Operations and Maintenance Facility South

Draft Environmental Impact Statement

Appendix G3: Ecosystems Resources Technical Report

SoundTransit

March 2021

Appendix G3 prepared by:
Parametrix

Summary

This technical report addresses ecosystem components that may be affected by the Sound Transit Operations and Maintenance Facility South (OMF South) Project. The ecosystem components addressed in this report are aquatic species and habitat, vegetation, wildlife and wildlife habitat, and wetlands. The report describes the affected environment and the expected temporary construction impacts and permanent long-term operational impacts of the proposed alternatives, including the No-Build Alternative, on these resources. It also identifies measures intended to avoid and minimize impacts and potential compensatory mitigation for unavoidable impacts.

This technical report was prepared to support the OMF South Project Draft Environmental Impact Statement (EIS). As such, analyses in this report meet the requirements of the Washington State Environmental Policy Act (SEPA). To maintain Sound Transit's ability to pursue future options that may require a federal approval, this report also meets the requirements of the National Environmental Policy Act and provides information that would typically be addressed in a biological assessment or other document that demonstrates compliance with the requirements of Section 7(c) of the Endangered Species Act (ESA). Further, this report addresses potential effects on essential fish habitat, consistent with the requirements for federal action agencies under the Magnuson-Stevens Fishery Conservation and Management Act.

Under any of the project alternatives, direct long-term impacts on ecosystem resources would occur where permanent features such as project facilities overlap features such as streams, stream buffers, native or structurally complex vegetation, wetlands, or wetland buffers. Temporary, construction-related impacts would occur where such features are affected by clearing and ground disturbing work but are revegetated following construction.

Aquatic Species and Habitats

The study area includes two streams: East Fork Hylebos Creek Tributary 0016A and West Fork Hylebos Creek Tributary 0014C. Both are tributaries to Hylebos Creek, an independent tributary that discharges to the Hylebos Waterway along the eastern shore of Puget Sound's Commencement Bay in Tacoma. A third stream (North Fork McSorley Creek) would receive treated stormwater runoff from the Midway Landfill Alternative but would otherwise not be affected by project construction or operation.

Two ESA-listed fish species have the potential to occur in the study area: Puget Sound Chinook salmon and Puget Sound steelhead, both which are listed as threatened. None of the streams in the study area include any proposed or designated critical habitat for ESA-listed species.

Direct long-term impacts on aquatic resources would occur where permanent features such as project facilities permanently alter in-stream habitat (including habitat accessibility) or riparian functions. Additional impacts may occur where surface waters receive stormwater runoff from impervious surfaces created or replaced by project construction. Potential construction-related impacts include temporary disturbance of riparian vegetation and an elevated risk of delivering sediment or contaminants, such as fuel and hydraulic fluids to streams during construction.

Sound Transit has committed to minimizing the need for streams to be enclosed in pipes or culverts and has designed the alternative OMF sites to avoid piping any stream channels.

Under the South 336th Street Alternative or the South 344th Street Alternative, construction of the OMF facility and associated elevated mainline would necessitate the realignment of the stream channel for East Fork Hylebos Creek Tributary 0016A. The channelized stream in this area would be reconfigured to include meanders and other features that enhance the availability and diversity of aquatic habitats. The new channel would be designed to maintain flows and water quality conditions. Substrate and bank conditions in the realigned channel would be improved from existing conditions. The presence of support columns for the elevated mainline may, however, constrain options for natural or human-created modifications to channel configuration in the future. Approximately 2,500 to 2,600 feet of the East Fork Tributary would be reconfigured under the South 336th Street Alternative, compared to approximately 2,800 to 2,900 under the South 344th Street Alternative.

Construction and operation of the South 336th Street Alternative would affect aquatic and riparian habitats associated with West Fork Hylebos Creek Tributary 0014C where it flows through a wetland that serves as an in-line stormwater detention facility south of S 336th Street. The stream lacks a defined bed and bank in the wetland/stormwater detention facility. Potential project-related impacts would include reduced riparian function and alterations to peak flows.

Under the South 344th Street Alternative, to accommodate the relocation of an existing Washington State Department of Transportation (WSDOT) stormwater pond, approximately 800 linear feet of East Fork Hylebos Creek Tributary 0016A immediately north of S 344th Street would be removed from culverts and restored to a surface-flowing channel. Daylighting this segment would remove an existing barrier to fish passage and would increase the amount of functioning aquatic and riparian habitat available in the stream system.

Emergency vehicle access to the Tacoma Dome Link Extension (TDLE) mainline would be needed near the location of the daylighted stream segment. One of the options under consideration may require approximately 60 feet of channel that is currently culverted (and that would otherwise be daylighted, as described above) to be placed in a new culvert. If a culvert is needed, it would be designed using the stream simulation methodology outlined in WDFW's Water Crossing Design Guidelines (Barnard et al. 2013), avoiding the potential creation of a barrier to fish passage. It may be possible to eliminate the need for a culvert through detailed design of the access and of the stream meanders. The design of the emergency vehicle access would need to be coordinated and approved by Sound Transit, WSDOT, and the City of Federal Way.

The Midway Landfill Alternative would not be expected to affect aquatic resources because it would not include any construction activities within 200 feet of a surface-flowing stream.

Vegetation, Wildlife, and Wildlife Habitat

Much of the study area is dominated by urban development, including industrial, institutional, commercial, and residential areas. These areas support plant and animal species adapted to disturbed urban areas. However, patches of less-developed habitats occur along tributaries to Hylebos Creek in Federal Way and at the Midway Landfill in Kent.

Analysts identified and delineated 10 vegetation cover types in the study area and evaluated their relative habitat value. Relative habitat value is based on habitat structure, scarcity in the study area, disturbance types and frequency, and time required for ecosystem functions to recover following clearing and post-construction revegetation.

No plant or wildlife species that are listed or proposed for listing under the ESA are known or expected to use habitats in the study area. Patches of mature forest, a state priority habitat, are found in riparian areas along East Fork Hylebos Creek Tributary 0016A within the study area.

Impacts on terrestrial resources would occur where project construction converts vegetation or other wildlife habitat features to project facilities. Clearing for project construction would also increase the risk of contributing to the spread of noxious or invasive weed species. Noise, light, and human activity associated with construction and operation of OMF South may also have short- and long-term impacts on wildlife.

Compared to the other project alternatives, the Midway Landfill Alternative would have minimal effects on existing native or complex habitats and a lower risk of contributing to the establishment and spread of noxious weeds and invasive plants. The extent of the South 336th Street Alternative's effects on native and complex habitats would be greater than any of the other alternatives.

Wetlands

Sound Transit identified a total of 21 wetlands in the study area. Biologists performed formal delineations of wetland boundaries in legally accessible areas associated with tributaries of Hylebos Creek, which included most wetlands in the study area. Agencies, tribes, and the public expressed a high level of concern about potential impacts on ecosystem resources in these areas. While formal delineations are not typically required at this stage of the environmental review process, Sound Transit determined that detailed information collected early in the process would help the design team avoid or minimize impacts on wetlands. Other wetlands were mapped and characterized during site reconnaissance visits.

Among the build alternatives, the Midway Landfill Alternative would have the least wetland impact because there are no regulated wetlands or wetland buffers within its project footprint. The South 336th Street Alternative would have the greatest degree of permanent impact on wetlands and wetland buffers, while the South 344th Street Alternative would have the greatest degree of construction-related (temporary) impact on wetlands and wetland buffers. The TDLE Design Option for the curve at the northern end of the mainline would affect one wetland that would otherwise be avoided by the TDLE Preferred Alternative mainline alignment. Under each of the alternatives, the extent of temporary construction-related impacts on wetlands and wetland buffers would be substantially less than long-term permanent impacts.

Potential Mitigation

The proposed project would mitigate impacts on ecosystem resources in accordance with the mitigation sequencing requirements established by SEPA, the Clean Water Act (CWA), and local critical areas ordinances. In this context, mitigation sequencing is defined as first avoiding and minimizing, then rectifying, reducing, compensating, and monitoring environmental impacts (Washington Administrative Code [WAC] 197-11-768). As described below, the project alternatives would first avoid or minimize potential impacts on ecosystems resources to the greatest degree feasible, and Sound Transit is committed to providing compensatory mitigation when avoidance is not practicable.

The avoidance and minimization of impacts was a guiding principle in the preliminary design of the project alternatives. The build alternatives for the proposed project would avoid or minimize potential impacts on ecosystems resources whenever practicable. Sound Transit would comply with standard specifications, best management practices (BMPs), and applicable federal, state, and local mitigation requirements during design, construction, and post construction activities. Sound Transit would meet all regulatory requirements and continue to implement proactive avoidance and minimization measures related to these BMPs in adherence with federal, state, and local regulations.

The development of the design for OMF South was strongly influenced by the presence and location of habitat features, vegetation conditions, and the potential presence of fish and wildlife. The project footprint was adjusted to avoid and minimize impacts on streams, riparian areas, wetlands (Wetland WFW-02 in particular), and areas of mature native forest, particularly along East Fork Hylebos Creek Tributary 0016A. Sound Transit is exploring options for reducing impacts on West Fork Hylebos Creek Tributary 0014C without jeopardizing the operability of the South 336th Street Alternative.

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

For unavoidable long-term impacts on wetlands, streams, and their buffers, Sound Transit would develop a compensatory mitigation plan during the permitting phase, in accordance with applicable federal, state, and local requirements and guidelines. These include the federal Final Compensatory Mitigation Rule (40 Code of Federal Regulations [CFR] Part 230); interagency guidance (Wetland Mitigation in Washington State; Ecology et al. 2006, or as updated); and the applicable local critical areas ordinances. Use of the King County In-Lieu Fee Program (Mitigation Reserves Program) or an approved mitigation bank would be considered as options for compensatory mitigation. Sound Transit has committed to achieving no net loss of wetland function and area on a project-wide basis.

Table of Contents

Figures

Tables

Attachments

Acronyms and Abbreviations

BMP	best management practice
Belmor	Belmor Park Golf and Country Club
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FWHCA	fish and wildlife habitat conservation area
FWLE	Federal Way Link Extension
GIS	geographic information system
HPA	Hydraulic Project Approval
I-5	Interstate 5
LRV	light rail vehicle
LWD	large woody debris
MOW	Maintenance of Way
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWL	ordinary high water line
OMF	Operations and Maintenance Facility
OMF South	Operations and Maintenance Facility South
PEM	palustrine emergent
PFO	palustrine forested
PGIS	pollution-generating impervious surface
PHS	Priority Habitats and Species
PSS	palustrine scrub-shrub
RCW	Revised Code of Washington
SASSI	Salmon and Steelhead Stock Inventory
SEPA	State Environmental Policy Act
Sound Transit	Central Puget Sound Regional Transit Authority
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
TDLE	Tacoma Dome Link Extension
TESC	Temporary Erosion and Sediment Control
UGA	Urban Growth Area
USFWS	U.S. Fish and Wildlife Service

USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WWTT	Western Washington Treaty Indian Tribes

1 INTRODUCTION

This technical report addresses ecosystem components that may be affected by the Sound Transit Operations and Maintenance Facility South (OMF South) Project. The ecosystem components addressed in this report are aquatic species and habitats; vegetation, wildlife, and wildlife habitat; and wetlands. For brevity, aquatic species and habitats, and vegetation, wildlife, and wildlife habitat are sometimes identified as aquatic resources and terrestrial resources, respectively. Discussions in this document also address threatened and endangered species. The report describes the affected environment and the expected temporary construction impacts and long-term operational impacts of the proposed alternatives, including the No-Build Alternative, on these resources. It also identifies measures intended to avoid and minimize impacts and potential compensatory mitigation for unavoidable impacts.

Sound Transit proposes to construct and operate an operations and maintenance facility in its South Corridor (OMF South) to meet agency needs for an expanded fleet of light rail vehicles (LRVs). The need to expand LRV maintenance capacity was identified in Sound Transit 3: The Regional Transit System Plan for Central Puget Sound (Sound Transit 3). OMF South would be used to store, maintain, and deploy about 144 LRVs for daily service. It would provide facilities for vehicle storage, inspections, maintenance and repair, interior vehicle cleaning, and exterior vehicle washing. Additionally, the facility would receive, test, and commission new LRVs for the entire light rail system.

OMF South would also be used to accommodate administrative and operational functions, such as serving as a report base for LRV operators. Included is a Maintenance of Way (MOW) building for maintenance and storage of spare parts for tracks, vehicle propulsion equipment, train signals, and other infrastructure, in addition to storage facilities for the entire Link system. Other facility elements would include employee and visitor parking, operations staff offices, maintenance staff offices, dispatcher work stations, an employee report room, and areas with lockers, showers, and restrooms for both operators and maintenance personnel.

OMF South would need to have tracks connecting to a light rail line that will be operating when the facility is planned to open, which in southern King County is the Federal Way Link Extension (FWLE). The length and location of these connecting tracks varies by alternative.

Three site alternatives for the proposed project are evaluated in the Draft Environmental Impact Statement: one in Kent and two in Federal Way (Figure G3.1-1). These alternatives are named the Midway Landfill Alternative, South 336th Street Alternative, and South 344th Street Alternative, respectively (Figures G3.1-2 through G3.1-4, respectively). Figure G1.1-5 shows the mainline track options.

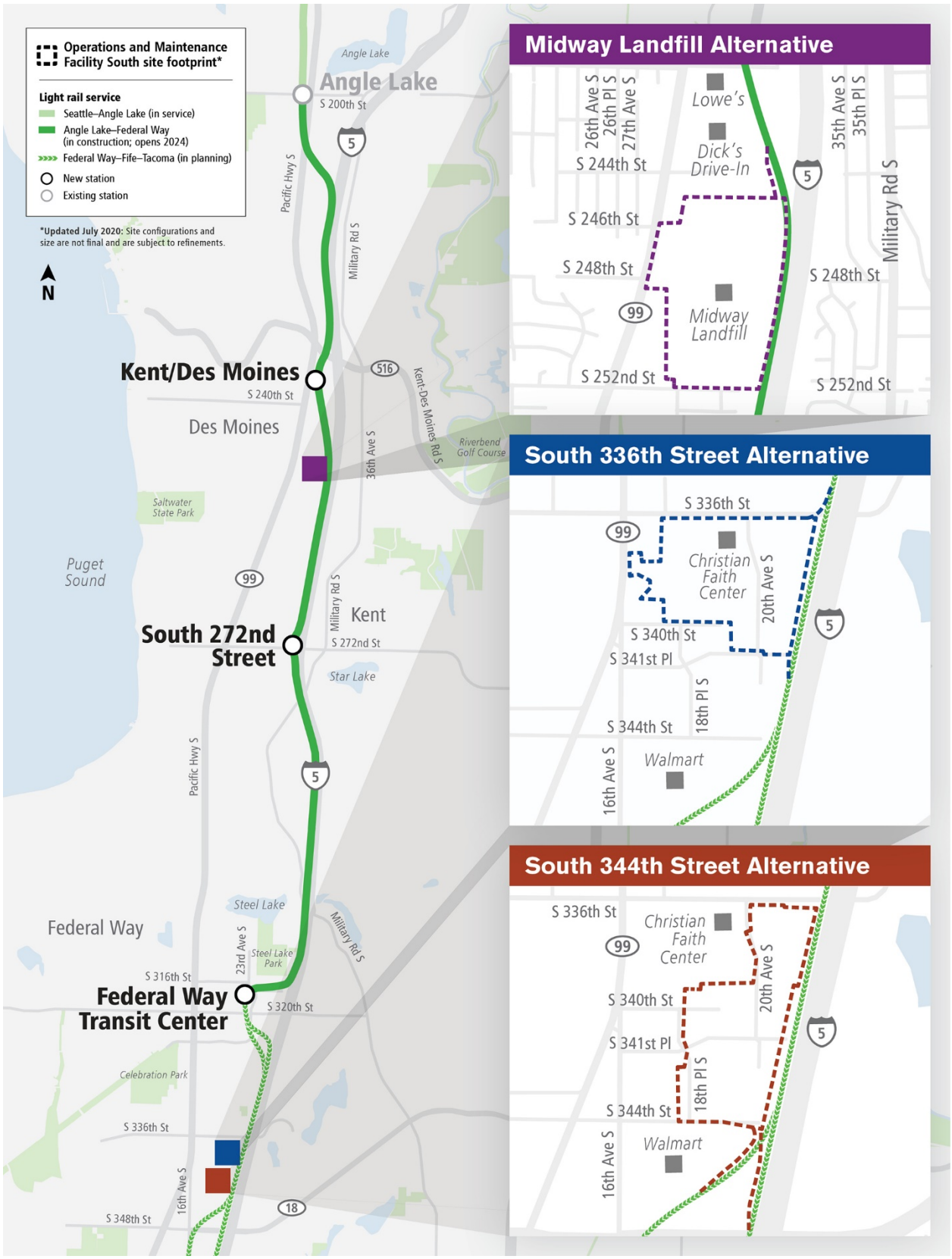
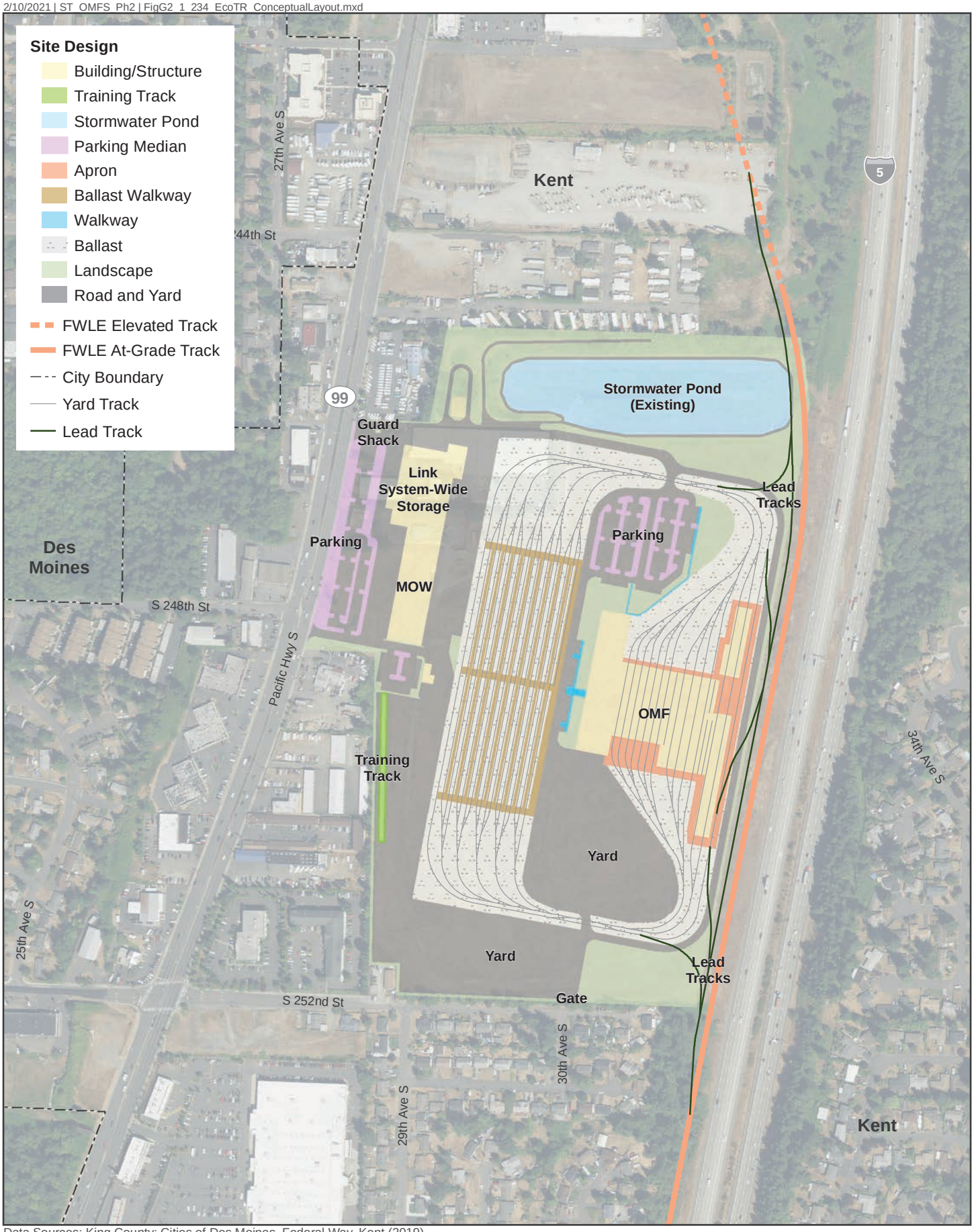


