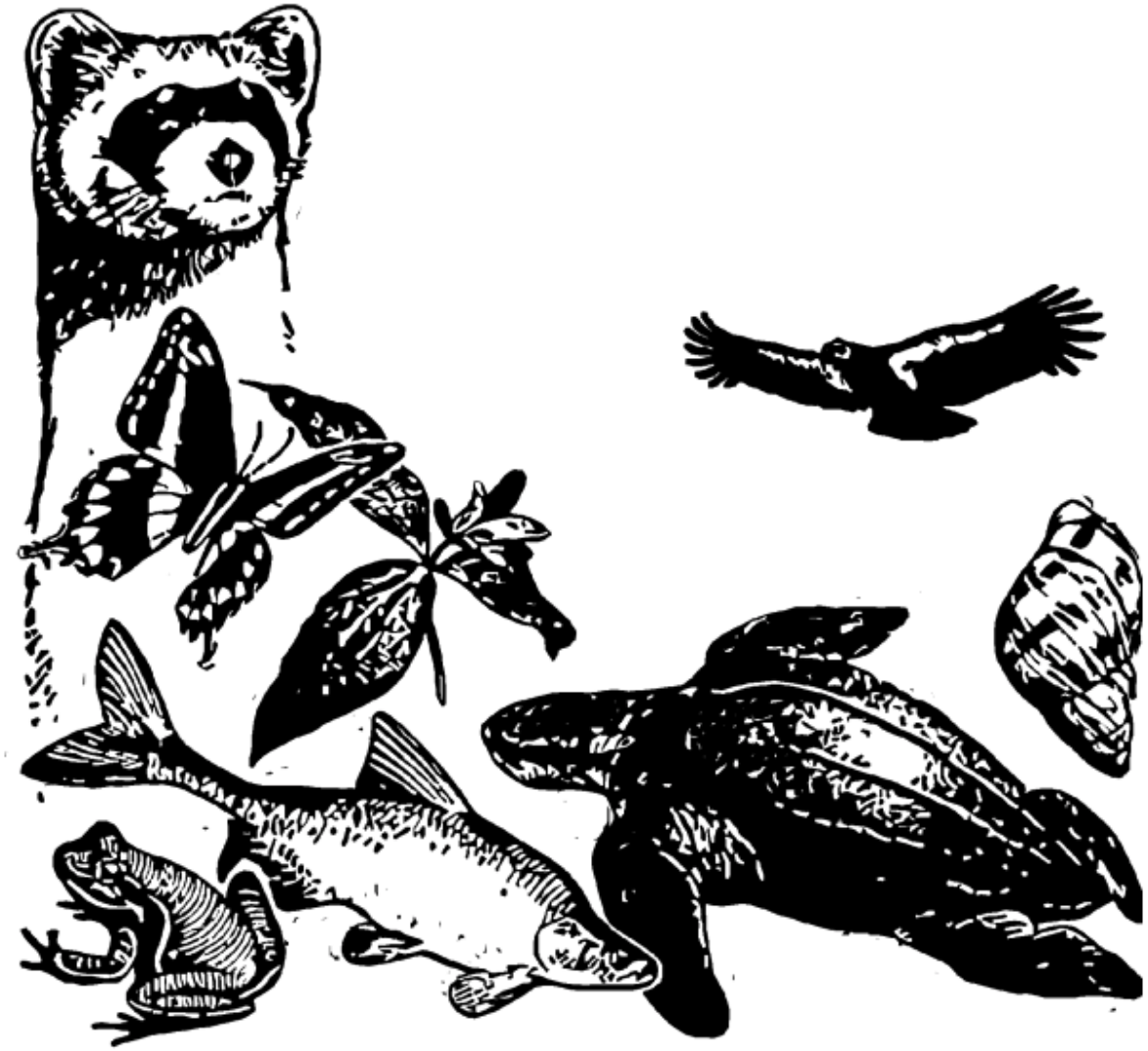
U.S. Fish & Wildlife Service

ST_BA

IPaC Trust Resource Report

Generated February 18, 2016 05:37 PM MST, IPaC v2.3.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

US Fish & Wildlife Service

IPaC Trust Resource Report

NAME

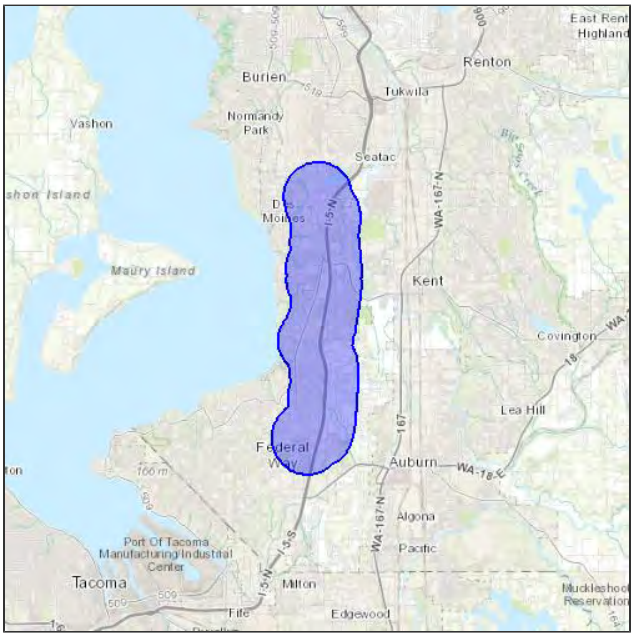
ST_BA

LOCATION

King County, Washington

IPAC LINK

https://ecos.fws.gov/ipac/project/O5QRI-XMVVF-CJTHB-5FPFB-YKVDII



U.S. Fish & Wildlife Contact Information

Trust resources in this location are managed by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require FWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from the Regulatory Documents section in IPaC.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Amphibians

Oregon Spotted Frog Rana pretiosa — Threatened

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02A

Birds

Marbled Murrelet Brachyramphus marmoratus — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08C