Figure G3.1-1 Project Vicinity: OMF South Alternatives



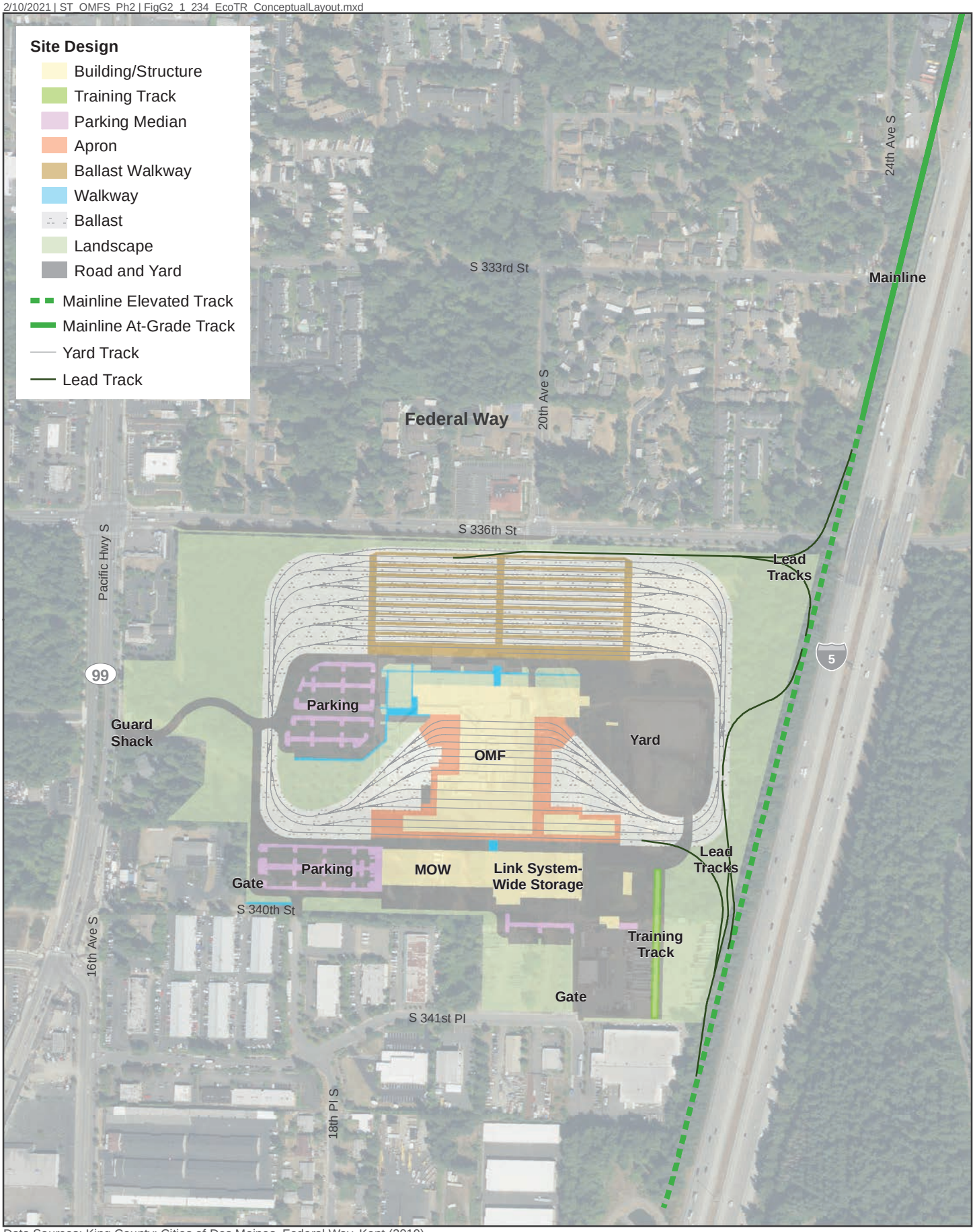
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-2
Conceptual Layout
Midway Landfill Alternative

OMF South



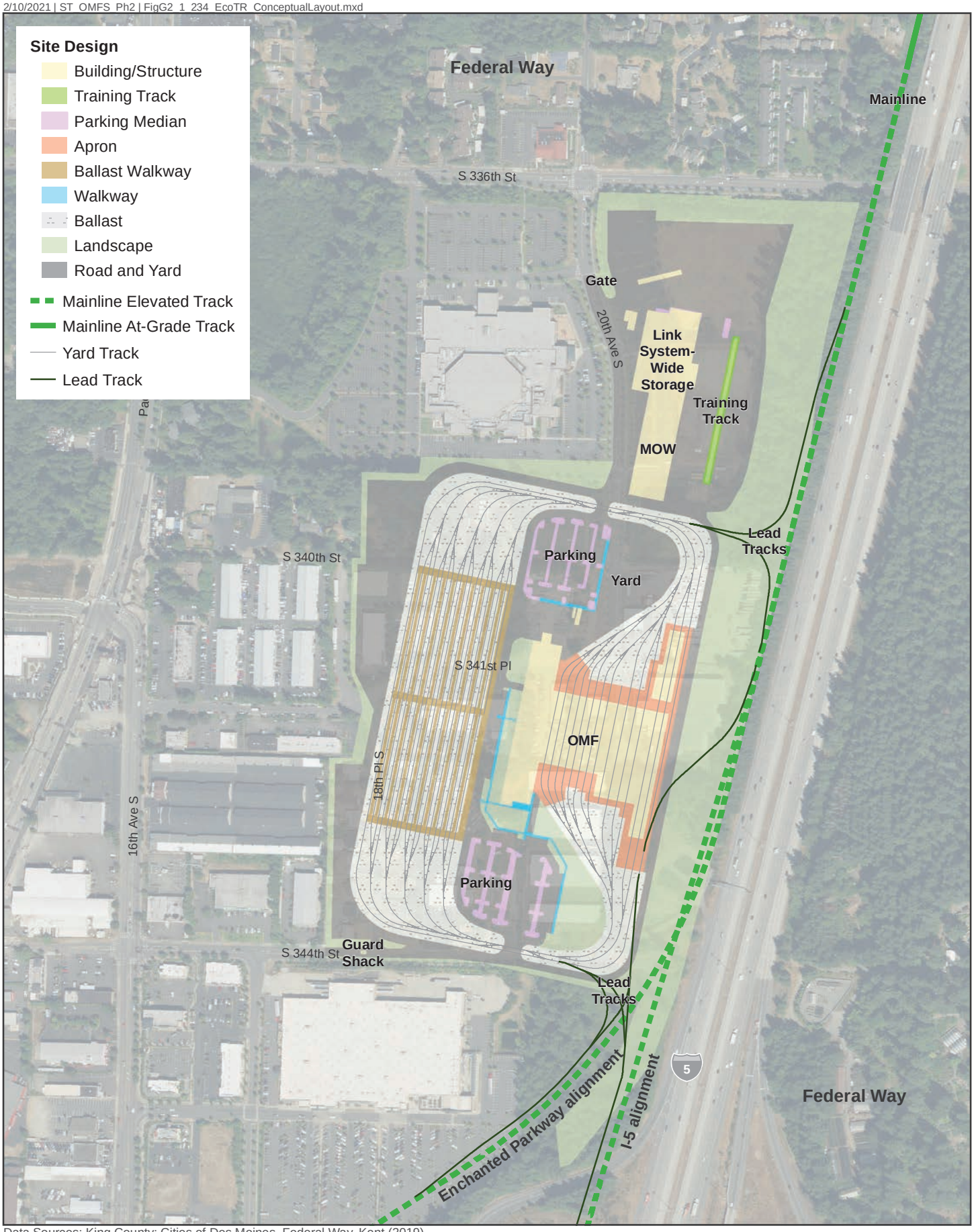
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-3
Conceptual Layout
South 336th Street Alternative

OMF South



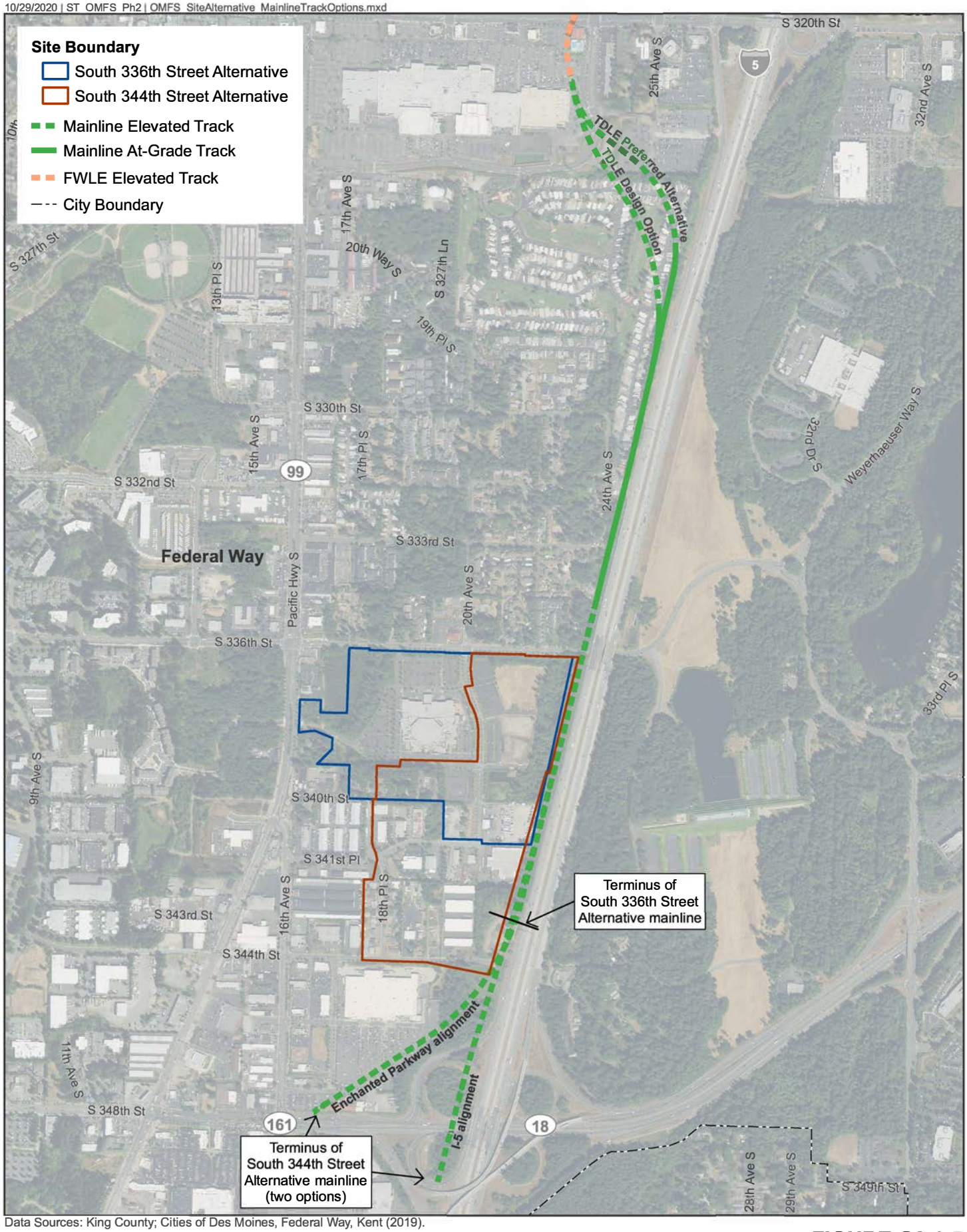
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-4
Conceptual Layout
South 344th Street Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G3.1-5
Mainline Track Options
South 336th Street and South 344th Street Alternatives

OMF South

This technical report was prepared to support the Draft Environmental Impact Statement for the OMF South Project. As such, analyses in this report meet the requirements of the State Environmental Protection Act (SEPA). Federal funding for the OMF South project is not being pursued and federal approval may or may not be required depending on the final project alternative selected. To maintain Sound Transit's ability to pursue future options that may require a federal approval, this report also meets the requirements of the National Environmental Policy Act and describes existing conditions and analyzes potential impacts on species and habitats that would typically be addressed in a biological assessment or other document that demonstrates compliance with the requirements of Section 7(c) of the Endangered Species Act (ESA). Further, this report addresses potential effects on essential fish habitat, consistent with the requirements for federal action agencies under the Magnuson-Stevens Fishery Conservation and Management Act.

The attachments to this report provide additional information on fieldwork methodologies and information that supports the ecosystems resources evaluation. Attachment G.3-1 describes the wetland delineation methodology. Attachment G.3-2 describes Sound Transit's Stream Habitat Assessment Guidelines. Attachment G.3-3 contains background and research information related to the wetland and stream assessments. Attachments G.3-4 and G.3-5 provide wetland determination data forms and Washington State Department of Ecology (Ecology) wetland rating forms. Attachment G.3-6 presents photographs of the wetlands, streams, and habitat types discussed, and Attachment G.3-7 includes a list of common and scientific names of plant and animal species discussed in this report.

1.1 Data Gathered

The following documents and data sources were reviewed to identify ecosystem features in the project vicinity, including the alternative footprints and potential mitigation sites:

1.1.1 Federal

- U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey maps (NRCS 2019)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) website (USFWS 2020a)
- USFWS list of ESA-listed species and critical habitats (obtained via the online Information for Planning and Consultation planning tool) (USFWS 2020b)
- National Marine Fisheries Service (NMFS) ESA species lists (NMFS 2021)
- U.S. Geological Survey (USGS) Topographic Maps (USGS 2020)

1.1.2 State

- Washington Department of Natural Resources (WDNR) Forest Practice Applications Review System online water typing map (WDNR 2020)
- WDNR Washington Natural Heritage Program rare plants and high-quality ecosystems datasets (WDNR 2019)
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) data (WDFW 2019a)

- WDFW SalmonScape fish database and mapping application (WDFW 2019b)
- StreamNet (2019) fish distribution data
- Fish passage barrier maps from WDFW and the Washington State Department of Transportation (WSDOT) (WSDOT 2020; WDFW 2020)
- Washington Department of Fisheries catalog of Washington streams and salmon utilization (Williams et al. 1975)
- Ecology 303(d)-listed waters information

1.1.3 Local

- King County iMap interactive mapping tool (King County 2018)
- King County aerial imagery (King County 2019)
- City of Federal Way wetland inventory report (Fischer 1999)
- City of Federal Way Hylebos Creek fish use and habitat technical memorandum (HDR 2014)
- City of Federal Way Critical Areas Map (City of Federal Way 2016)
- Other studies and environmental reviews that have been conducted in or near the study area (also see studies and sources cited in resource-specific discussions):
  - Federal Way Link Extension Final EIS Appendix G2: Ecosystems Technical Report (Sound Transit 2016a)
  - OMF South Scoping Summary Report (Sound Transit 2019a)
  - OMF South Alternatives Development Technical Memorandum (Sound Transit 2019b)
  - Tacoma Dome Link Extension Pre-Screening and Level 1 Alternatives Evaluation Report (Sound Transit 2019c)
  - Tacoma Dome Link Extension Level 2 Alternatives Evaluation Report (Sound Transit 2019d)
  - Tacoma Dome Link Extension Scoping Summary Report (Sound Transit 2019e)
  - Hylebos Watershed Plan (EarthCorps 2016)

1.2 Related Laws, Regulations, and Guidelines

Project activities that may affect wetlands, aquatic species, and habitat; vegetation, wildlife species, and habitat; or threatened and endangered species in the project area are subject to the following regulations, plans, and policies:

1.2.1 Federal

- The National Environmental Policy Act, ESA Section 7, and the Magnuson Stevens Fishery Conservation and Management Act (for projects that receive funding, permits, or other authorization from a federal agency)
- Sections 404, 402, and 401 of the Clean Water Act
- Protection of Wetlands, Presidential Executive Order 11990
- Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (73 Federal Register 19594, April 10, 2008)

- U.S. Army Corps of Engineers (Corps) Wetland Delineation Manual (Environmental Laboratory 1987)
- Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0) (Corps 2010)
- Bald and Golden Eagle Protection Act
- Migratory Bird Treaty Act
- Treaty of Point Elliott of 1855

1.2.2 State

- SEPA (Chapter 43.21C Revised Code of Washington [RCW]) and implementing rules (Chapter 197-11 Washington Administrative Code [WAC])
- Washington State Growth Management Act (Chapter 36.70A RCW)
- Hydraulic code (Chapter 220-110 WAC)
- Protection of Wetlands, Governor's Executive Order 89-10
- Protection of Wetlands, Governor's Executive Order 90-04
- Water Pollution Control Act, Chapter 90.48 RCW
- Wetland Mitigation in Washington State (Ecology et al. 2006)

1.2.3 Regional and Local

- Sound Transit SEPA rules (Board Resolution No. R2018-17) and Sound Transit Environmental Policy (Board Resolution No. R2004-06)
- Sound Transit 3, the Regional Transit System Plan for Central Puget Sound (Sound Transit 2016b)
- Sound Transit Sustainability Plan (Sound Transit 2019f)
- Sound Transit Stream Assessment Guidelines (Sound Transit 2016c)
- Sound Transit EO Number 1: Establishing a Sustainability Initiative (Sound Transit 2007)
- City of Kent critical areas regulations (Kent City Code Chapter 11.06), amended July 21, 2015
- City of Federal Way critical areas regulations (Federal Way Revised Code Chapter 19.145), amended June 15, 2015
- King County Mitigation Reserves Program – In-Lieu Fee Program Instrument (King County 2011)
- Hylebos Watershed Plan (EarthCorps 2016)

1.3 Study Areas

Sound Transit established distinct study areas for aquatic resources, terrestrial resources, and wetlands based on proposed project footprints and areas outside the footprint that could be potentially affected by the project, such as nearby wildlife habitat affected by noise. The project footprint consists of the construction limits – the maximum extents within which clearing, grading, and the operation of construction machinery would occur – for the OMF South alternatives, as well as any areas of modifications to roadways and other existing infrastructure to accommodate the proposed facilities.