Streaked Horned Lark Eremophila alpestris strigata — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0B3

Yellow-billed Cuckoo Coccyzus americanus — Threatened

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06R

Fishes

Bull Trout Salvelinus confluentus — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E065

Flowering Plants

Golden Paintbrush Castilleja levisecta — Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q26U

Mammals

Canada Lynx Lynx canadensis — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A073

Critical Habitats

This location overlaps all or part of the critical habitat for the following species:

Bull Trout Critical Habitat Final designated

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E065#crithab

Chinook Salmon Critical Habitat Final designated

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E06D#crithab

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black Swift Cypseloides niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FW

Calliope Hummingbird Stellula calliope — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K3

Caspian Tern Hydroprogne caspia — Bird of conservation concern
Season: Breeding

Fox Sparrow Passerella iliaca — Bird of conservation concern
Year-round

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Purple Finch Carpodacus purpureus — Bird of conservation concern

Year-round

Rufous Hummingbird selasphorus rufus — Bird of conservation concern

Season: Breeding

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0E1

Short-eared Owl Asio flammeus — Bird of conservation concern

Year-round

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Western Grebe aechmophorus occidentalis — Bird of conservation concern

Season: Wintering

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

Willow Flycatcher Empidonax traillii — Bird of conservation concern

Season: Breeding

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Freshwater Emergent Wetland

PEMAd	157.0 acres
PEMC	61.5 acres
PEM/SSF	17.7 acres
PEMF	13.1 acres
PEM/UBH	3.11 acres
PEMA	2.15 acres
PEMCx	1.73 acres

Freshwater Forested/shrub Wetland

PSSC	104.0 acres
	40.5 acres

PFOC	
PFOA	24.7 acres
PSS/EMC	18.1 acres
PSS/FOC	2.4 acres
PSSA	1.96 acres
PSSF	0.704 acre
PSSCx	0.15 acre

Freshwater Pond

PUBH	39.4 acres
PUBHx	17.6 acres
PUB/ABHx	9.1 acres
PUBHh	8.87 acres
PUBKh	5.44 acres
PUB/ABH	4.65 acres
PUBFx	2.27 acres
PUB/EMHx	1.19 acres
PABHx	0.215 acre

Lake

L1UBH	211.0 acres
L2ABH	25.9 acres
L2UB/ABH	1.59 acres

Other

PUSKx	3.24 acres
PUSCx	0.953 acre

Riverine

R2UBH	249.0 acres

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

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Appendix B

Essential Fish Habitat Consultation

Appendix B

Essential Fish Habitat Consultation

Table B-1 lists the Essential Fish Habitat in the Federal Way Link Extension (FWLE) action area.

TABLE B-1
Essential Fish Habitat in Action Area

Fishery	Essential Fish Habitat for Life Stages
Pacific salmon	Coho: Habitat present to potentially support juvenile rearing and spawning pending removal of passage barriers between the Green River valley and reaches upstream
Groundfish	No EFH in action area
Coastal pelagic	No EFH in action area

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal fishery management plans and to require federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH.

The Magnuson-Stevens Act requires all fishery management councils to amend their fishery management plans to describe and identify EFH for each managed fishery. The Pacific Fishery Management Council (1999) has issued such an amendment in the form of Amendment 14 to the Pacific Coast Salmon Plan, and this amendment covers EFH for Pacific salmon (Chinook salmon, coho salmon, and pink salmon) under NMFS jurisdiction that would be potentially affected by the proposed action.

EFH for Pacific salmon in freshwater includes all streams, lakes, ponds, wetlands, and other currently viable bodies of freshwater and the substrates within those water bodies accessible to Pacific salmon. Activities occurring above impassable barriers that are likely to adversely affect EFH below impassable barriers are subject to the consultation provisions of the Magnuson-Stevens Act.

EFH for groundfish and coastal pelagic species includes all waters from the mean high water line along the coasts of Washington upstream to the extent of saltwater intrusion and seaward to the boundary of the U.S. exclusive economic zone (370.4 kilometers) (Pacific Fisheries Management Council [PFMC], 1998a and 1998b). Designated EFH for salmonid species in estuarine and marine areas includes nearshore and tidally submerged environments within state territorial water out to the full extent of the exclusive economic zone (370.4 kilometers) offshore of Washington (PFMC, 1999). No such EFH is present in the action area.

The Magnuson-Stevens Act requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NOAA Fisheries is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the Magnuson-Stevens Act, NOAA Fisheries is required to provide EFH

conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Wherever possible, NMFS uses existing interagency coordination processes to fulfill EFH consultations with federal agencies. For the proposed action, this goal is being met by incorporating EFH consultation to the ESA Section 7 consultation, as represented by this Biological Assessment (BA).

Indicate which of the guilds listed below may be affected by project activities:

☒ Pacific Salmon ☐ Groundfish ☐ Coastal Pelagic Species

B.1 Location

The FWLE would impact Bingaman Creek, a tributary to the Green River in the Green River watershed in King County, Washington. The Green River and all tributaries accessible to Chinook and coho salmon are considered to be Pacific Salmon EFH. As described in the BA, Bingaman Creek is not documented to support Chinook salmon, and habitat conditions in the creek do not make it suitable for Chinook. Coho do occur in the lower reach of Bingaman Creek and their presence would likely extend upstream if several road culvert barriers were removed, and therefore Bingaman Creek is included in EFH for coho salmon.

B.2 Chinook Salmon

Chinook salmon are not documented in Bingaman Creek, but do occur in the Green River outside of the action area and vicinity (WDFW, 2016).

B.3 Coho Salmon

WDFW's Salmonscape (2016) documents coho salmon in Bingaman Creek. The reach in the action area is upstream of several passage barriers and is currently not inhabited by coho salmon. However, EFH includes all stream reaches, lakes, ponds, and wetlands upstream of man-made barriers historically accessible to salmon (PFMC, 1999). Coho salmon are also documented in McSorley Creek downstream of the action area.