The project footprint for each OMF South alternative includes the OMF site, short segments of lead tracks that connect the site to the mainline, and any new mainline that would be constructed to connect the site to the southern terminus of the FWLE. The footprints for two of the build alternatives also encompass a track design option near the northern end of the mainline that would reduce the curve of the mainline, allowing for higher speeds. In addition to the project footprint, the study areas also include specified adjacent areas that could be affected by activities within the project footprint. Study areas for each resource are specified in Section 1.3.1 through Section 1.3.3, below. Study areas are shown in Figures G3.1-6, G3.1-7, and G3.1-8.

1.3.1 Aquatic Species and Habitat

Reconnaissance-level aquatic habitat surveys were conducted 300 feet downstream and 100 feet upstream of each water body crossing, and the entire stretch of any water body paralleling the project within 200 feet of the project limits. The survey extended to 300 feet upstream if channel configuration resulted in stream buffers overlapping the project limits.

1.3.2 Vegetation, Wildlife, and Wildlife Habitat

The study area for vegetation and wildlife habitat consists of the project footprint, plus the areas within 200 feet of the project footprint. This represents a conservative estimate of the area in which project construction and operation could affect vegetation cover and habitat quality for terrestrial wildlife. To address wildlife potentially affected by project-related noise and human activity, resource analysts also reviewed documented occurrences of sensitive wildlife species within 0.25 mile of project construction areas.

1.3.3 Wetlands

The study area for wetlands consists of the project footprint, plus the areas within 300 feet of the project footprint to account for the typical largest applicable potential buffer width for wetlands in the area. Wetlands evaluated include those features that are wholly or partly within the study area.

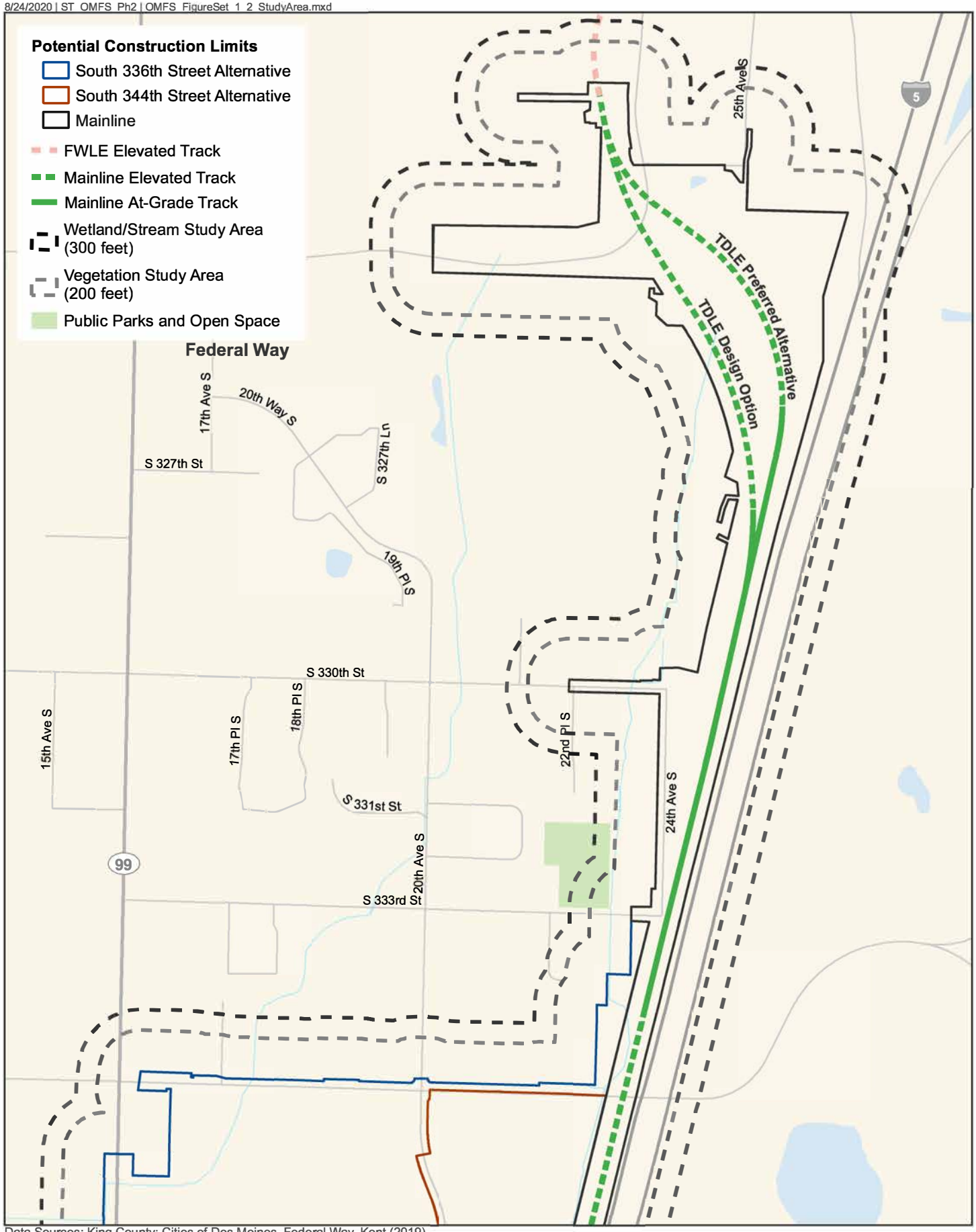
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-6
Ecosystem Resources Study Area
Midway Landfill Alternative

OMF South



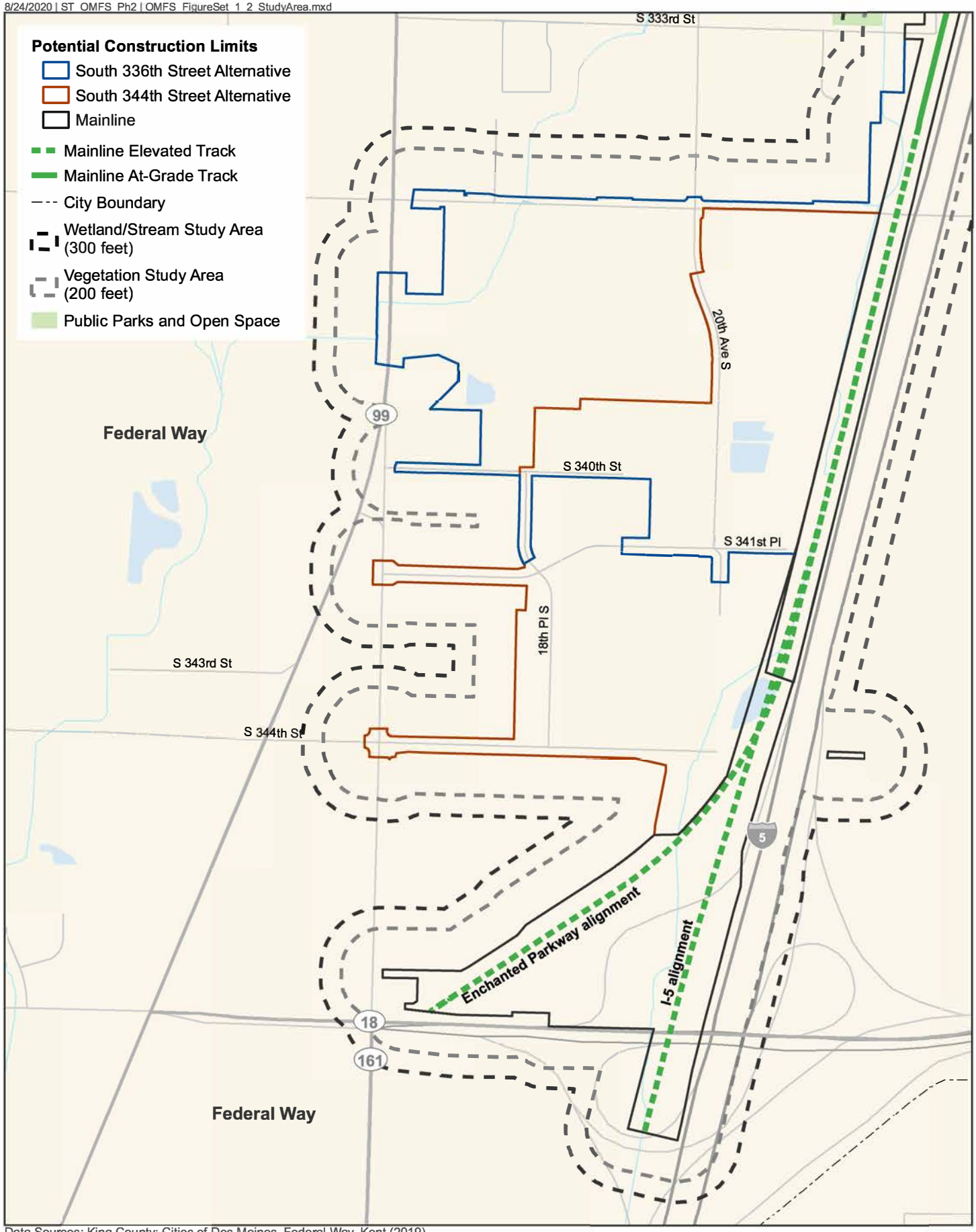
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-7
Ecosystem Resources Study Area
Mainline Track Options

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.1-8
Ecosystem Resources Study Area
South 336th Street and South 344th Street Alternatives

OMF South

2 STUDY OBJECTIVES AND METHODS

This section describes the objectives and methods used to study and evaluate potential impacts on aquatic resources, terrestrial resources, and wetlands. Discussions in this section are based on the approach defined in the OMF South environmental methodology report (Sound Transit 2019g).

2.1 Aquatic Species and Habitat

2.1.1 Study Objectives

The purpose of the aquatic resource investigation is to describe aquatic resources near the build alternative sites and the potential for impacts on these resources. Objectives included the following:

- Characterize all surface water bodies and riparian habitat near the project limits for each alternative.
- Identify all water bodies potentially affected (directly or indirectly) by the construction and/or operation of each alternative.
- Identify aquatic species presence and use of the surface water bodies near each project alternative.
- Identify potential effects of the proposed project on aquatic resources near each project alternative.
- Identify avoidance, minimization, and mitigation opportunities to offset potential direct and indirect effects of each alternative on aquatic resources.

2.1.2 Methods

2.1.2.1 Review of Existing Maps and Documentation

Biologists reviewed existing maps and documentation to identify known streams and water bodies in the study area and vicinity (see Section 1.1, Data Gathered). When applicable, documentation of aquatic species and habitat was analyzed from Water Resource Inventory Area (WRIA), county, and subbasin reports. These streams were then verified and evaluated in the field within the field reconnaissance survey area. Existing geographic information system (GIS) data were gathered from Kent, Federal Way, and King County. Streams that extend beyond the field reconnaissance survey area and other previously mapped streams outside of the WSDOT or other public rights-of-way were also incorporated into the GIS database. Background information about riparian vegetation, physical in-stream habitat, biological connectivity, water quality and quantity, stream typing, and fish presence and habitat use was collected during the pre-field review phase.

Species known to use habitats in the study area are those whose presence is documented by the information sources identified in Section 1.1, Data Gathered, as well as species observed during site visits conducted for this analysis. Species whose known or expected distribution encompasses the study area and that are associated with habitat types in the study area are considered potentially present.

Aquatic habitats and species of concern are those with a regulatory status that prompts individual attention through federal, state, and/or local permitting processes. Specific habitat

types that receive consideration under local critical areas regulations are also identified. Species and habitats of concern include the following:

- Species listed or proposed for listing as threatened or endangered under the ESA, as well as designated critical habitat for those species
- Species for which fish and wildlife habitat conservation areas (FWHCAs) have been established under local critical areas rules
  - The Kent City Code (Section 11.06.710) identifies the following as FWHCAs:
    - Areas with the documented presence of federally or state-listed endangered, threatened, or sensitive species
    - Areas with the documented presence of species or habitats identified in the WDFW PHS database, current city habitat maps, or other relevant databases
    - Naturally occurring ponds
    - Waters of the state (including streams and lakes)
  - The Federal Way Revised Code (Section 19.145.260) identifies the following as FWHCAs:
    - Areas with which federally listed endangered or threatened species or state-listed endangered, threatened, or sensitive species have a primary association
    - State priority habitats and areas associated with state priority species, as identified by WDFW
    - Habitats and species of local importance (the City of Federal Way has not identified any habitats or species of local importance)
    - Streams
    - Lakes

2.1.2.2 Field Reconnaissance and Delineation

The aquatic species and habitat assessment focused on key habitats and aquatic features that may be affected by the project and that are directly related to ecological functions that support aquatic ecosystems. After collecting and reviewing existing information, biologists conducted detailed field reconnaissance and delineation surveys within the study area to identify and confirm ecosystem resources that could be affected. Biologists conducted formal delineations (flagging and professional land surveying) of the ordinary high water line (OHWL) of East Fork Hylebos Creek Tributary 0016A, and its associated wetlands, on the east side of the South 336th Street and South 344th Street alternatives due to the anticipated high level of interest from agencies, tribes, and the public and to aid design work. Other locations of East Fork Hylebos Creek Tributary 0016A and other Hylebos Creek tributaries were not delineated for this analysis and habitat conditions were documented at a reconnaissance level.

Sound Transit's Stream Habitat Assessment Guidelines (Sound Transit 2016c) (Attachment G.3-2) were used to determine the level of information that should be collected for each identified stream. In accordance with the guidelines, research and field surveys were conducted to identify, map, and describe aquatic species and the condition of in-stream and riparian habitats within the study area. The Phase 1 project approach (planning-level study) was used to provide analysis for SEPA and ESA coordination. Within the Phase 1 approach, the project used the Track A methods for assessing aquatic area impacts where property access is not granted and for all streams other than East Fork Hylebos Creek Tributary 0016A. Track B methods were used on East Fork Hylebos Creek Tributary 0016A and Sound Transit, WSDOT, or other publicly owned right-of-way/easement areas. Track A is typically used where access is limited or impacts are not anticipated; Track B is typically used where access is possible and impacts are anticipated (Sound Transit 2016c).

Habitat was assessed with the assumption that anadromous fish may one day be able to enter stream reaches where no natural barriers exist, even if human-created barriers currently prevent access. Using information gathered during field reconnaissance and from sources such as tribes, local jurisdictions, WSDOT, and fish passage barrier maps maintained by WDFW, biologists evaluated the accessibility of each stream in the study area, identifying downstream impediments to fish passage.

Biologists classified streams according to the interim water typing definitions in WAC section 222-16-031, and the applicable stream classification systems in the City of Kent's Environmental Management Code and the City of Federal Way's Zoning and Development Code. The biologists then identified regulatory buffers based on each stream's water type or classification.

2.2 Vegetation, Wildlife, and Wildlife Habitat

This section identifies the objectives of the investigations into terrestrial resources in the study area and describes the methods used to characterize the vegetation and wildlife habitats in the project vicinity and to identify potential impacts on those habitats. It also includes a discussion of threatened and endangered species, species of concern, and high-value habitats in the vegetation and wildlife study area.

2.2.1 Study Objectives

The purpose of the investigation into terrestrial resources was to characterize the existing condition of vegetation and wildlife habitat in the study area and to identify species of concern that may be affected by the proposed alternatives. Study objectives included the following:

- Identify, map, and describe the existing conditions of the vegetation communities and wildlife habitat resources in the study area.
- Characterize the potential for species of concern to use habitats in the study area.
- Evaluate the potential effects of each alternative on vegetation, wildlife, and wildlife habitat.
- Identify potential measures to avoid, minimize, or compensate for unavoidable adverse effects.

2.2.2 Methods

To establish the basis for the analysis of effects on vegetation, wildlife, and wildlife habitat, biologists delineated and classified land cover on aerial photographs and visited a sample of these areas during the field reconnaissance surveys. Land cover types were identified and classified based on study area-specific refinements of the structural categories defined by Johnson and O'Neil (2001). Forest composition, relative age, native species cover, and habitat features were key attributes in determining vegetation types. Vegetation data, including dominant plant species composition, were gathered and classified by habitat type using field observation, aerial photographs, and pertinent literature.