B.4 Pink Salmon

Pink salmon are not documented in Bingaman Creek, but do occur in the Green River outside of the action area and vicinity (WDFW, 2016).

B.5 Description of Project Activities

The project activities are described in Chapter 2 of the BA, Project Description. The project is not anticipated to have any effects on salmon species as described in Chapter 5, Species and Critical Habitat Status and Occurrence.

B.6 Conservation Measures and Best Management Practices

Conservation measures and best management practices (BMPs) are included for project activities and are described in Chapter 2 of this BA. Conservation measures would avoid or minimize potential effects to existing habitat conditions, including EFH, in the action area.

B.7 Conclusions

Fish access is blocked by impassable culverts downstream of the project-impacted reach of Bingaman Creek, and the BMPs described in Chapter 2 of the BA will prevent downstream effects to EFH.

In accordance with the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act, it has been determined that the project would have the following effect to EFH for the guilds identified below:

☒ Pacific Salmon	☒ No Adverse Effect	☐ Adverse Effect
☒ Chinook Salmon	☒ No Adverse Effect	☐ Adverse Effect
☒ Coho Salmon	☒ No Adverse Effect	☐ Adverse Effect
☒ Pink Salmon	☒ No Adverse Effect	☐ Adverse Effect
☐ Groundfish	☐ No Adverse Effect	☐ Adverse Effect
☐ Coastal Pelagic Species	☐ No Adverse Effect	☐ Adverse Effect

B.8 References

Pacific Fisheries Management Council (PFMC). 1998a. *The Coastal Pelagic Species Fishery Management Plan: Amendment 8*.

Pacific Fisheries Management Council (PFMC). 1998b. *Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan*.

Pacific Fisheries Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast Salmon Plan, Appendix A, Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon.

Washington Department of Fish and Wildlife (WDFW). 2016. Salmonscape Species Presence Mapping. http://apps.wdfw.wa.gov/salmonscape/. Accessed February 2016.

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Appendix C

Stormwater Analysis

Appendix C

Stormwater Analysis

This appendix presents the results of modeling conducted to support the analysis of stormwater-related impacts of the FWLE on listed salmonid species. The Washington Department of Transportation (WSDOT) Highway Runoff and Dilution Loading (HI-RUN) model version 2.1 was used to generate estimates of current and anticipated future loadings and concentrations of dissolved copper and dissolved zinc in runoff from the FWLE. "P(exceed)" values less than 0.50 represent conditions under which runoff quality is expected to improve. Given the inherent uncertainty and variability in the data, a P(exceed) threshold value of 0.45 was selected to provide a level of confidence that proposed conditions would not be degraded when compared to background conditions (WSDOT, 2016a). The model results are described below and in the tables at the end of this appendix.

The project corridor is in the cities of SeaTac, Des Moines, Kent, and Federal Way, and in portions of the WSDOT right-of-way in unincorporated King County. Consistent with WSDOT's *Highway Runoff Manual*, threshold discharge areas (TDAs) were delineated in the analysis area. All of these TDAs have outfalls to streams and other water bodies that eventually discharge to either the Green River or Puget Sound where Endangered Species Act (ESA) listed species may be present. In total, the project contains 16 TDAs. Two TDAs, F2 (which discharges to Bingaman Creek) and K8 (which discharges to the drainage ditch south of S 260th Street), would not add or replace PGIS that requires water quality treatment and therefore is not included in the table.

Table C-1 presents detailed information about the areas of new PGIS from the FWLE, including estimates of the average daily number of vehicles using each roadway or parking area. The table also describes the path traveled by water discharged from stormwater facilities and describes the water quality treatment for the runoff from new areas of PGIS.

In all TDAs, runoff from PGIS created or removed by the FWLE would commingle with runoff from numerous other sources. The greatest contributor is I-5, which has traffic volumes of approximately 153,000 to 203,000 vehicles per day in the analysis area (WSDOT, 2016b). In contrast, more than 95 percent of the new PGIS created by the project would be used by 5,000 or fewer vehicles per day (Table C-1).

Because most of the stormwater runoff from PGIS in the action area comes from sources other than the FWLE, National Marine Fisheries Service has suggested for similar projects that Sound Transit employ a "pipe-within-a pipe" approach when using the HI-RUN model to analyze project-related stormwater impacts. This approach assumes that stormwater from the new project-related PGIS would not combine with water from other sources before reaching the discharge point. This approach recognizes the need to consider the project's contribution to water quality independently of the much greater contribution of contaminants from I-5 and other sources.

TABLE C-1

Acreage and Approximate Traffic Volumes on PGIS Areas to Be Added by the FWLE, and the Routes Traveled by Water Discharged from New Stormwater Treatment Facilities

TDA	Average Daily Traffic	PGIS Area (acres)[a]	Treatment and Post-Treatment Path
S1	130	1.727	Stormwater would be conveyed to Detention Pond A, flow through approximately 3,950 feet of pipe and a bioretention swale at S 212th Street and the Des Moines Creek Regional Stormwater Facility located west of 24th Avenue S, joining Des Moines Creek approximately 12,555 feet upstream of Puget Sound, where Chinook are known or expected to be present.
D1	N/A	.869	Stormwater would be conveyed to Detention Pond B, then flow through approximately 4,416 feet of pipe and 1,067 feet of vegetated swale before discharging to Barns Creek, approximately 8,750 feet upstream of Puget Sound, where Chinook are known or expected to be present.
D2	N/A	.258	Stormwater runoff would be conveyed to Detention Pond C, located at the northwest corner of the intersection of the southbound I-5 off-ramp and Kent-Des Moines Road. Stormwater would then flow through approximately 5,930 feet of pipe and 470 feet of vegetated swale before discharging into Midway Creek, where steelhead may be present.
K1	1,470	7.902	The stormwater runoff would be conveyed to vaults under the Kent/Des Moines Station, then drain through 1,855 feet of pipe and 773 feet of vegetated swale to the north and west before discharging to Massey Creek Wetlands, approximately 10,300 feet upstream of Puget Sound, where Chinook are known or expected to be present.
K2	4,200	2.375	The stormwater runoff from the roadway portion of the TDA and Kent/Des Moines Station would drain to proposed detention Pond KDM-D between S 236th Street and the southbound I-5 ramp, then east through 6,110 feet of pipe and 856 feet of vegetated swale before discharging into a wetland approximately 500 feet landward of Midway Creek where Chinook or steelhead are known or expected to be present.
K3	N/A	0.451	The stormwater runoff would discharge to Detention Pond D, then flow through 7,083 feet of pipe and 1,076 feet of vegetated swale before discharging into Midway Creek, where steelhead may be present.
K4	N/A	0.071	The stormwater runoff would be dispersed on the grass landfill cover at Midway Landfill, then infiltrate to underdrain systems to the Midway Landfill Detention Pond. Stormwater would then flow through 4,599 feet of pipe before discharging into a headwater wetland of the north fork of McSorley Creek, approximately 5,090 feet upstream of Puget Sound, where Chinook are known or expected to be present.
K5	N/A	0.154	The stormwater runoff would discharge to Pond E, then flow through 903 feet of unvegetated ditch before discharging to the McSorley Creek Wetland (Wetland 12-1), approximately 7,345 feet upstream of Puget Sound, where Chinook are known or expected to be present.
K6	N/A	0.203	Stormwater runoff would discharge to Pond G, then flow through 79 feet of pipe and 811 feet of vegetated swale before discharging to the McSorley Creek wetlands, approximately 7,345 feet upstream of Puget Sound, where Chinook are known or expected to be present
K7	5,000	5.733	Stormwater from the Star Lake Station, 28th Avenue S, and 26th Avenue S would flow through the detention pond SL-A located west of 26th Avenue S. Stormwater would then flow through 1,419 feet of pipe before discharging to McSorley Creek Wetland (Wetland 12-1), approximately 7,345 feet upstream of Puget Sound, where Chinook are known or expected to be present.
F1	N/A	0.035	Stormwater runoff would be conveyed to Pond H, then flow through 255 feet of pipe and 1,025 feet of vegetated swale before discharging to Wetland 25-1, a remnant headwater wetland of McSorley Creek, located over 11,000 feet upstream of Puget Sound, where Chinook are known or expected to be present.
F3	N/A	0.013	Stormwater would discharge to Pond J at a low point adjoining Military Road S, then flow through 646 feet of pipe and 946 feet of vegetated swale before draining to Lake Dolloff, approximately 7,200 feet upstream of Mill Creek, where steelhead are known or expected to be present.
F4	70	0.452	Stormwater flows to detention Pond K, which then discharges through 277 feet of pipe and 898 feet of vegetated swale before discharging to Hylebos Creek, 12,000 feet upstream of where steelhead are known or expected to be present.
F5	2,800	6.668	Stormwater runoff from the Federal Way Station would be conveyed to vault FW-A, then flow through 2,401 feet of pipe before discharging to Hylebos Creek, approximately 11,310 upstream of where steelhead are known or expected to be present.

[a] New or replaced PGIS in each TDA requiring water quality treatment.
N/A = not applicable; no additional traffic to be generated in the TDA by the project.

The model results show a P(exceed) value of less than 0.45 for TDAs S1, D1, D2, K3, K4, K6, K7, F1, F3, F4, and F5, indicating a decrease in pollutant loading compared to current conditions.

TDA F2 does not have any new PGIS added by the proposed project, and would not require water quality treatment. Stormwater runoff from TDA F2 would discharge to a flow control vault and then to Bingaman Creek, which crosses under I-5 through a 42-inch-diameter culvert that discharges to an open creek channel. Bingaman Creek continues east to Bingaman Pond, which is over 1/4 mile downstream from the TDA discharge point. Bingaman Pond overflows at the east end, where Bingaman Creek reemerges, continuing east to the Lower Green River.

In TDA K1, the HI-RUN model results indicate potential for increased pollutant loading with a P(exceed) value of 0.457 for dissolved copper. However, this TDA discharges into the wetland at the head of Massey Creek, which acts as a biofiltration site, and any pollutant loadings would be retained in the wetland and vegetation and would not continue downstream to Puget Sound where Chinook salmon are present.

TDA K5 has P(exceed) values of 0.662 for dissolved copper and 0.528 for dissolved zinc. However, this TDA discharges into the McSorley Creek wetlands, which, as described above, would serve as a biofilter and prevent impacts on water quality downstream.

In TDA K2, the HI-RUN model results indicated the potential for P(exceed) values of 0.681 for dissolved copper and 0.544 for dissolved zinc. The end discharge point for this TDA is a large forested wetland landward of Midway Creek, which acts as a biofiltration site. Any pollutant loadings would be retained in the wetland and its vegetation and not continue downstream to Midway Creek, which connects to the Green River where ESA fish species occur.

Based on these results, the potential for stormwater runoff from the Federal Way Link Extension to result in adverse effects on ESA-listed fish would be insignificant and discountable. The model results support the determination in the Biological Assessment that construction and operation of the FWLE would have no effect on Puget Sound Chinook salmon or Puget Sound steelhead.

Literature Cited

Washington State Department of Transportation (WSDOT). 2016a. *Highway Runoff Manual*. M31-16.04. http://www.wsdot.wa.gov/Publications/Manuals/M31-16.htm. February 2016.

Washington State Department of Transportation (WSDOT). 2016b. Traffic GeoPortal. http://www.wsdot.wa.gov/mapsdata/tools/geoportal_ext.htm. Accessed June 2016.