To support the analysis of effects on wildlife, the biologists identified wildlife species associated with the land cover types in the study area, as well as specific habitat elements within each cover type. Biologists used geospatial data from the WDFW PHS Program and the WDNR Natural Heritage Program to identify documented locations of priority species, priority habitats, rare plant populations, and high-quality ecosystems in the study area. Biologists also reviewed site-specific wildlife data, including bird surveys (e.g., Opperman et al. 2006, eBird 2019), supplemented with data gathered during field visits.

Wildlife habitat values were not evaluated for each occurrence of each land cover type along the project corridor but instead were assigned to the cover type as a whole. Habitat value within a cover type at a specific location can vary and depend on several factors, such as size of the area; degree of fragmentation or isolation; presence of (or proximity to) other valuable habitat; potential role as a travel corridor; level and type of human disturbance; diversity of plant species; presence of multiple cover layers (i.e., tree, shrub, and herbaceous layers); presence of threatened, endangered, or sensitive species; and extent of invasive weeds.

Species known to use habitats in the study area are those whose presence is documented by the information sources identified in Section 1.1, Data Gathered, as well as species observed during site visits conducted for this analysis. Species for which known or expected distribution encompasses the study area and that are associated with habitat types in the study area are considered potentially present.

Plant and animal species of concern are those with a regulatory status that prompts individual attention through federal, state, and/or local permitting processes. Specific habitat types that receive consideration under local critical areas regulations are also identified. Species and habitats of concern include the following:

- Species listed or proposed for listing as threatened or endangered under the ESA, as well as designated critical habitat for those species.
- Species for which FWHCAs have been established under local critical areas rules.
  - The Kent City Code (Section 11.06.710) identifies the following as FWHCAs:
    - Areas with the documented presence of federally or state-listed endangered, threatened, or sensitive species
    - Areas with the documented presence of species or habitats identified in the WDFW PHS database, current city habitat maps, or other relevant databases
    - Areas with unusual nesting or resting sites, such as heron rookeries or active nests of raptors that are included in the listing categories specified above
    - Naturally occurring ponds
    - Waters of the state (including streams and lakes)
  - The Federal Way Revised Code (Section 19.145.260) identifies the following as FWHCAs:
    - Areas with which federally listed endangered or threatened species or state-listed endangered, threatened, or sensitive species have a primary association
    - State priority habitats and areas associated with state priority species, as identified by WDFW
    - Habitats and species of local importance (the City of Federal Way has not identified any habitats or species of local importance)
    - Streams
    - Lakes
- Bird species protected under the Migratory Bird Treaty Act

2.3 Wetlands

2.3.1 Study Objectives

The wetland study was conducted to identify, map, and describe wetlands in the study area. Study objectives included the following:

- Thoroughly research and assess field site conditions with respect to wetlands
- Evaluate the effects of the alternatives on these features
- Identify potential measures to avoid, minimize, or compensate for unavoidable adverse effects on wetlands

2.3.2 Methods

Wetland assessments are based on background research (see Section 1.1, Data Gathered) and analysis of existing information and datasets, combined with field surveys to document current conditions. Wetland assessments include both delineated and estimated extents for all wetlands in the study area. The extents of wetlands on properties lacking access were estimated by using remote sensing and best professional judgment. Vegetation and potential wetlands in areas where rights of entry had not been obtained were identified based on field reconnaissance from public areas; current local, state, and federal habitat maps and reports; and the examination of aerial photographs. Documented wetlands from other projects or sources were evaluated and, where appropriate, included in the wetland findings.

Where property access was obtained, wetland boundaries were formally delineated in areas associated with East Fork Hylebos Creek Tributary 0016A and West Fork Hylebos Creek Tributary 0014C. If access to properties was not obtained, wetlands associated with Hylebos Creek tributaries were identified as described above for areas where rights of entry were not granted. While a formal delineation level of study is not required at this stage of the environmental review process, Sound Transit felt that the interest expressed during the scoping period justified collecting detailed information, particularly to advise the engineering design team and avoid resources where possible. This detailed work was conducted to provide comprehensive information in areas with anticipated high level of interest from agencies, tribes, and the public. Other wetlands in the study area were identified at the reconnaissance level in which wetland boundaries were not formally delineated. Almost all wetlands in the study area are associated with tributaries of Hylebos Creek, and property access was obtained for almost all parcels where access was needed. As a result, most wetlands in the study area were delineated.

Wetland boundaries were estimated or delineated using methods outlined in the Corps Wetland Delineation Manual (Environmental Laboratory 1987) and indicators defined in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0 (Corps 2010). Detailed methodology for wetland assessments is included in Attachment G.3-2. Observations of existing conditions and characteristics were recorded for each wetland and associated buffer.

Wetlands were classified according to the USFWS (Cowardin et al. 1979, FGDC 2013) and hydrogeomorphic (Brinson 1993) classification systems. These were rated according to local jurisdiction critical area ordinances and the Washington State Wetland Rating System for Western Washington: 2014 Update (Hruby 2014). The width of each wetland's regulatory buffer was identified based on the wetland's rating and habitat function score, as required under the critical area code of the local jurisdiction. All wetland ratings, and therefore associated

regulatory buffer widths, are preliminary and are subject to change. Wetland functions were based on using the Washington State Wetland Rating System for Western Washington: 2014 Update (Hruby 2014).

Wetland determination forms and rating forms are included in Attachment G.3-4 and G.3-5, respectively. Representative photographs of wetlands in the study area are in Attachment G.3-6. Scientific names of plants and animals are presented in Attachment G.3-7.

2.4 Impact Assessment Methods and Assumptions

Resource analysts evaluated long-term and temporary (construction-related) impacts on ecosystem resources. The following subsections describe the process by which direct, indirect, and cumulative impacts on each ecosystem component were identified, as well as the supporting assumptions for the impact analyses.

2.4.1 Direct Impacts

For this analysis, the design team identified a permanent impact footprint based on the preliminary (less than 10 percent) design for the OMF sites, including lead tracks, mainline, and other project features that would result in long-term impacts on ecosystem resources. The design team also defined a construction footprint, which encompasses the permanent impact footprint and surrounding areas where vegetation clearing and ground-disturbing work are likely to be required for project construction. Areas outside the permanent impact footprint but within the construction footprint would be expected to be restored to pre-project conditions, or better, following construction. These footprints were overlain on mapped locations of streams, wetlands, and vegetation cover types to determine the extent of the potential impacts of the alternatives on ecosystem resources. Once a preferred alternative has been selected, the permanent and construction footprints for the preferred alternative will be refined, and additional field work will be conducted to gain a more detailed understanding of project impacts.

Direct impacts on aquatic species and habitat were determined by evaluating the length (in linear feet) of each water body and the acreage of riparian buffers that would be altered or eliminated for each alternative. As with wetland buffers, standard regulatory buffers for streams were trimmed at the edge of developed areas to denote the extent of the functional buffer. Direct impacts on aquatic species were assessed qualitatively by considering such factors as the regional significance of the resident and anadromous fish species resource, fish habitat value (such as its role as a migration corridor or spawning), degree of connectivity and loss of habitat following project implementation, overall habitat quality, and potential for enhancing or restoring aquatic habitat or connectivity. Construction and operational impacts on aquatic species from water quality degradation and loss of habitat were also assessed. Potential long-term impacts on threatened and endangered species were determined, including direct mortality, disturbance and displacement effects, and loss or degradation of habitat. The assessment also included a review of potential effects on essential fish habitat.

Potential impacts of each alternative on terrestrial resources were quantitatively evaluated by evaluating the acreage of major vegetation types that would be temporarily or permanently affected by project construction and operation. Impacts on rare plant populations were determined by evaluating the acreage of any mapped populations that would be affected by construction or operation of each alternative. The potential for the introduction or removal of noxious or invasive plant species was also evaluated.

Potential impacts on wildlife, including species of concern, were also assessed qualitatively by considering such factors as the regional significance of the resource, wildlife habitat value of affected areas (such as its role as a wildlife movement corridor), degree of fragmentation and loss of the habitat following project implementation, overall habitat quality, and the potential for enhancing or restoring unique plant communities or wildlife habitat or connectivity. Evaluations of the potential for increased human access, noise, and light to affect sensitive wildlife species were based on the proximity of project features and work sites to known locations of sensitive sites such as breeding areas or communal roosts.

Impact analyses on wetlands and buffers were based on direct impacts from both long-term effects (filling or other permanent displacement) and short-term construction-related effects (vegetation clearing). If a contiguous wetland lies partially within and partially outside the project limits, project effects on the portion of the wetland not directly affected by the project were assessed using guidance in Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance (Ecology et al. 2006). Functional effects that extend beyond the area of direct wetland impacts were also assessed. In many areas, the functional extent of wetland buffers was compromised by high-intensity land uses and development (e.g., buildings, parking lots, and roads). In such cases, the standard buffer width was trimmed at the edge of the developed areas to denote the extent of the functional buffer; in other words, the buffer did not include or extend across buildings, parking lots or roads.

2.4.2 Indirect Impacts

Indirect impacts are project-related effects that are reasonably foreseeable but separated from project implementation by distance or time. Examples may include changes in land use patterns, population density, or water quality in the areas affected by the project. Indirect impacts may also occur through the implementation of mitigation measures for other environmental impacts, or through supporting projects that are not yet defined or considered part of the project alternatives. Indirect impacts on ecosystem resources were analyzed qualitatively in this document.

2.4.3 Cumulative Impacts

Cumulative impacts are the effects of the project when combined with other past, present, and reasonably foreseeable future actions. The cumulative impacts analysis incorporated the effects of Sound Transit's other proposed light rail extension projects, including the FWLE project and the TDLE project which are assumed to be part of the No-Build Alternative. Reasonably foreseeable projects include the WSDOT State Route (SR) 509 Completion project and the Federal Way City Center Access project.

2.4.4 Analysis Assumptions

The process of analyzing and estimating project impacts requires a series of assumptions regarding the physical extent of impacts, the duration of impacts, site restoration following construction, and measures that would be implemented to avoid or minimize potential impacts. This analysis also includes temporary construction impacts and permanent operational impacts within the project right-of-way.

For the impact analysis, Sound Transit assumes that all aquatic resources, terrestrial resources, and wetlands within the limits of the specific facilities proposed under each alternative, including the area within the footprint of the mainline and lead tracks, would be modified during

construction. In most areas, the ecosystem functions of such areas would be substantially degraded or eliminated. In the case of streams within the project footprint, Sound Transit would minimize impacts on streams by avoiding placement in culverts or pipes, to the degree feasible.

Compared to the impacts of site facilities and at-grade tracks, the impacts of elevated portions of the mainline, lead tracks, and tail tracks would be less severe. These structures would be relatively narrow (typically 20 to 30 feet wide) and generally more than 15 feet above the ground surface. Vegetation would be able to grow in such areas, although the density and variety of vegetation would be limited by the reduced availability of sunlight and water. For operational safety, trees and other tall vegetation would not be allowed to grow underneath or within 15 feet of elevated track segments.

The permanent and construction footprints developed for this analysis represent Sound Transit's best estimates of the areas that may be affected by the OMF South alternatives. These estimates are conservative. For example, clearing of all areas within the construction footprint may not be necessary, but analyses of construction-related impacts are based on the assumption that the entire construction footprint would be cleared. In addition, the permanent impact footprint may include some areas where project components could be scaled down or eliminated as the project design progresses from its current, preliminary status. Moreover, not all areas within the project footprint would be converted to structures or hard surfaces. Some vegetated areas, for example, would be converted to other land cover types, such as landscaping or stormwater facilities. In other areas, existing hard surfaces may be converted to vegetation.

By applying a consistent set of assumptions for all of the alternatives, these footprints allow analysts to evaluate the relative degree of the potential impacts of the alternatives on ecosystem resources. Actual anticipated impacts would be determined when an alternative is selected to be built and the project design is sufficiently advanced to undergo permitting review. Additional field work would be conducted for the selected alternative to refine project impacts.

Vegetation in temporarily disturbed areas (e.g., in construction access areas and related rights-of-way) would be restored after construction is complete. Site restoration would include replanting disturbed areas with appropriate native vegetation immediately following construction. The length of time required for recovery of ecological functions would vary depending upon the intensity of the temporary impact (e.g., vegetation clearing *versus* temporary fill), as well as the type, age, and diversity of the existing plant community in the affected areas. The estimated extent of areas that would be temporarily affected by project construction is based on mapping provided by the project design team.

OMF South would be designed and constructed in compliance with all applicable federal, state, and local regulations. Sound Transit assumes the overall extent and magnitude of potential temporary construction impacts would be controlled by the types of construction activities and by the implementation of best management practices (BMPs; see Section 5.1.1, Avoidance and Minimization During Design Development and Section 5.1.2, Construction Best Management Practices). These BMPs would be designed to accommodate site-specific characteristics such as the widths of wetland and stream buffers.

Adverse effects on ecosystem resources would be avoided or minimized first through the project design process and through careful implementation, monitoring, and maintenance of BMPs during project construction and operation. Compensatory mitigation for unavoidable adverse effects would be implemented in accordance with permit requirements and local critical areas regulations (see Section 5, Potential Mitigation Measures).

3 AFFECTED ENVIRONMENT

The alternative sites characterized within the affected environment include the Midway Landfill Alternative in Kent and two sites in Federal Way, the South 336th Street and South 344th Street alternatives. The South 336th Street and South 344th Street alternatives each include the two alternatives for the mainline tracks that would connect the sites to the Federal Way Transit Center, known as the TDLE Preferred Alternative and the TDLE Design Option. The site footprints in Federal Way, including the mainline, are largely overlapping and are described as one unit for the purposes of simplifying the description of resources in the affected environment section.

3.1 Aquatic Species and Habitat

This section identifies aquatic species and habitats that may be affected by the construction and operation of OMF South. The study area is in an urban area where aquatic habitats have been highly modified by past development. The proposed facilities lie within areas that were disturbed by the construction of Interstate 5 (I-5), the Midway Landfill, and commercial, institutional, and light industrial development. Several streams in the study area have been placed partially in conveyance systems consisting of pipes, stormwater facilities, and ditches, interfering with natural flow patterns and processes, such as groundwater recharge and floodplain connectivity. The surrounding areas are dominated by commercial, institutional, residential, and light industrial development with extensive areas of impervious surface.

The portion of the study area in Kent drains to the North Fork McSorley Creek in WRIA 9, the Duwamish-Green watershed. The study area in Federal Way drains to Hylebos Creek in WRIA 10, the Puyallup-White watershed.

Many species of fish, both native and introduced, inhabit WRIAs 9 and 10. Discussions in this document focus on salmonids – anadromous salmonids in particular – because these species are a management concern due to habitat degradation and population declines. Salmonids in WRIAs 9 and 10 are a mix of native and introduced stocks. For example, sockeye salmon that spawn in some areas appear to be descendants of introduced fish, while those in other areas may be native fish (Hendry et al. 1996). Little genetic information is available for salmon originating from smaller independent tributaries to Puget Sound, such as McSorley Creek and Hylebos Creek. No unique stocks have been identified in Hylebos Creek or McSorley Creek (WDFW and WWTT 1994). However, LeClair (1999) determined that fall chum salmon stocks occurring in Hylebos Creek are of an unknown stock origin.

3.1.1 Streams in the Study Area

Consistent with Sound Transit's stream habitat assessment guidelines (Sound Transit 2016c), this subsection describes the streams in the study area, or those potentially affected by the project, and provides information about the following key aquatic habitat elements:

- Riparian vegetation
- Physical in-stream habitat
- Biological connectivity
- Water quality and quantity
- Fish presence and habitat use, and stream typing

The proposed OMF South facilities (including lead tracks) and mainline would cross or parallel two streams in the study area: East Fork Hylebos Creek Tributary 0016A and West Fork Hylebos Creek Tributary 0014C. Both streams are tributaries to Hylebos Creek, an independent tributary that discharges to the Hylebos Waterway along the eastern shore of Puget Sound's Commencement Bay in Tacoma. A third stream (North Fork McSorley Creek) is a tributary to McSorley Creek, an independent tributary that discharges to the eastern shore of Puget Sound in Saltwater State Park in Des Moines. Figures G3.3-1 through G3.3-3 show stream locations, conditions (surface-flowing or piped), and fish passage barriers. Table G3.3-1 summarizes regulatory information for the streams either in the study area, or potentially affected by the project.

Table G3.3-1 Summary of Streams in the Study Area

Stream Name	Stream Index No.[1]	State Interim Water Type[2]	Local Jurisdiction	Local Jurisdiction Stream Classification	Local Jurisdiction Buffer Width[3]
North Fork McSorley Creek[4]	09.0382	NA	N/A	F	NA
East Fork Hylebos Creek Tributary 0016A	10.0016A	3	Federal Way	F	100
West Fork Hylebos Creek Tributary 0014C	10.0014C	3	Federal Way	F	100

Notes: Streams listed from north to south.

(1) WRIA identification numbers according to Williams et al. (1975) and King County (1990)

(2) WAC 222-16-031

(3) Federal Way Municipal Code 19.145.270 (Revised 10/15/2019)

(4) No surface-flowing portion of North Fork McSorley Creek is within the study area; however, because the Midway Landfill Alternative may potentially discharge stormwater to the stream, it is included in this analysis.

3.1.1.1 North Fork McSorley Creek

North Fork McSorley Creek is included in the Lower Puget Sound–Des Moines/Federal Way drainage basin of WRIA 9 and originates in Des Moines, approximately 2,000 feet west of the Midway Landfill Alternative. The headwaters of North Fork McSorley Creek are near Parkside Elementary School west of SR 99. From there, the stream flows west and then south-southwest through primarily single-family residential areas before entering Saltwater State Park on the west side of 16th Avenue S. At that point, the stream joins South Fork McSorley Creek to form McSorley Creek, continuing west to its discharge point in Puget Sound. The stream length from the headwaters to McSorley Creek's discharge point into Puget Sound is approximately 1.8 miles. The portion of stream within the residential areas has been highly modified and confined to a straight and narrow ditch-like feature with a limited riparian corridor.

While no surface-flowing portions of North Fork McSorley Creek are within the Midway Landfill Alternative study area, a regional stormwater detention facility at the north end of the study area discharges to North Fork McSorley Creek approximately 1.1 miles west of the study area at the S 250th Street stream crossing. Figure G3.3-1 shows the pipe discharging from the stormwater detention facility. This pipe conveys only stormwater; it is not part of the stream network. Limited information is provided below to describe what is known about existing water quality and fish use of North Fork McSorley Creek, because these are the elements that could potentially be affected by any stormwater discharges from the Midway Landfill Alternative to the regional stormwater facility.

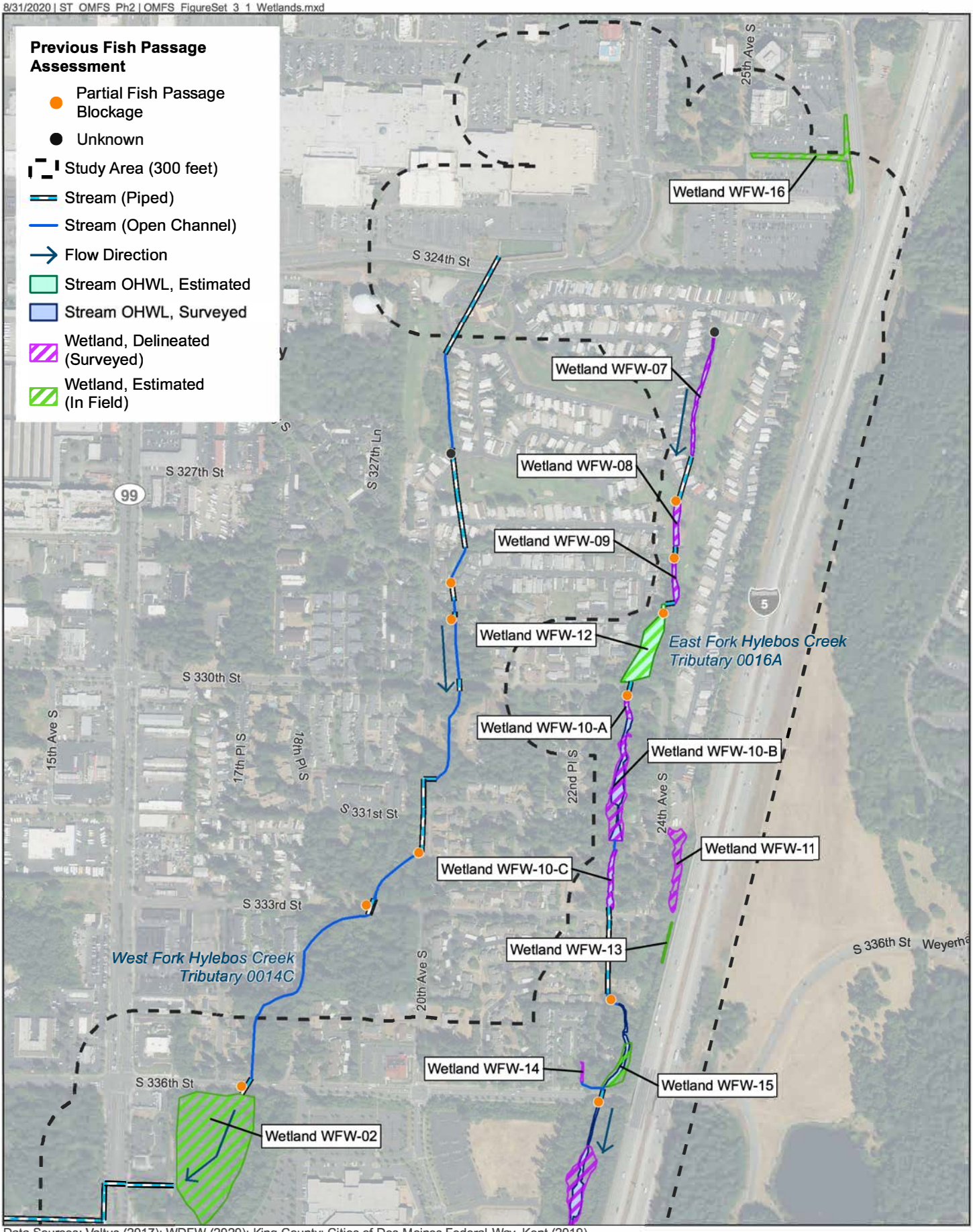
Data Sources: Valtus (2017); WDFW (2020); King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.3-1
Wetland and Stream Existing Conditions
Midway Landfill Alternative

OMF South



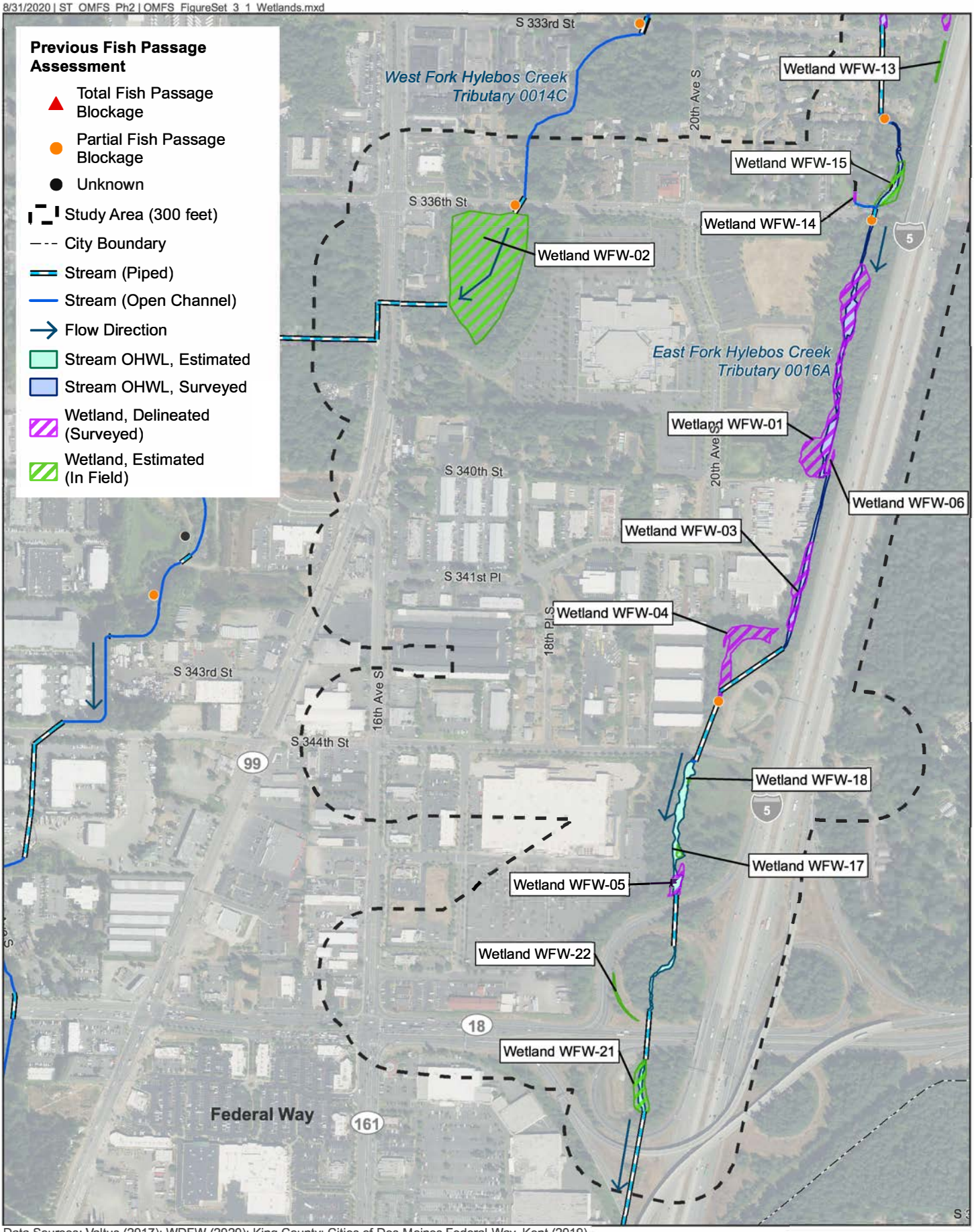
Data Sources: Valtus (2017); WDFW (2020); King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.3-2
Wetland and Stream Existing Conditions
Mainline Track Options

OMF South



Data Sources: Valtus (2017); WDFW (2020); King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.3-3
Wetland and Stream Existing Conditions
South 336th Street and South 344th Street Alternatives

OMF South

Biological Connectivity

Numerous barriers to fish passage exist downstream of the Midway Landfill Alternative study area, including two culverts on a non-fish-bearing segment of stream, three complete fish passage barriers, and four partial barriers. Table G3.3-2 summarizes the status of known fish passage barriers on North Fork McSorley Creek downstream of the Midway Landfill Alternative.

Table G3.3-2 Fish Passage Barrier Assessment for North Fork McSorley Creek

Approximate Road Crossing	Unique Site ID	Barrier Status
Parkside Elementary School	940301	On a non-fish-bearing stream
20th Avenue S	940300	Complete
S 245th Place	940299	Partial
S 246th Place	940298	Partial
Outlet of Martindale Lake	940296	Complete
S 250th Street	940295	Complete
Private property	940294	Partial
Saltwater State Park	940284	Partial

Source: WDFW Fish Passage and Diversion Screening Inventory Database (WDFW 2020)

Water Quality and Quantity

North Fork McSorley Creek is not listed on the Ecology 303(d) list of impaired waterbodies for any parameters. The nearest listed stream segment is McSorley Creek, approximately 1.2 miles from the Midway Landfill Alternative. McSorley Creek contains 303(d) listings for bacteria and dissolved oxygen (Ecology 2020).

No hydrologic data are available for North Fork McSorley Creek; however, the stream is known to have intermittent or seasonal flow between the headwater area at Parkside Elementary School and Martindale Lake just upstream of S 250th Street.

Fish and Habitat Use

Electrofishing surveys conducted by Washington Trout (2003) documented the presence of coastal cutthroat trout in North Fork McSorley Creek as far upstream as S 250th Street (approximately 1 mile from the study area) and western brook lamprey as far upstream as 20th Avenue S (a total barrier to fish passage approximately 0.5 mile west of the study area). Washington Trout also found juvenile chum salmon, juvenile coho salmon, juvenile rainbow trout/steelhead, sculpin, and sea-run and resident cutthroat trout in the lower reaches of McSorley Creek.

According to WDFW (2019b), fall-run Chinook salmon, fall-run chum salmon, coho salmon, and winter-run steelhead are potentially present[1] in North Fork McSorley Creek as far upstream as Martindale Lake, approximately 1 mile west of the study area. With the exception of the potential presence of Chinook salmon, these determinations of potential presence are all superseded by the documented observations of the Washington Trout survey (2003).

[1] Fish are classified as potentially present in a stream segment if artificial obstructions, degraded habitat quality, or extirpation of local populations currently preclude their presence, but the stream segment has the potential to support these species if obstructions were removed, habitat restored, and/or fish reintroduced (WDFW 2020).

3.1.1.2 East Fork Hylebos Creek Tributary 0016A

East Fork Hylebos Creek Tributary 0016A flows through the eastern portions of both the South 336th Street and South 344th Street alternatives west of I-5. Surface-flowing segments near the stream's headwaters are within the study area for both mainline track options. Before the construction of I-5 in 1965, the reaches of this stream that flow through the study area were the headwaters of Tributary 0013 in the West Fork Hylebos Creek subbasin. Construction of the I-5 system created a drainage catchment that permanently diverted Tributary 0016A into the East Fork Hylebos Creek subbasin (WSDOT and Federal Highway Administration [FHWA] 2009).

East Fork Hylebos Creek Tributary 0016A originates on the east side of I-5 north of S 320th Street in Federal Way. The stream is piped under the freeway, emerging in the study area in Belmor Park Golf and Country Club (Belmor). The stream flows south for approximately 2.1 miles before turning east near S 356th Street and crossing I-5 to join other tributaries to form East Fork Hylebos Creek. The stream channel in the study area is low-gradient, straight, and confined between I-5 and residential, commercial, institutional, and light industrial developments.

East Fork Hylebos Creek continues on the east side of I-5 and converges with West Fork Hylebos Creek near the Porter Way crossing of I-5. From this point, the stream continues as Hylebos Creek, crossing back across to the west side of I-5 and discharging to the Hylebos Waterway in Tacoma.

Before the mid-19th century, the Hylebos Creek watershed is thought to have been one of the most productive small, salmon-bearing streams draining to southern Puget Sound (King County 1990). Development of the region began in 1851, when the first Euro-American settlers began arriving in the Tacoma area. Since that time, extensive forest cover has been removed, wetlands have been drained and filled, stream channels have been modified, and forested areas have been converted to impervious surfaces. Currently, Hylebos Creek is located in one of the most heavily urbanized watersheds in the state (Kerwin 1999). Most of East Fork Hylebos Creek Tributary 0016A is in Federal Way, where population growth continues. Land in Federal Way is largely built out; most remaining undeveloped lands are in environmentally sensitive areas, such as streams and wetlands and their regulatory buffers.

The following subsections describe key habitats and stream features that are directly related to ecological functions supporting stream ecosystems and may be affected by the project, consistent with the stream habitat assessment guidelines established by Sound Transit (2016c).

Riparian Vegetation

Riparian vegetation along some portions of East Fork Hylebos Creek Tributary 0016A in the study area is dominated by native forest and wetlands. In other areas, native riparian vegetation has been replaced with landscaping, mowed grasses, or invasive shrubs.

In the area near the South 336th Street and South 344th Street alternatives, riparian vegetation is characterized as a mixed deciduous and coniferous forest. The mature forested canopy consists of bigleaf maple, black cottonwood, Oregon ash, Douglas-fir, red alder, Sitka willow, and western redcedar. The understory vegetation consists of cascara, vine maple, salmonberry, beaked hazelnut, sword fern, osoberry, red-twig dogwood, skunk cabbage, lady fern, stink currant, red elderberry, Himalayan blackberry, trailing blackberry, stinging nettle, and reed canarygrass. A large portion of the riparian corridor contains wetland habitats and associated vegetation. The left bank riparian zone in this area includes the fill slope for I-5 and is dominated by upland-associated vegetation, such as Douglas-fir. The right bank riparian zone is dominated by more typical riparian species, as described above.

Areas such as those described above, which are dominated by native forest and wetlands, are considered high-quality riparian habitat because they support functions such as fish and wildlife habitat provision; food chain support; water temperature maintenance; infiltration; groundwater recharge and discharge; sediment delivery, transport, and storage; organic matter input; nutrient and pathogen removal; and stream channel formation and maintenance. In other parts of the study area, riparian habitat along East Fork Hylebos Creek Tributary 0016A has been degraded through the conversion of native and structurally complex habitats into landscaping, mowed grasses, or invasive shrubs.

The width of the vegetated riparian area south of S 336th Street ranges from 130 feet on the right bank to 150 feet on the left bank. Downstream of the Christian Faith Center (until the stream reaches the culvert upstream of the WSDOT stormwater facility north of S 344th Street), the vegetated riparian area narrows to 30 feet on the right bank and to 50 feet on the left bank. Where the stream resurfaces in the cloverleaf interchange between southbound I-5 and SR 18, the vegetated riparian area varies between 100 and 150 feet, narrowing as the stream approaches culverts on the upstream and downstream ends.

Canopy cover was measured every 150 feet along the surveyed stream length. The average stream canopy cover between S 336th Street and S 344th Street is 75 percent. Stream canopy cover in the onramp from southbound I-5 to westbound SR 18 is 79 percent; stream canopy cover in the onramp from southbound I-5 to eastbound SR 18 is 41 percent.

Physical In-Stream Habitat

As observed in the field, habitat in East Fork Hylebos Creek Tributary 0016A is degraded. Glides (one of the least desirable habitat types for salmonids) make up more than 50 percent of the stream length between S 336th Street and S 344th Street. Riffles constitute approximately 30 percent of stream habitat in the study area, followed by pools (15 percent) and wetlands (4 percent). The average channel width for the stream within this reach was 8 feet.

The gradient of the stream is low, generally 1 percent or less. As a result, fine sediments have accumulated over time, resulting in the shallowing and widening of the streambed. Dense patches of reed canarygrass have become established in some low-energy areas, exacerbating the deposition of fine sediment and covering any usable spawning gravels. Fine sediments, including sand and silt, dominate the substrate composition in the study area. Patches of gravel are present, primarily in riffle areas; in most areas, however, these gravels are 30 to 40 percent embedded with fine sediments. Pebble count data collected from representative riffle habitats indicate that medium- to coarse-sized gravels (8 mm to 64 mm) are dominant and small gravel and small cobble are subdominant.

Channel sinuosity in the study area is low. Much of the channel is confined within a straight and uniform (ditch-like) channel profile. Reaches with a more natural, meandering profile are rare and short. Fine sediment deposition throughout the reach in the study area is raising the streambed elevation, resulting in frequent channel overtopping and the formation of backwaters and high-flow channels adjacent to the primary channel. During higher flows, the stream overtops its banks quickly and engages the floodplain and riparian wetlands.

Key restoration opportunities in East Fork Hylebos Creek Tributary 0016A in the study area include removal of fish passage barriers, debris, and garbage; removal and control of invasive plant species; large woody debris installation; and possible channel reconfigurations to increase pool quantity and quality, stream sinuosity, stream flow infiltration, temperature moderation (thermal protection), and overall habitat complexity.

Table G3.3-3 summarizes the characteristics of physical in-stream habitat of East Fork Hylebos Creek Tributary 0016A in the study area, using the metrics and measurements recommended by Sound Transit (2016c).