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Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:16
Outfall ID: S1
Rain Gauge: Puget East 40
Description: drains to Des Moines Creek, a tributary to Puget Sound

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Discharge Areas

Subbasin 1 - Baseline Conditions - 2.048 acres
no treatment - 0% infiltration - 2.048 acres

Subbasin 1 - Proposed Conditions - 1.727 acres
enhanced treatment - 0% infiltration - 1.727 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	97043	17851	8.18	0.82	2.93	0.62	48.7	5.4	33.3	5.2
75th Percentile	1901	165	0.417	0.093	0.097	0.06	2.57	0.46	0.777	0.31
Median	924	72	0.237	0.062	0.055	0.039	1.44	0.3	0.408	0.2
25th Percentile	451	32	0.133	0.042	0.031	0.025	0.808	0.19	0.215	0.13
Min	8.14	0.35	0.006	0.005	0.001	0.002	0.022	0.02	0.006	0.01
P (exceed)		**0.058**		**0.101**		**0.369**		**0.071**		**0.269**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:19
Outfall ID: D1
Rain Gauge: Puget East 40
Description: drains to Barns/Massey Creek, tributary to Puget Sound

---

Discharge Areas

Subbasin 1 - Baseline Conditions - 1.08 acres
no treatment - 0% infiltration - 1.08 acres

Subbasin 1 - Proposed Conditions - 0.869 acres
enhanced treatment - 0% infiltration - 0.869 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	47364	9541	5.2	0.41	0.876	0.3	27.4	3.1	10.2	1.5
75th Percentile	1010	83	0.22	0.047	0.051	0.03	1.35	0.23	0.413	0.16
Median	489	36	0.124	0.031	0.029	0.019	0.757	0.15	0.215	0.1
25th Percentile	240	16	0.07	0.021	0.016	0.012	0.427	0.096	0.112	0.064
Min	3.71	0.17	0.004	0.002	0.001	0.001	0.016	0.007	0.004	0.005
P (exceed)		**0.054**		**0.092**		**0.348**		**0.065**		**0.258**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:23
Outfall ID: D2
Rain Gauge: Puget East 40
Description: DRAINS TO MIDWAY CREEK, A TRIBUTARY TO GREEN RIVER

Discharge Areas

Subbasin 1 - Baseline Conditions - 2.261 acres
no treatment - 0% infiltration - 2.261 acres

Subbasin 1 - Proposed Conditions - 0.258 acres
enhanced treatment - 0% infiltration - 0.258 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	107136	2667	9.03	0.12	3.24	0.093	53.8	0.81	36.8	0.78
75th Percentile	2098	25	0.461	0.014	0.107	0.009	2.83	0.069	0.858	0.047
Median	1020	11	0.261	0.009	0.061	0.006	1.59	0.044	0.451	0.03
25th Percentile	498	4.7	0.147	0.006	0.034	0.004	0.893	0.029	0.237	0.019
Min	8.98	0.053	0.006	0.001	0.001	0	0.024	0.003	0.006	0.001
P (exceed)		**0.003**		**0.001**		**0.013**		**0.001**		**0.01**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/21/16 12:45
Outfall ID: K1
Rain Gauge: Puget East 40
Description: Drains to Massey Creek, a tributary to Puget Sound

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Discharge Areas

Subbasin 1 - Baseline Conditions - 7.376 acres
no treatment - 0% infiltration - 7.376 acres

Subbasin 1 - Proposed Conditions - 7.902 acres
enhanced treatment - 0% infiltration - 7.902 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	349508	81680	29.5	3.7	10.6	2.8	175	25	120	24
75th Percentile	6845	756	1.5	0.43	0.349	0.27	9.24	2.1	2.8	1.4
Median	3329	331	0.852	0.29	0.198	0.18	5.18	1.4	1.47	0.91
25th Percentile	1626	145	0.478	0.19	0.112	0.11	2.91	0.87	0.773	0.58
Min	29.3	1.6	0.02	0.021	0.005	0.009	0.079	0.093	0.02	0.046
P (exceed)		**0.077**		**0.148**		**0.457**		**0.107**		**0.341**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:33
Outfall ID: K2
Rain Gauge: Puget East 40
Description: DRAINS TO MIDWAY CREEK, A TRIBUTARY TO GREEN RIVER

Discharge Areas

Subbasin 1 - Baseline Conditions - 1.203 acres
no treatment - 0% infiltration - 1.203 acres

Subbasin 1 - Proposed Conditions - 2.375 acres
enhanced treatment - 0% infiltration - 2.375 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	57004	24550	4.81	1.1	1.72	0.86	28.6	7.4	19.6	7.1
75th Percentile	1116	227	0.245	0.13	0.057	0.082	1.51	0.63	0.457	0.43
Median	543	100	0.139	0.086	0.032	0.053	0.845	0.41	0.24	0.27
25th Percentile	265	43	0.078	0.057	0.018	0.034	0.475	0.26	0.126	0.17
Min	4.78	0.49	0.003	0.006	0.001	0.003	0.013	0.028	0.003	0.014
P (exceed)		**0.147**		**0.321**		**0.681**		**0.249**		**0.544**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:35
Outfall ID: K3
Rain Gauge: Puget East 40
Description: DRAINS TO MIDWAY CREEK, A TRIBUTARY TO GREEN RIVER

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.582 acres
no treatment - 0% infiltration - 0.582 acres

Subbasin 1 - Proposed Conditions - 0.451 acres
enhanced treatment - 0% infiltration - 0.451 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	42371	3107	2.97	0.19	0.691	0.16	14.5	1.4	10.7	1.2
75th Percentile	543	43	0.118	0.024	0.028	0.015	0.724	0.12	0.223	0.082
Median	264	19	0.067	0.016	0.016	0.01	0.407	0.078	0.116	0.052
25th Percentile	130	8.2	0.038	0.011	0.009	0.007	0.228	0.05	0.061	0.033
Min	2.24	0.091	0.001	0.001	0.001	0.001	0.01	0.005	0.002	0.003
P (exceed)		**0.052**		**0.086**		**0.338**		**0.062**		**0.247**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 08:58
Outfall ID: K4
Rain Gauge: Puget East 40
Description: DRAINS TO MASSEY CREEK, A TRIBUTARY TO PUGET SOUND

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.117 acres
no treatment - 0% infiltration - 0.117 acres

Subbasin 1 - Proposed Conditions - 0.071 acres
enhanced treatment - 0% infiltration - 0.071 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	5544	734	0.467	0.034	0.168	0.026	2.78	0.22	1.9	0.21
75th Percentile	109	6.8	0.024	0.004	0.006	0.002	0.147	0.019	0.044	0.013
Median	52.8	3	0.014	0.003	0.003	0.002	0.082	0.012	0.023	0.008
25th Percentile	25.8	1.3	0.008	0.002	0.002	0.001	0.046	0.008	0.012	0.005
Min	0.465	0.015	0	0	0	0	0.001	0.001	0	0
P (exceed)		**0.038**		**0.056**		**0.26**		**0.039**		**0.186**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 09:01
Outfall ID: K5
Rain Gauge: Puget East 40
Description: DRAINS TO MCSORLEY CREEK, A TRIBUTRARY TO PUGET SOUND

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.082 acres
no treatment - 0% infiltration - 0.082 acres

Subbasin 1 - Proposed Conditions - 0.154 acres
enhanced treatment - 0% infiltration - 0.154 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	3596	1691	0.395	0.073	0.066	0.052	2.08	0.55	0.777	0.27
75th Percentile	76.7	15	0.017	0.008	0.004	0.005	0.102	0.041	0.031	0.028
Median	37.1	6.5	0.009	0.006	0.002	0.003	0.057	0.026	0.016	0.018
25th Percentile	18.2	2.8	0.005	0.004	0.001	0.002	0.032	0.017	0.009	0.011
Min	0.282	0.031	0	0	0	0	0.001	0.001	0	0.001
P (exceed)		**0.14**		**0.305**		**0.662**		**0.235**		**0.528**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 09:03
Outfall ID: K6
Rain Gauge: Puget East 40
Description: DRAINS TO MCSORLEY CREEK, A TRIBUTARY TO PUGET SOUND

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.281 acres
no treatment - 0% infiltration - 0.281 acres

Subbasin 1 - Proposed Conditions - 0.203 acres
enhanced treatment - 0% infiltration - 0.203 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	13365	2030	2.52	0.14	0.356	0.086	8.15	0.75	4.01	0.39
75th Percentile	260	20	0.057	0.011	0.013	0.007	0.35	0.054	0.107	0.037
Median	128	8.5	0.032	0.007	0.008	0.005	0.198	0.035	0.056	0.023
25th Percentile	62	3.7	0.018	0.005	0.004	0.003	0.11	0.023	0.029	0.015
Min	0.899	0.028	0.001	0	0	0	0.004	0.002	0.001	0.001
P (exceed)		**0.049**		**0.076**		**0.315**		**0.054**		**0.225**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 09:05
Outfall ID: K7
Rain Gauge: Puget East 40
Description: DRAINS TO MCSORLEY CREEK, A TRIBUTARY TO PUGET SOUND

Discharge Areas

Subbasin 1 - Baseline Conditions - 7.462 acres
no treatment - 0% infiltration - 7.462 acres

Subbasin 1 - Proposed Conditions - 5.733 acres
enhanced treatment - 0% infiltration - 5.733 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	371179	32668	27.9	2.5	7.71	1.6	364	16	72.8	11
75th Percentile	6950	552	1.53	0.31	0.352	0.2	9.38	1.5	2.86	1
Median	3406	240	0.858	0.21	0.199	0.13	5.23	0.98	1.5	0.66
25th Percentile	1656	105	0.485	0.14	0.113	0.082	2.93	0.63	0.779	0.42
Min	26.5	0.98	0.021	0.016	0.004	0.007	0.126	0.056	0.028	0.028
P (exceed)		**0.052**		**0.085**		**0.336**		**0.059**		**0.245**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/19/16 09:10
Outfall ID: F1
Rain Gauge: Puget East 40
Description: DRAINS TO MCSORLEY CREEK, A TRIBUTARY TO PUGET SOUND

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.035 acres
no treatment - 0% infiltration - 0.035 acres

Subbasin 1 - Proposed Conditions - 0.035 acres
enhanced treatment - 0% infiltration - 0.035 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	1801	544	0.182	0.02	0.042	0.016	1.05	0.084	0.497	0.088
75th Percentile	32.6	3.4	0.007	0.002	0.002	0.001	0.044	0.009	0.013	0.006
Median	15.9	1.5	0.004	0.001	0.001	0.001	0.025	0.006	0.007	0.004
25th Percentile	7.73	0.64	0.002	0.001	0.001	0.001	0.014	0.004	0.004	0.003
Min	0.188	0.01	0	0	0	0	0.001	0	0	0
P (exceed)		**0.071**		**0.131**		**0.433**		**0.094**		**0.316**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/21/16 12:50
Outfall ID: F2
Rain Gauge: Puget East 40
Description: Drains to Bingaman Creek, tributary to Green River

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Discharge Areas

Subbasin 1 - Baseline Conditions - 0.192 acres
no treatment - 0% infiltration - 0.192 acres

Subbasin 1 - Proposed Conditions - 0.025 acres
enhanced treatment - 0% infiltration - 0.025 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	9098	258	0.767	0.012	0.275	0.009	4.57	0.078	3.12	0.075
75th Percentile	178	2.4	0.039	0.001	0.009	0.001	0.241	0.007	0.073	0.005
Median	86.6	1	0.022	0.001	0.005	0.001	0.135	0.004	0.038	0.003
25th Percentile	42.3	0.46	0.012	0.001	0.003	0	0.076	0.003	0.02	0.002
Min	0.763	0.005	0.001	0	0	0	0.002	0	0.001	0
P (exceed)		**0.003**		**0.001**		**0.018**		**0.001**		**0.014**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/21/16 12:54
Outfall ID: F3
Rain Gauge: Puget East 40
Description: Drains to Mill Creek, a tributary Green River

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.206 acres
no treatment - 0% infiltration - 0.206 acres