Table G3.3-3 Characteristics of Physical In-Stream Habitat for East Fork Hylebos Creek Tributary 0016A in the Study Area

Parameter	Metric/Measurement	Condition in Study Area
Channel Form and Profile	Macrohabitat – habitat type	Habitats in the study area were dominated by glide habitat, followed by low gradient riffle habitat, pools, and wetlands.
	Macrohabitat – pool characteristics	No pools in the project area exceeded 2 feet in depth with average residual pool depths of 0.71 feet throughout the corridor. The intermittent nature of the stream, combined with moderately infiltrative soils, indicates that while pools may have some moderate ability to retain water, this water quickly dries up.
	Stream Slope	East Fork Hylebos Creek Tributary 0016A is a low-gradient stream within the project area. Stream slopes ranged from 0.4 percent to 1.1 percent.
	Stream Patterns	Straight
	Confinement	The entrenchment ratio for all measurements was > 2.2, indicating that the East Fork Hylebos Creek Tributary 0016A is only slightly entrenched within good connectivity to the adjacent floodplain.
	Channel Dimension/Shape	East Fork Hylebos Creek is characterized by a shallow U-shaped channel with an average bankfull width of 10.5 feet and an average bankfull depth of approximately 1.2 feet.
Streambank Condition	Stability	Streambanks are typically stable with some areas of low scour.
	Bank Hardening/Revetments	Shoreline armoring is largely absent from the streambanks except for riprap armoring at many of the culvert crossings.
Substrate/ Sediment	Particle Frequency	Representative pebble counts were conducted at several riffles and pool tail-out locations throughout the assessed reaches. In general, gravels (particles ranging from 8-64 mm) were dominant, with small gravel (2-8 mm) and small cobble being subdominant (64-128 mm).
	Percentage of Fine Sediments/Embeddedness	Gravels, where present, are typically between 30 and 40 percent embedded with fines.
Large Woody Debris (LWD)	LWD Presence, Frequency, and Location	Approximately 71 pieces of LWD were observed over the 3,234 feet of assessed stream length. This equates to a density of 115 pieces per mile. A total of 66 percent of pieces were in the water, 31 percent spanned the channel, and 2 percent were not in the water but were below the bankfull elevation.
	Debris Jams	No debris jams were observed throughout the assessed reach.
	LWD Size	Coniferous logs averaged 28 feet in length and 12.2 inches in diameter. Deciduous logs averaged 23 feet in length and 8.1 inches in diameter.
	Age and Type	31 percent coniferous logs, 18 percent coniferous root wads, and 51 percent deciduous logs. The coniferous logs were typically in better condition with an average decay class of 2, which indicates the bark was typically still intact and the log maintained its original color. The majority of deciduous logs had a decay class between 3 and 4, meaning that most of the bark had gone and deterioration was advanced or advancing.

Table G3.3-3 Characteristics of Physical In-Stream Habitat for East Fork Hylebos Creek Tributary 0016A in the Study Area (continued)

Parameter	Metric/Measurement	Condition in Study Area
Cover and Refuge	Pool Quality	Pools in the project area have pool quality index values ranging from 2 to 4, with the majority being between 2 and 3. Pools, where present, were small, lacked sufficient depth, and had low to moderate cover.
	Undercut Banks	Undercut banks were rare throughout the reach. Undercut banks, where present, were shallow and provided little to no cover.
	Off-channel/Side-channel Habitat	The surveyed reach was devoid of off-channel habitat, such as side channels and beaver dams.
	In-Stream Cover/Protection	Other than LWD, no boulders or aquatic macrophytes were present that would provide any type of cover. The intermittent nature of the stream prevents the colonization of the stream channel by aquatic macrophytes. Reed canarygrass is present in some areas; however, where present, this material tends to choke the channel and divert water around the channel and is effectively inaccessible to rearing fish.

Note: *PQI = Pool Quality Index for Puget Sound Lowland Streams (modified from Platts et al. 1983)

Biological Connectivity

Numerous barriers to fish passage exist downstream of the study area, including four partial barriers, three complete passage barriers, and numerous unknown barriers or crossings that have not been evaluated for fish passage. Table G3.3-4 summarizes the status of known fish passage barriers in East Fork Hylebos Creek Tributary 0016A downstream of the South 336th Street and South 344th Street alternatives.

Table G3.3-4 Fish Passage Barrier Assessment for East Fork Hylebos Creek Tributary 0016A in the Study Area

Approximate Road Crossing	Unique Site ID	Barrier Status
Winged Foot Way	992364	Unknown
Burning Tree Boulevard	935279	Partial
Golf Course Path	935278	Partial
Abandoned Utility Corridor	935277	Partial
S 330th Street	935276	Partial
S 333rd Street	935275	Complete
S 336th Street	935274	Partial
WSDOT Detention Facility near S 344th Street	935271	Partial
I-5 SB off-ramp at Exit 142B	995293	Partial
SR 18 at Exit 142B	995298	Complete
I-5 SB on-ramp at Exit 142B	995297	Complete
I-5	995292	Partial
WSDOT NB right-of-way Access Road	995295	Partial
20th Avenue S	995296	Partial
20th Place S	932946	Unknown
S 363rd Place	932945	Complete

Source: WDFW Fish Passage and Diversion Screening Inventory Database (WDFW 2020)

Several road crossings of East Fork Hylebos Creek Tributary 0016A within the project footprints for the South 336th Street and South 344th Street alternatives in Federal Way have not been fully evaluated for fish passage. These include six crossings from north to south: 1) Winged Foot Way, 2) Belmor paved golf cart path, 3) S 330th Street, 4) S 333rd Street, 5) S 336th Street, and 6) the WSDOT stormwater facility near S 344th Street.

Water Quality and Quantity

East Fork Hylebos Creek Tributary 0016A is not on the most recent (2016) 303(d) list of impaired waters (Ecology 2020). The nearest listed segment is approximately 2 miles downstream, where East Fork Hylebos Creek is listed as impaired due to elevated levels of fecal coliform bacteria.

East Fork Hylebos Creek Tributary 0016A flows intermittently near the South 336th Street and South 344th Street alternatives. The streambed in this area is typically dry during summer and early fall. The stream channel was completely dry during the October 9, 2019, reconnaissance survey, and a soil pit excavated to a depth of 20 inches below the ground surface elevation in the stream failed to reach the groundwater table. Two weeks later (October 22, 2019), after several days of consistent rainfall, flows were reestablished in the stream channel. Several culverted and un-culverted discharges to East Fork Hylebos Creek Tributary 0016A were observed during site surveys. On the left bank, a culvert discharges to the stream directly from S 336th Street, which was assumed to be stormwater from the roadway. Another 12-inch-diameter corrugated plastic pipe discharges to the stream along the left bank at Station 1,530 and appears to originate from the adjacent commercial property. A quarry spall-lined channel, originating from a small culvert adjacent to I-5 and presumably conveying stormwater runoff from I-5, enters the right bank at Station 2,042.

Fish and Habitat Use

Current salmonid use of the Hylebos Creek watershed includes fall-run Chinook salmon, fall-run chum salmon, coastal cutthroat trout, coho salmon, and winter steelhead (HDR 2014). According to SalmonScape online mapping, several species of salmon and winter steelhead may potentially be present in East Fork Hylebos Creek Tributary 0016A based upon accessible stream gradient (WDFW 2019b). However, there is no documented or presumed[2] fish use in East Fork Hylebos Creek Tributary 0016A (WDFW 2019a and 2019b). Under current conditions, human-created barriers to fish passage prevent anadromous salmonids from entering stream reaches in the study area (WDFW 2019a, 2019b). No resident fish are present given the intermittent flow of the stream, lack of pools with sufficient depth to hold fish during periods when stream channel is dry, and the presence of barriers between the study area and potential population sources downstream. However, the basin size, channel width, and gradient of the stream indicate the potential to support fish in the future. For this reason, the stream is classified as a Type F stream, in accordance with Federal Way Municipal Code section 19.145.260.

The documented distribution of Chinook salmon distribution in the Hylebos Creek watershed does not extend into East Fork Hylebos Creek or its tributaries except for the lowest 730 feet of the stream (WDFW 2019a). This is approximately 3 miles downstream of the South 336th Street and South 344th Street alternatives (WDFW 2019a). Chinook salmon are not presumed to use habitats in East Fork Hylebos Creek or its tributaries upstream of that point, but there are no gradient barriers that preclude access to East Fork Hylebos Creek Tributary 0016A in the study area (WDFW 2019a).

[2] Presumed use means reliable documentation of fish use is lacking, but available data and consensus indicate that fish are likely to be present.

Coho salmon and winter-run steelhead have been documented in East Fork Hylebos Creek approximately 1.85 miles downstream of the South 336th Street and South 344th Street alternatives (WDFW 2019a). Chum salmon have been documented in East Fork Hylebos Creek approximately 2.3 miles downstream of the South 336th Street and South 344th Street alternatives. Pink salmon have been documented in the lower reaches of Hylebos Creek system and are presumed to occur in East Fork Hylebos Creek as far upstream as 3 miles downstream of the South 336th Street and South 344th Street alternatives (WDFW 2019a). As noted above, the basin size, channel width, and gradient of East Fork Hylebos Creek Tributary 0016A in the study area indicate the potential to support these species in the future.

3.1.1.3 West Fork Hylebos Creek Tributary 0014C

The only surface-flowing segment of West Fork Hylebos Creek Tributary 0014C in the study area flows through the northwestern corner of the project limits of the South 336th Street Alternative. An approximately 500-foot-long piped segment of the stream is present at the northern end of mainline portion of the study area.

West Fork Hylebos Creek Tributary 0014C originates on the west side of I-5, near The Commons at Federal Way and Belmor. The stream flows south through residential development to S 336th Street, where it enters a series of stormwater detention ponds. The stream then turns west and crosses SR 99 in a long, piped segment, before joining several other tributaries to form West Hylebos Creek just north of S 356th Street. West Hylebos Creek continues southeast and joins East Fork Hylebos Creek on the east side of I-5 near the Porter Way crossing of I-5. From this point, the stream continues as Hylebos Creek, crossing back across to the west side of I-5 and discharging to the Hylebos Waterway in Tacoma.

The development history of the area is similar to that of East Fork Hylebos Creek; however, the intensity of development is greater, resulting in higher levels of impervious surface area. With this higher level of development in the basin, West Fork Hylebos has experienced flooding and water quality problems associated with the increased impervious surface area. The City of Federal Way has constructed numerous stormwater facilities across the basin to address the flooding issues, including the stormwater facilities through which West Fork Hylebos Creek Tributary 0014C flows near the South 336th Street Alternative.

Riparian Vegetation

West of the South 336th Street Alternative, West Fork Hylebos Creek Tributary 0014C flows through a stormwater pond north of S 336th Street and enters a second, larger stormwater facility south of S 336th Street. Vegetation within the latter stormwater facility is dominated by native trees and shrubs (Pacific willow, black cottonwood, red-twig dogwood, salmonberry, and Douglas' spiraea) that provide high-quality riparian habitat.

Physical In-Stream Habitat

As noted above, West Fork Hylebos Creek Tributary 0014C near the South 336th Street Alternative is confined within stormwater facilities or pipes. There is no defined channel within Wetland WFW-02, which serves as a stormwater facility south of S 336th Street. Where it exits the wetland/stormwater facility, the stream flows through a raised outlet standpipe and then enters an approximately 500-foot-long culvert under SR 99. While ponded, this facility could retain and support fish use; however, once the facility drains, there is little or no holding water for fish. The pond's substrate is predominantly fine sediment and, as such, provides no suitable spawning habitat for anadromous or resident fish.

The surface-flowing segment of West Fork Hylebos Creek Tributary 0014C in the mainline portion of the study area is associated with a stormwater facility in Belmor. In contrast to the segment in the South 336th Street Alternative portion of the study area, the stream's connection to the stormwater facility in Belmor is off-line rather than in-line, which means the stormwater facility has a connection to the stream, but the stream does not flow through the facility.

Biological Connectivity

Numerous barriers to fish passage exist downstream of the South 336th Street and South 344th Street alternative portions of the study area, including seven partial barriers, four complete passage barriers, and numerous unknown barriers or crossings that have not been evaluated for fish passage. Table G3.3-5 summarizes the status of known fish passage barriers downstream of the South 336th Street and South 344th Street alternatives.

Table G3.3-5 Fish Passage Barrier Assessment for West Fork Hylebos Creek Tributary 0014C

Approximate Road Crossing	Unique Site ID	Barrier Status
The Dunes Court	995301	Unknown
S 328th Place	995302	Partial
Private Property	995303	Partial
S 330th Street	995304	Complete
20th Avenue S	933222	Partial
S 333rd Street	933223	Partial
S 336th Street	933224	Partial
SR 99	933225	Complete
S 340th Street	933226	Unknown
Private Property	933227	Complete
Private Property	933229	Partial
Private Property	933061	Unknown
Private Property	933060	Unknown
S 348th Street	933058	Full
S 356th Street	992011	Partial
S 373rd Place	921135	Unknown

Source: WDFW Fish Passage and Diversion Screening Inventory Database (WDFW 2020)

Water Quality and Quantity

A segment of West Fork Hylebos Creek Tributary 0014C approximately 0.2 mile downstream of the South 336th Street Alternative project limits is on the most recent (2016) 303(d) list of impaired waters, based on violations of state standards for pH, lead, zinc, and copper (Ecology 2020). Large amounts of impervious surface area in the upper watershed have likely contributed to elevated levels of pollutants associated with vehicle use, including metals such as copper, lead, and zinc.

The high level of development and associated impervious surface in the West Fork Hylebos Creek basin have resulted in severe flooding issues over the years and have contributed to altered peak and base flows in West Fork Hylebos Creek Tributary 0014C (King County 1990). As a result, Federal Way has initiated and completed numerous flood control projects, including large stormwater facilities throughout the basin.

Fish and Habitat Use

SalmonScape shows no fish present in West Fork Hylebos Creek Tributary 0014C (WDFW 2019b). Based on the presence of human-created barriers to fish passage, no anadromous fish are documented or presumed to use West Fork Hylebos Creek Tributary 0014C in the South 336th Street and South 344th Street alternatives portions of the study area (WDFW 2019a, 2019b). No resident fish are present, given the intermittent flow of the stream, lack of pools with sufficient depth to hold fish during periods when stream channel is dry, and the presence of barriers between the study area and potential population sources downstream. However, the basin size, channel width, and gradient of the stream indicate the potential to support fish in the future. For this reason, the stream is classified as a Type F stream, in accordance with Federal Way Municipal Code section 19.145.260.

The documented distribution of Chinook salmon in the Hylebos Creek watershed extends into the lower reaches West Fork Hylebos Creek (WDFW 2019b). The upstream limit of documented Chinook salmon presence is near S 373rd Street, approximately 2.5 miles downstream of the South 336th Street Alternative (WDFW 2019b). The presumed distribution of Chinook salmon extends an additional 0.3 mile upstream, to a point approximately 2.2 miles downstream of the South 336th Street Alternative. Chinook salmon are not presumed to use habitats in West Fork Hylebos Creek or its tributaries upstream of that point, but there are no gradient barriers that preclude access to West Fork Hylebos Creek Tributary 0014C in the study area.

Coho salmon and winter-run steelhead have been documented in West Fork Hylebos Creek approximately 1.3 miles downstream of the South 336th Street Alternative (WDFW 2019b). Pink salmon have been documented in the lower reaches of Hylebos Creek system and are presumed to occur in West Fork Hylebos Creek as far upstream as 2.2 miles downstream of the South 336th Street Alternative (WDFW 2019b). Fall-run chum salmon have been documented in West Fork Hylebos Creek approximately 1.9 miles downstream of the South 336th Street Alternative (WDFW 2019b). As noted above, the basin size, channel width, and gradient of West Fork Hylebos Creek Tributary 0014C in the study area indicate the potential to support these species in the future.

3.1.2 Aquatic Species of Concern

3.1.2.1 ESA-listed Species and Critical Habitat

Discussions in this document pay particular attention to species with listing status under the ESA because such status triggers additional regulatory review. If the project requires federal approval, the ESA requires each federal agency to ensure that any actions it undertakes or approves do not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of their designated critical habitat. To meet this requirement, a lead federal agency would evaluate the potential impacts of the Preferred Alternative, once selected by the Sound Transit Board of Directors, on ESA-listed species and critical habitat and, if necessary, initiate consultation with USFWS and NMFS. The assessment would also include a review of potential effects on essential fish habitat, as required by the Magnuson-Stevens Fishery Conservation and Management Act.

Aquatic species that are currently protected under the ESA and that have the potential to occur in the study area include Chinook salmon and steelhead, which are listed as threatened. Bull trout, another regionally significant and federally threatened species, has not been identified as occurring in Hylebos Creek or McSorley Creek. The distribution of these species within affected waterbodies is discussed in more detail above in Section 3.1.1, Streams in the Study Area.

None of the streams in the study area includes any proposed or designated critical habitat for ESA-listed species. However, these streams are designated as essential fish habitat for Pacific salmon.

Critical habitat has been designated for Chinook salmon and steelhead within the Hylebos Creek watershed, but not East Fork Hylebos Creek Tributary 0016A or West Fork Hylebos Creek Tributary 0014C. With respect to East Fork Hylebos Creek and South 336th Street and South 344 Street alternatives, the nearest designated critical habitat for Chinook salmon is approximately 3 miles downstream of the study area, and the nearest designated critical habitat for steelhead is approximately 1.85 miles downstream of the study area. With respect to West Fork Hylebos Creek and the South 336th Street Alternative, the nearest designated critical habitat for Chinook salmon is approximately 2.5 miles downstream of the study area, and the nearest designated critical habitat for steelhead is approximately 1.6 miles downstream. Critical habitat has not been designated for any aquatic species in McSorley Creek or North Fork McSorley Creek with respect to the Midway Landfill Alternative.

Critical habitat for bull trout is not present within any of the affected streams; however, bull trout critical habitat has been designated along the marine nearshore of Puget Sound at the mouths of both Hylebos Creek and McSorley Creek and includes the upstream extent of tidal influence into both streams.

3.1.2.2 Other Aquatic Species of Concern

Currently, no state-listed fish species are expected to occur in streams within the study area. Resident coastal cutthroat trout, identified as a state priority species due to its recreational importance, has not been documented as occurring in either East Fork Hylebos Creek Tributary 0016A or West Fork Hylebos Creek Tributary 0014C; however, there is a potential for this species to occur in these streams downstream of the study area. It is possible that remnant populations have persisted in these streams after the barriers were installed; however, the potential is very low given the presence of numerous barriers on the system, seasonal flow, and lack of pools with adequate holding depth to remain wetted over the drier summer months. Presence within North Fork McSorley Creek and the Midway Landfill Alternative is not anticipated. The cities of Kent and Federal Way have not identified any species of local concern at this time.