Subbasin 1 - Proposed Conditions - 0.067 acres
enhanced treatment - 0% infiltration - 0.067 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	12266	424	1.03	0.045	0.237	0.029	6.51	0.26	2.71	0.15
75th Percentile	191	6.4	0.042	0.004	0.01	0.002	0.256	0.018	0.079	0.012
Median	93.9	2.8	0.024	0.002	0.006	0.001	0.143	0.012	0.041	0.008
25th Percentile	45.9	1.2	0.013	0.002	0.003	0.001	0.081	0.007	0.022	0.005
Min	0.753	0.013	0.001	0	0	0	0.003	0.001	0.001	0
P (exceed)		**0.015**		**0.014**		**0.11**		**0.01**		**0.076**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/21/16 13:02
Outfall ID: F4
Rain Gauge: Puget East 40
Description: Drains to Hylebos Creek

Discharge Areas

Subbasin 1 - Baseline Conditions - 0.48 acres
no treatment - 0% infiltration - 0.48 acres

Subbasin 1 - Proposed Conditions - 0.452 acres
enhanced treatment - 0% infiltration - 0.452 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	24914	2800	2.17	0.18	0.399	0.25	17.5	1.1	6.65	1.1
75th Percentile	445	44	0.097	0.024	0.023	0.015	0.602	0.12	0.184	0.083
Median	218	19	0.055	0.016	0.013	0.01	0.337	0.078	0.096	0.052
25th Percentile	106	8.2	0.031	0.011	0.007	0.007	0.189	0.05	0.05	0.033
Min	2.48	0.11	0.002	0.001	0	0.001	0.007	0.004	0.002	0.003
P (exceed)		**0.067**		**0.117**		**0.409**		**0.085**		**0.304**

Highway Runoff Dilution and Loading model (HI-RUN) Version 2.0

End of Pipe Loading Subroutine Report

This model is for stormwater analysis associated with biological assessments, and is not a design tool.

Input Summary

Run Date/Time: 4/21/16 13:06
Outfall ID: F5
Rain Gauge: Puget East 40
Description: Drains to Hylebos Creek

Discharge Areas

Subbasin 1 - Baseline Conditions - 9.291 acres
no treatment - 0% infiltration - 9.291 acres

Subbasin 1 - Proposed Conditions - 6.668 acres
enhanced treatment - 0% infiltration - 6.668 acres

Load Analysis

	TSS Load (lb/yr)		Total Copper Load (lb/yr)		Dissolved Copper Load (lb/yr)		Total Zinc Load (lb/yr)		Dissolved Zinc Load (lb/yr)	
	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed
Max	527829	39838	31.9	2.9	10.7	2.7	285	17	164	16
75th Percentile	8604	633	1.89	0.36	0.443	0.23	11.6	1.8	3.55	1.2
Median	4197	277	1.07	0.24	0.249	0.15	6.51	1.1	1.85	0.77
25th Percentile	2055	122	0.605	0.16	0.141	0.096	3.66	0.74	0.969	0.49
Min	50.2	1.6	0.028	0.017	0.006	0.008	0.219	0.06	0.041	0.037
P (exceed)		**0.048**		**0.073**		**0.314**		**0.052**		**0.225**

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Concurrence Letter

U.S. Department
of Transportation
Federal Transit Administration

REGION X
Alaska, Idaho, Oregon,
Washington

915 Second Avenue
Federal Bldg. Suite 3142
Seattle, WA 98174-1002
206-220-7954
206-220-7959 (fax)

August 12, 2016

Mr. Ken Berg
U.S. Fish and Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503-1273

Re: Sound Transit Federal Way Link Extension Project
ESA Formal Consultation and Biological Assessment

Sound Transit, in cooperation with the Federal Transit Administration (FTA), is proposing the Federal Way Link Extension (FWLE). This light rail project would extend light rail approximately 7.6 miles from the nearly-complete Angle Lake Station at S 200th Street in SeaTac to the Federal Way Transit Center in Federal Way. The project is considered a federal undertaking and therefore subject to Section 7 of the Endangered Species Act (ESA). This letter initiates FTA's informal consultation.

Project Overview

The FWLE would provide a rapid, reliable, accessible, and efficient alternative for travel to and from Kent, Des Moines, Federal Way, and other urban growth and activity centers in the region, with capacity to meet projected demand. It would also support the adopted land use, transportation, and economic development visions of the affected communities and the region as a whole, as well as Sound Transit's Long Range Plan.

The FWLE generally follows a topographic ridge between the Puget Sound and the Green River Valley in the cities of SeaTac, Kent, Des Moines, and Federal Way in King County. It includes light rail guideway, stations with parking, traction power substations, and other structures to support the light rail system. Sound Transit and FTA published a Draft Environmental Impact Statement (DEIS) in April 2015 that studied alternatives along State Route 99 (SR 99) and Interstate 5 (I-5) (available at: http://www.soundtransit.org/Projects-and-Plans/Federal-Way-Link-Extension/Federal-Way-document-archive/Federal-Way-Documents/Draft-EIS-document). After considering the DEIS and public and agency comments, the Sound Transit Board identified a Preferred Alternative along the west side of I-5 with stations at Kent/Des Moines, S 272nd Street, and the Federal Way Transit Center.

Summary of Likely Effects

The enclosed biological assessment (BA) evaluates the Preferred Alternative's potential effects on listed animal species that might occur in the action area: Streaked horned lark (*Eremophila alpestris strigata*) and Yellow-billed cuckoo (*Coccyzus americanus*) and concludes that it not likely to adversely affect them. There is no designated critical habitat in the action area.

Species	Status	Federal Jurisdiction	Effects Determination	Critical Habitat
Streaked horned lark	Threatened	USFWS	NLAA	NE
Western yellow-billed cuckoo	Threatened	USFWS	NLAA	NE

NE = No Effect; NLAA = Not Likely to Adversely Affect

The project **may affect** individuals of these two species because of project noise or the removal of cottonwoods from mixed deciduous stands. However, the project is **not likely to adversely affect** either species for the following reasons:

- The area is urbanized with interspersed natural areas that consist of forest and shrub cover; with the possible exception of the Midway Landfill site, there is no habitat in the action area suitable for streaked horned lark.
- Streaked horned lark presence is not documented in the vicinity of the project corridor. The closest recorded observation of streaked horned lark occupancy is at Joint Base Lewis-McChord, about 18 miles south of the project.
- The action area does not contain suitable habitat for western yellow-billed cuckoos.
- Western yellow-billed cuckoos are very rare in Washington and presence of any individuals in the project vicinity is very unlikely.
- Any western yellow-billed cuckoos that might occur in the action area would be migrants, and consequently no breeding birds would be affected.

Listed fish species may have historically occurred in the action area, but are now absent due to impassable barriers and culverts downstream that block them from accessing it. In addition, the streams are dry during much of the year and lack pools and habitat structure. The conditions and distance also preclude potential indirect effects downstream.

The BA also discusses two other listed species: the Oregon spotted frog and the marbled murrelet. The analysis concludes that the project is likely to have **no effect** on either of those species.

Request for Concurrence

Based on the information provided, **FTA proposes a finding that the project may affect but is not likely to adversely affect streaked horned lark and yellow-billed cuckoo. FTA seeks your concurrence with the proposed finding.**

If you have any questions, please contact Dan Drais at (206) 220-4465 or Daniel.drais@dot.gov.

Sincerely,

Kenneth Feldman
Deputy Regional Administrator

Encl.: Federal Way Link Extension Project Biological Assessment

cc: Erin Green, Sound Transit

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

SEP - 8 2016

In Reply Refer To:
01EWFW00-2016-I-1199

Kenneth Feldman, Deputy Regional Administrator
U.S. Dept. of Transportation
Federal Transit Administration, Region X
ATTN: Dan Drais
915 Second Avenue
Federal Bldg. Suite 3142
Seattle, WA 98174-1002

Dear Mr. Feldman:

Subject: Sound Transit Federal Way Link Extension Project

This letter is in response to your August 12, 2016, request for our concurrence with your determination that the proposed action in Sea Tac, Kent, Des Moines, and Federal Way, King County, Washington, "may affect, but is not likely to adversely affect" federally listed species. We received your letter and Biological Assessment, providing information in support of "may affect, not likely to adversely affect" determinations, on August 18, 2016. The project involves constructing approximately 7.6 miles of light rail, connecting the Angle Lake in SeaTac to the Federal Way Transit Center. The light rail route will parallel the I-5 corridor and includes guideways, stations, parking, power substations, and other associated structures.

Specifically, you requested informal consultation pursuant to section 7(a) (2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) for the federally listed species and critical habitat identified below.

- Streaked horned lark *(Eremophila alpestris strigata)*
- Western yellow-billed cuckoo (*Coccyzus americanus*)

The Federal Transit Administration has determined that the action will have "no effect" on bull trout (*Salvelinus confluentus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), Oregon spotted frog (*Rana pretiosa*), and Western snowy plover (*Charadrius alexandrinus nivosus*) which are not expected to occur in the project area. The determination of "no effect" to listed resources rests with the action agency. The U.S. Fish and Wildlife Service (Service) has no regulatory or statutory authority for concurring with a "no effect" determination, and no consultation with the Service is required. We recommend that the action agency document their analysis on effects to listed species, and maintain that documentation as part of the project file.

We believe that sufficient information has been provided to determine the effects of the proposed action and to conclude whether it would adversely affect federally listed species and/or designated critical habitat. Our concurrence is based on information provided by the action agency, best available science, and complete and successful implementation of agreed-upon conservation measures.

EFFECTS TO STREAKED HORNED LARK

The action is not expected to affect breeding streaked horned larks due to absence of suitable nesting habitat in the project area. The project is located in the historic range of the species, but is not within the geographic area where streaked horned larks currently breed. The only potentially suitable nesting habitat close to the project area may be the Midway Landfill site, a 70-acre grassy area adjacent to I-5. The light rail will be built along the edge of this landfill, adjacent to I-5. If streaked horned larks are nesting at the landfill, they are likely accustomed to heavy traffic on the freeway. The action would not affect any occupied breeding habitat and would not impact breeding adults. Because the project will not affect suitable habitat or nesting individuals, effects to streaked horned larks are considered discountable.

EFFECTS TO WESTERN YELLOW-BILLED CUCKOO

The action area does not contain suitable nesting habitat (patches of mature willow-cottonwood dominated riparian vegetation >50 acres.)

Available data suggest that if western yellow-billed cuckoos still breed in Washington, the numbers are extremely low, with pairs numbering in the single digits. Given the extremely low numbers of western yellow-billed cuckoo expected within the action area, and the relatively small amount of suitable habitat in the project action area, the potential project impacts to western yellow-billed cuckoo are anticipated to be extremely unlikely and are therefore discountable.

Conclusion

This concludes consultation pursuant to the regulations implementing the Endangered Species Act (50 CFR 402.13). Our review and concurrence with your effect determination is based on the implementation of the project as described. It is the responsibility of the Federal action agency to ensure that projects that they authorize or carry out are in compliance with the regulatory permit and/or the Endangered Species Act, respectively. If a permittee or the Federal action agency deviates from the measures outlined in a permit or project description, the Federal action agency has the obligation to reinitiate consultation and comply with section 7(d).

This project should be re-analyzed and re-initiation may be necessary if 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or 3) a new species is listed or critical habitat is designated that may be affected by this project.

This letter and its enclosures constitute a complete response by the U.S. Fish and Wildlife Service to your request for informal consultation. A complete record of this consultation is on file at the Washington Fish and Wildlife Office, in Lacey, Washington. If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact the consulting biologist identified below.

U.S. Fish and Wildlife Service Consultation Biologist(s):
Lindsy Wright (360-753-6037)

Sincerely,

for Martha C. Jensen

Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

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