3.2 Vegetation, Wildlife, and Wildlife Habitat

The study area includes a variety of cover types and wildlife habitats. Much of the study area is dominated by urban development, including industrial, institutional, commercial, and residential areas. These areas support plant and animal species adapted to disturbed urban areas. However, patches of less-developed habitats occur along the Hylebos Creek tributaries in Federal Way and at the Midway Landfill in Kent. Vegetation conditions and wildlife habitats are described in the following subsections, followed by a summary of species and habitats of concern that are known or expected to be present in the study area.

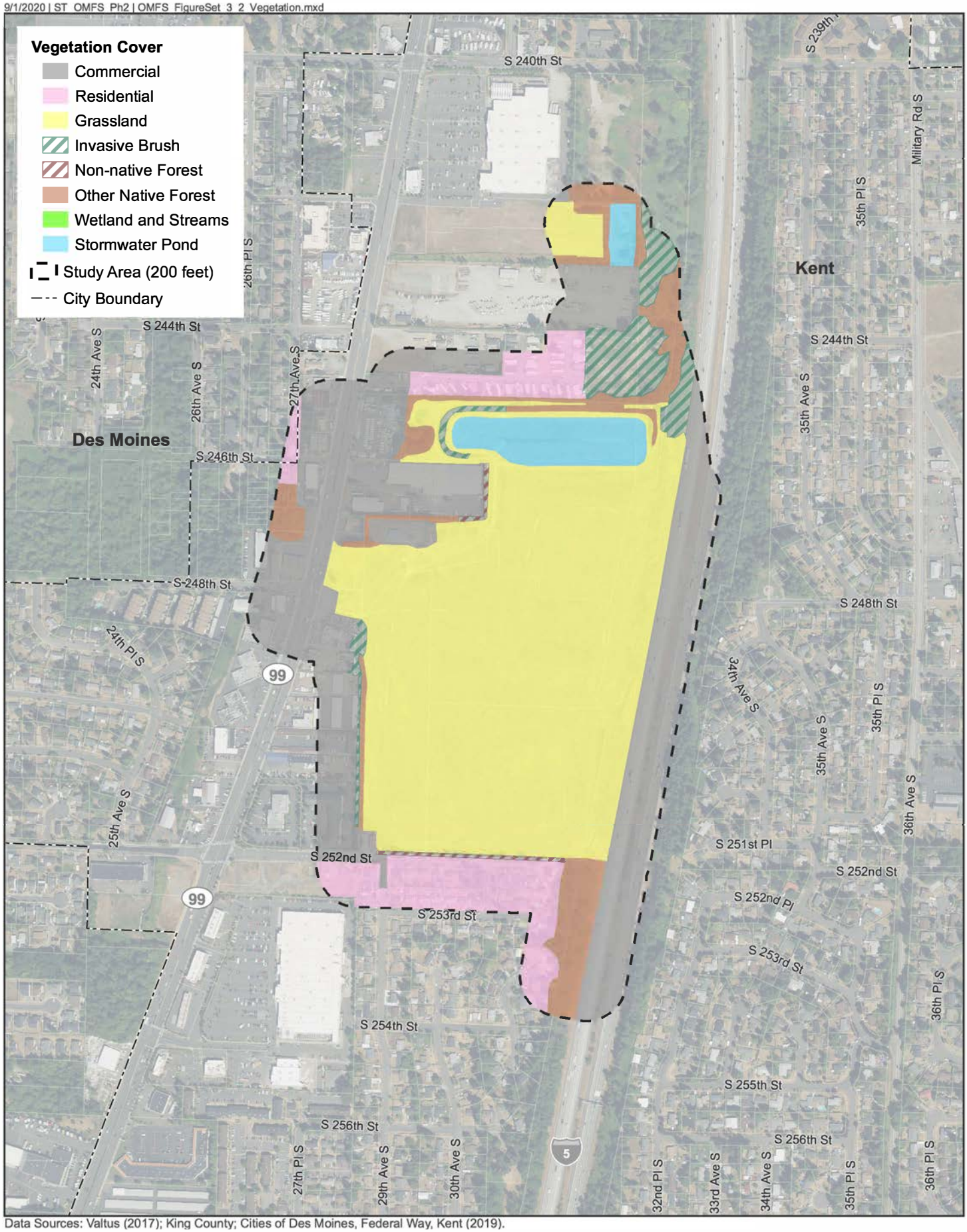
3.2.1 Vegetation

Vegetation in the study area was classified in land cover types and characterized according to the methods described in Section 2.2.2, Methods. Ten cover types were identified in the study area: commercial, residential, grassland, invasive brush, native brush, non-native forest, mature native forest, other native forest, wetland/stream, and stormwater pond. Table G3.3-6 lists these cover types and summarizes the acreage of each. Because the footprints of the two project alternatives in Federal Way overlap substantially, land cover acreage values for the portion of the study area surrounding those two sites (including lead tracks) are presented together. Similarly, land cover acreage values for the mainline track options are presented together. Figures G3.3-4, G3.3-5, and G3.3-6 depict the distribution of the cover types in the study area around the project alternatives. The figures also depict priority habitats that have been identified and mapped by WDFW. Representative photographs of each cover type are included in Attachment G.3-6.

The following subsections describe and summarize the relative habitat value of the land cover types in the study area. Relative habitat value is based on habitat structure, scarcity in the study area, disturbance types and frequency, and time required for ecosystem functions to recover following clearing and replanting. Priority habitats, based on WDFW definitions (WDFW 2019a) are identified and described in Section 3.2.3, Species and Habitats of Concern.

Table G3.3-6 Vegetation and Wildlife Habitats in the OMF South Study Area

Land Cover Type	Acres in Study Area			
	Midway Landfill	Mainline	South 336th Street and South 344th Street Alternatives	Total
Commercial	40	104	73	217
Residential	12	33	11	56
Grassland	61	10	4	75
Invasive Brush	6	4	5	15
Native Brush	0	2	0	2
Non-native Forest	1	0	1	2
Mature Native Forest	0	4	9	13
Other Native Forest	10	32	7	49
Wetlands and Streams	0	4	2	6
Stormwater Pond	5	<0.5	2	7
Total	**135**	**193**	**114**	**442**

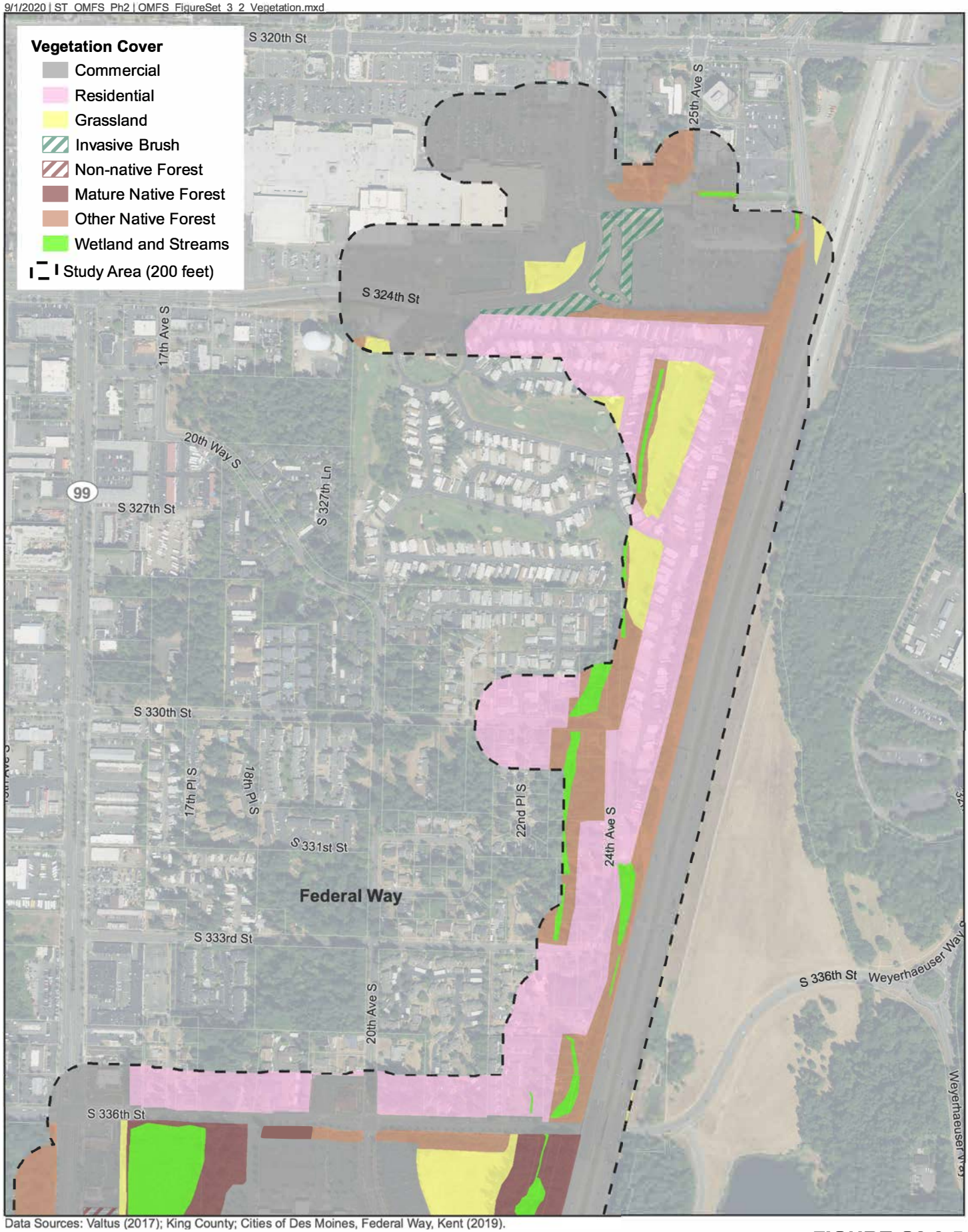


Data Sources: Valtus (2017); King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.3-4
Vegetation Cover Existing Conditions
Midway Landfill Alternative
OMF South



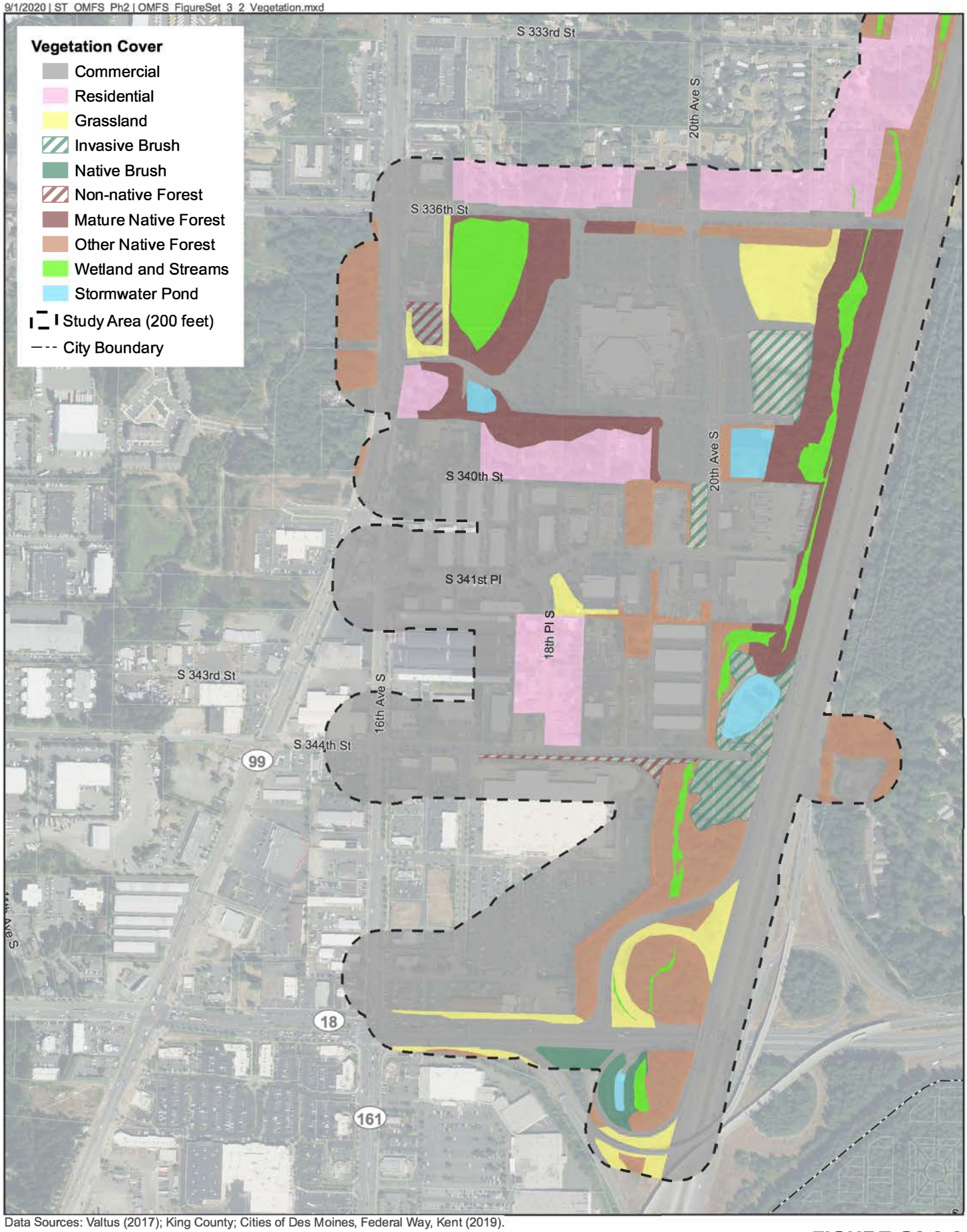
Data Sources: Valtus (2017); King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.3-5
Vegetation Cover Existing Conditions
Mainline Track Options

OMF South



Data Sources: Valtus (2017); King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G3.3-6
Vegetation Cover Existing Conditions
South 336th and South 344th Street Alternatives
OMF South

3.2.1.1 Commercial

The commercial cover type represents the heavily developed and built portions of the study area. It includes large buildings and parking lots, most of which are commercial areas. These areas contain minimal habitat value for wildlife. Vegetation is restricted to scattered non-native trees in landscaping, and invasive species. These features could provide some habitat for species adapted to disturbed and developed conditions (e.g., house sparrows, American robins, European starlings, American crows). Dominant species within commercial areas within the study area are non-native trees and shrubs, including horticultural species and invasive species, such as Himalayan blackberry.

This cover type has a relatively low value for wildlife. If disturbed during construction, there would be minimal effects on existing vegetation or wildlife habitat. The minimal habitat present could be easily replaced following construction. The built portions of the proposed project would have similar vegetation condition and habitat value compared to current conditions.

3.2.1.2 Residential

The residential cover type represents developed areas with houses, driveways, yards, and associated landscaping. Vegetation incudes mown lawns, horticultural species, and native species in some areas. Regular disturbances from humans and domestic animals limit habitat value for some wildlife species. However, the higher cover and diversity of vegetation provides some habitat value, compared to fully developed and built commercial areas. Relative habitat value is low.

If disturbed during construction, there would be effects on existing vegetation and wildlife habitat. The habitat present could be replaced following construction as landscaped elements of OMF South. However, the configuration of the habitat and overall cover may change compared to current conditions, based on the design.

3.2.1.3 Grassland

The grassland cover type represents areas dominated by upland grasses and other herbaceous species. They are maintained in the study area through mowing and brush control. The largest patch of this habitat occurs at the Midway Landfill. Large patches of grassland are relatively rare in the vicinity of the study area and restricted to large landholdings. Wildlife species associated with grassland habitats in the study area include Savannah sparrows, barn swallows, swallowtail butterflies, meadow voles, and Townsend's moles. Red-tailed hawks and other raptors prey on voles and other small mammals that are found in abundance in grassy habitats. Relative habitat value is moderate.

If disturbed during construction, the habitat present could be easily replaced following construction, as the establishment of grasses could occur within weeks following construction.

Dominant species within the Midway Landfill study area were bentgrass, bluegrass, fescues, Bermuda grass, and other non-native grass and herbaceous species. Dominant species within the study area surrounding the South 336th Street and South 344th Street alternatives are fescues, velvetgrass, and bluegrass.

3.2.1.4 Invasive Brush

The invasive brush land cover type represents areas dominated by non-native brush species such as Himalayan blackberry, Scotch broom, and butterfly bush. Although non-native, this

habitat does provide nesting, foraging, and refuge habitat for several species of birds and small mammals.

If disturbed during construction, the habitat present could be easily replaced and restored following construction. Temporarily disturbed areas would be restored with native plants suitable to the site, and/or horticultural species in landscaped areas. Reestablishment of native and non-native brush species is expected to be rapid (within a year). Relative habitat value is low.

3.2.1.5 Native Brush

The native brush cover type represents areas dominated by native species that include shrub species and/or sapling-sized tree species. Typical species observed in the study area include Nootka rose, sweet gale, salmonberry, black cottonwood, and red alder. This habitat provides nesting, foraging, and refuge habitat for birds and small mammals, as well as native species resources for the wildlife food web, including pollinators. Overall habitat value is moderate; it provides good habitat for native species and is able to reestablish quickly following disturbances.

3.2.1.6 Non-Native Forest

Forests composed primarily of non-native species occur in the study area. Although most of these non-native forests represent plantings of horticultural species as part of residential or commercial development, some areas have been colonized by non-native species. The planted areas are dominated by Austrian pine, Norway maple, and Lombardy poplar. Areas colonized by non-native trees are dominated by honey locust, European mountain ash, and bird cherry.

These forests, though non-native, do provide some habitat value for local wildlife, as well as stormwater moderation and other ecosystem functions. If removed as part of this project, these functions would be temporarily lost, and the recovery of these functions would take years to decades (time for the trees to mature). Given the vigorous nature of these species, however, it would not be difficult to reestablish these plant communities given time. Relative habitat value is moderate.

3.2.1.7 Mature Native Forest

Some of the forested areas in the study area meet WDFW's criteria for the Mature Forest priority habitat type. These stands are generally over 80 years old, with trees exceeding 21 inches in diameter at breast height, on average (WDFW 2008). These forests are dominated by Douglas-fir, western redcedar, western hemlock, and black cottonwood. The understory in many areas is dominated by native shrubs and groundcovers, although English ivy, Himalayan blackberry, and other weeds have encroached on some areas.

Compared to other cover types, structurally complex habitats, such as native forested areas and wetlands, have more biological diversity and higher value as wildlife habitat. With habitat features such as large trees, snags, decaying logs, and a diverse understory, areas classified as Mature Native Forest typically support diverse communities of forest-associated wildlife. Because of the long time period (decades to centuries) needed to reestablish native forested conditions, disturbance or removal of this habitat type would have a substantial effect on habitat throughout the time period needed to reestablish the forests.

3.2.1.8 Other Native Forest

The other native forest land cover type represents forests dominated by native tree species but lacking the defining features of mature forest (see Section 3.2.1.7, Mature Native Forest, above). Several types of native forests (coniferous, deciduous, and mixed) were observed in the study area. Relative habitat value is high.

Coniferous forests in the study area are dominated primarily by Douglas-fir and western redcedar, with occasional occurrences of Sitka spruce and shore pine. Deciduous forests are dominated by black cottonwood and red alder, with some occurrence of bigleaf maple, bitter cherry, and the broad-leaved evergreen tree, Pacific madrone. Mixed forests are dominated by a combination of the species described above. Forests with native understory commonly contain sword fern, salal, osoberry, beaked hazelnut, and red elderberry. Forests with an invasive understory typically contain Himalayan blackberry, cut-leaf blackberry, butterfly bush, and English ivy.

Dominant species within the Midway Landfill Alternative study area are bigleaf maple, red alder, black cottonwood, and madrone. Dominant species within the study area surrounding the South 336th Street and South 344th Street alternatives are Douglas-fir, western redcedar, western hemlock, and black cottonwood.

All native forest areas provide high habitat value for native wildlife, based on the diversity and structural complexity provided by overstory trees and understory shrubs. Many areas classified as other native forest are several decades old and would require several decades to recover following disturbance. For these reasons, the other native forest cover type is considered to have a high habitat value.

3.2.1.9 Wetland/Stream

The wetland/stream land cover type represents areas with high water tables, including stream channels, wetlands, and frequently flooded areas. In the study area, streams and wetlands are interwoven into complexes of vegetated wetlands, scoured channels, and vegetated areas within the OHWL of streams. Areas classified as wetland/stream provide habitat functions similar to those described above for forests, brush areas, and grasslands (i.e., nesting, perching, hiding, and foraging habitats for many species), but with added habitat value due to the presence of water and unique habitats for water-dependent species, such as fish and amphibians. Relative habitat value is high. The existing conditions and habitat values of individual wetlands and streams are described previously in Sections 3.1, Aquatic Species and Habitat, and 3.2, Vegetation, Wildlife, and Wildlife Habitat. Habitat value is discussed by wetland.

Forested areas associated with wetlands and streams in the study area are dominated by Pacific willow, red alder, and black cottonwood, with an understory of Douglas' spiraea, salmonberry, Himalayan blackberry, slough sedge, and reed canarygrass. Similar to the forests described in the section above, the removal or disturbance of forested areas associated with wetlands would take years to decades to recover temporarily lost habitat functions.

Scrub-shrub areas associated with wetlands and streams in the study area are dominated by Scouler's willow, salmonberry, Himalayan blackberry, red-twig dogwood, and Douglas' spiraea. Reestablishment of scrub-shrub vegetation can be rapid after disturbances (within a few years), but often slower than emergent systems (within a year).

Emergent areas associated with wetlands and streams in the study area are dominated by reed canarygrass, bulrushes, beggar ticks, and smartweeds. Reestablishment of emergent vegetation can be rapid after disturbances.

3.2.1.10 Stormwater Pond

The stormwater ponds support native and non-native wetland species adapted to fluctuating water tables and disturbances related to maintenance. Common species in the stormwater ponds are reed canarygrass, cattails, bulrushes, and willows. Areas of open water in stormwater ponds provide resting and foraging areas for birds such as waterfowl and great blue herons. Due to extreme water level fluctuations and regular disturbance for maintenance, the relative habitat value of this cover type is low. Stormwater ponds that are designed to rapidly fill with water, and hold water only for a short period following precipitation events (as a way of maximizing groundwater recharge or minimizing mosquito populations) can attract amphibians and other aquatic species and then compromise embryonic and larval survival when the pond dries or water elevation rapidly increases. Regular maintenance, including removal of vegetation and accumulated sediments, further reduces habitat value by altering habitat structure, soils, and in-water conditions.

3.2.1.11 Priority Habitats

In addition to the priority areas mapped by WDFW (see Section 3.2.3, Species and Habitats of Concern), some portions of the study area meet the criteria established by WDFW for Priority Habitats. The streams in the study area and the vegetated areas along the streams are Riparian priority habitats. Approximately 13 acres of the forested habitat in the study area meet the criteria for Mature Forest priority areas. Streams are shown in Figures G3.3-1, G3.3-2, and G3.3-3. Areas of Mature Forest are shown in Figures G3.3-4 and G3.3-5.

3.2.2 Terrestrial Wildlife

Wildlife use of habitats in urban landscapes depends on the general location of the habitat, the size and type of undisturbed habitats, the degree of connectivity and extent of travel corridors between and among these habitats, and the types and levels of human activity. Much of the study area falls within commercial, industrial, institutional, and residential areas that provide habitat only for adaptable species, such as house sparrows, European starlings, rats, mice, raccoons, Virginia opossums, and eastern gray squirrels. Birds, such as rock pigeons and cliff swallows, commonly build nests on bridges and road overpasses, and many bat species use such structures as temporary roosting sites. Animals that use habitats in the study area are also exposed to high levels of disturbance generated by human activity in commercial and industrial areas and by traffic on I-5 and major arterial roadways.

Larger habitat patches and those connected to other natural areas or heavily vegetated residential neighborhoods support a larger variety of species, such as songbirds, raptors, small mammals, coyotes, and black-tailed deer. Songbird species commonly found in habitats similar to those in the study area include American robin, song sparrow, Steller’s jay, American crow, spotted towhee, black-capped chickadee, white-crowned sparrow, northern flicker, Bewick’s wren, and red-breasted nuthatch. Raptors include American kestrel, sharp-shinned hawk, Cooper’s hawk, red-tailed hawk, and great horned owl. Red-tailed hawks and other raptors prey on voles and other small mammals that are found in abundance in the grassy vegetation at Midway Landfill and in the I-5 right-of-way. A northern harrier was observed near the stormwater detention pond at the Midway Landfill site in October 2019. Open-water habitats, such as wetlands and stormwater detention ponds, provide resting and foraging areas for waterfowl.

Structurally complex habitats, such as forested areas and wetlands, generally have comparatively high levels of biological diversity and value as wildlife habitat. With habitat features such as large trees, snags, decaying logs, and a diverse understory, areas classified as mature native forest typically support diverse communities of forest-associated wildlife.

Most patches of forest cover in the study area are fragmented and separated from surrounding habitat areas by commercial and residential developments and roads. Despite their isolation, these areas still provide habitat for forest-associated resident and migratory songbirds, as well as for hawks, owls, woodpeckers, and small mammals. The largest patch of forested habitat in the study area, approximately 10 acres, is adjacent to I-5, along the eastern boundary of the South 336th Street and South 344th Street alternatives. As indicated by the detection of an ensatina (a terrestrial salamander whose eggs develop directly into adults without an aquatic larval stage, a reproductive strategy that depends on cool and humid conditions) during a site visit in October 2019, this patch supports many ecosystem functions, despite its isolation from other, less-disturbed areas of forest habitat.

Streams and riparian areas are used as travel corridors by many wildlife species. Despite the widespread urbanization of the study area, riparian areas along streams may serve as a connective corridor between pockets of wildlife habitat. In general, however, patches of forest and other native habitat types in the study area are isolated from other areas of similar habitat and do not serve as connective corridors to other areas of habitat outside of the study area. I-5 impedes the movement of wildlife between the Green River valley in the east and the Puget Sound shoreline to the west.

3.2.3 Species and Habitats of Concern

The Natural Heritage Program database does not include any records of extant rare plant populations or high-quality ecosystems in the study area (WDNR 2019). The only such record within 5 miles of the project alternatives is a population of Canadian St. John's-wort, a state sensitive species. It is mapped east of I-5 and approximately 0.6 mile southeast of the South 344th Street Alternative. The only high-quality ecosystems identified within 5 miles of the project alternatives are a bog identified by WSDOT east of I-5 and just north of S 320th Street and a forested bog in West Hylebos Wetlands Park, approximately 0.5 mile southwest of the South 344th Street Alternative. No rare plant species or high-quality ecosystems (as defined by the Natural Heritage Program) were observed in the study area during field surveys.

WDFW (2019a) does not identify any occurrences of priority wildlife species within 0.25 mile of any of the project alternatives. The only mapped priority habitats within or near the study area are wetland areas (WDFW 2019a). Wetlands are discussed in Section 3.3. Riparian areas, another WDFW priority habitat type, occur adjacent to surface-flowing streams in the study area but are not mapped by WDFW. The condition of riparian habitats in the study area is described in Section 3.1.1, Streams in the Study Area. Mature forest, meeting the definition of state priority habitat, was also identified in the field as shown on Figures G3.3-4 and G3.3-5.

Based on field observations, literature review, and sightings databases (e.g., eBird 2019, Opperman et al. 2006, Seattle Audubon Society 2019, WDFW 2019a), biologists identified wildlife species of concern that may use habitats in the study area (i.e., non-marine habitats in lowland urban and residential settings, excluding unique habitats that are not found in the study area, such as old-growth forest or sphagnum bogs). Table G3.3-7 lists these species and summarizes each species' known or expected use of habitats in the study area. No wildlife species of concern were observed in the study area during field surveys conducted for this project.

No wildlife species that are listed or proposed for listing under the ESA are known or expected to use habitats in the study area. For this reason, based on the definition of species of concern in Section 2.2.2, Methods, of this document, the only species of concern identified in Table G3.3-7 are state priority species (including one state-listed sensitive species, the common loon). Table G3.3-7 also lists the priority areas that have been identified by WDFW for each of these species. In many cases, WDFW considers species to be a priority only within known limiting habitats (e.g., breeding areas) or within areas that support a relatively high number of individuals (e.g., regular concentrations). For example, great blue herons are often found feeding along shorelines, but they are considered a priority only in breeding areas (WDFW 2008).

Table G3.3-7 Wildlife Species of Concern Potentially Occurring within the Study Area

Species[1]	Priority area(s)	Known or Expected Habitat Use in the Study Area
Amphibians		
Western toad	Any occurrence	No recent records near the study area. May breed in permanent wetlands, ponds, lakes, and off-channel habitats or rivers; adults may move through uplands for several miles.
Birds		
Band-tailed pigeon	Regular concentrations, occupied mineral sites	Observed in suitable habitat near the study area year-round, but no regular concentrations or mineral springs have been recorded. May nest in trees, commonly in tall conifers near open sites.
Barrow's goldeneye	Breeding areas	No known observations in the study area. Occasionally seen on larger waterbodies nearby (e.g., Lake Killarney), primarily during winter. Not expected to breed in or near the study area.
Brant	Regular concentrations in foraging and resting areas, migratory stopovers	No known observations in the study area. The study area is not expected to provide migratory stopover sites or foraging or resting areas.
Common goldeneye	Breeding areas	No known observations in the study area. Occasionally seen on larger waterbodies nearby, primarily during winter. Not expected to breed in or near the study area.
Common loon	Breeding sites, migratory stopovers, regular concentrations	No known observations in the study area. No suitable breeding sites (large lakes with low disturbance levels) in or near the study area. The study area is not expected to provide migratory stopover sites.
Great blue heron	Breeding areas	Observed in suitable habitats near the study area year-round. Nests in mature forests, forages in shallow, slow-moving, or still water. No known breeding sites within 1 mile of any site alternatives.
Hooded merganser	Breeding areas	Observed in suitable habitats near the study area year-round. May nest in tree cavities near small, forested, freshwater wetlands with emergent vegetation.
Oregon vesper sparrow	Any occurrence	Associated with open habitats. Breeding population in Washington largely limited to remnant prairies and grasslands in Pierce, Thurston, and Skagit counties. Rarely observed in southwestern King County during migration periods.
Pileated woodpecker	Breeding areas	Occasionally seen, year-round; breeding possible. Requires forested habitats with large trees and snags. No evidence of presence in forested area near South 336th Street Alternative site.
Trumpeter swan	Regular concentrations	No known observations in the study area. Occasionally seen on larger waterbodies nearby, primarily during winter. The study area is not expected to support concentrations.
Tundra swan	Regular concentrations	No known observations in the study area. Occasionally seen on larger waterbodies nearby, primarily during winter. The study area is not expected to support concentrations.

Table G3.3-7 Wildlife Species of Concern in the Study Area (continued)

Species[1]	Priority area(s)	Known or Expected Habitat Use in the Study Area
Vaux's swift	Breeding areas, communal roosts	Observed in suitable habitat near the study area, primarily during the breeding season. Nests and roosts in natural cavities with vertical entranceways, such as hollow trees and snags, in areas of coniferous or mixed forest.
Western grebe	Breeding areas, regular concentrations, migratory stopovers, regular occurrences in winter	Occasionally seen near open water, generally outside of the breeding season. Not expected to breed in or near the study area. The study area is not expected to provide migratory stopover sites or support concentrations.
Wood duck	Breeding areas	Observed in suitable habitats near the study area year-round. May nest in tree cavities near wooded wetlands.
Mammals		
Big brown bat, *Myotis* bats	Regular concentrations in naturally occurring breeding areas and other communal roosts	No known maternity or hibernation colonies or other concentrations in or near the study area. Summer roosts generally are in buildings, bridges, hollow trees, spaces behind exfoliating bark, rock crevices, or tunnels. Maternity colonies may form in attics, barns, rock crevices, or tree cavities. Caves, mines, and buildings are used for hibernation.
Townsend's big-eared bat	Any occurrence	No known maternity or hibernation colonies or other concentrations in or near the study area. Maternity and hibernation colonies typically are in caves, mine tunnels, and old buildings. Caves, tunnels, buildings, and tree cavities are used as night roosts.

Sources: eBird 2019; Opperman et al. 2006; Seattle Audubon Society 2019; WDFW 2008, 2019a, 2019c.

Note:

(1) All species in this table are State priority species; the common loon is a state sensitive species as well. No wildlife species listed or proposed for listing under the ESA are known or expected to use habitats in the study area.

Forested areas in the study area could provide suitable habitat for the following priority species: band-tailed pigeon, pileated woodpecker, Vaux's swift, big brown bat, *Myotis* bats, and Townsend's big-eared bat. Hooded mergansers and wood ducks may nest in forested wetlands. Open, grassy habitats at Midway Landfill may provide suitable habitat for migrating Oregon vesper sparrows.

The USFWS Information for Planning and Consultation planning tool identified three ESA-listed wildlife species, and two species proposed for listing, as potentially occurring in areas that might be affected by the project. None of these five species is expected to occur in the study area, however, for the following reasons:

- Marbled murrelets, listed as threatened, require old-growth forest for nesting and marine habitat for foraging. No breeding or foraging habitat is present in the study area and no observations have been documented within 10 miles (WDFW 2019a). The nearest location where critical habitat has been designated for the marbled murrelet is more than 25 miles from the study area.
- Yellow-billed cuckoos, listed as threatened, require large blocks of riparian forest habitat for breeding and foraging. Yellow-billed cuckoos nest almost exclusively in low- to mid-elevation riparian woodlands that cover 50 acres or more (Hughes 1999). No such habitat is present in or near the study area. Currently, the species no longer breeds in western Canada or the northwestern continental United States (Washington, Oregon, and Montana) (79 FR 59992, October 3, 2014). No observations of this species have been documented within 10 miles of the study area (WDFW 2019a). No critical habitat for the yellow-billed cuckoo has been proposed in Washington.

- Streaked horned larks, listed as threatened, are known to occur in Washington only in portions of southern Puget Sound, along the Washington coast, and at lower Columbia River islands (78 FR 61452, October 3, 2013). Breeding habitat for streaked horned larks in Washington consists of grasslands and sparsely vegetated areas at airports, sandy islands, and coastal spits. The subspecies is largely absent from the Puget Trough during the non-breeding season; individuals observed in this area outside of the breeding season have been seen using habitats similar to those used for breeding. The only potential suitable habitat for streaked horned larks in the study area is at the Midway Landfill site, which includes about 60 acres of grassy land cover. The likelihood that streaked horned larks use the Midway Landfill site is minimal, however, due to the site's size, distance from occupied sites, and scarcity of bare-ground habitat. Sites used by larks typically encompass hundreds of acres, but larks may use smaller sites that are located relatively close to occupied sites and/or along rivers (Anderson and Pearson 2015). The smallest site with evidence of streaked horned lark use in the Puget Trough region is 90 acres (Anderson and Pearson 2015). While the approximately 60-acre Midway Landfill site is substantially smaller than 90 acres, the adjacent I-5 corridor may create a visual impression similar to that of a river, potentially increasing the site's size, as perceived by larks. However, the nearest occupied site is more than 15 miles away (WDFW 2019a). In addition, the Midway Landfill site is dominated by densely growing sod-forming grasses (although a few scattered patches of bare ground are present along access roads). Streaked horned larks typically select habitat patches with low, sparse vegetation and a relatively high percent cover of bare ground, avoiding areas dominated by shrubs or sod-forming grasses (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, and their presence in the action area is unlikely (Sound Transit 2016a). The nearest designated critical habitat for the streaked horned lark is more than 100 miles from the study area.
- Gray wolves, proposed for listing as endangered, require habitats with high prey densities and low levels of human disturbance. No such habitat is present in the lowland, urban setting of the project area. Critical habitat for the gray wolf has not been proposed for designation in Washington State.
- North American wolverines, proposed for listing as threatened, avoid people and developed areas and prefer cold and remote mountainous areas with persistent spring snow cover. No such habitat is present in the lowland, urban setting of the study area.

The Migratory Bird Treaty Act of 1918, administered by USFWS, makes it unlawful to take any migratory bird, or the parts, nests, or eggs of any such bird, except under the terms of a valid permit. In the context of this Act, 'take' is defined as, "pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill" (16 U.S. Code § 715n). Nearly all bird species that may occur in the study area are protected under the Migratory Bird Treaty Act. Birds or bird nests protected under the Act may be present in any of the cover types described in Section 3.2.1, Vegetation. Forested areas, wetlands, and other areas with comparatively complex cover types are likely to support greater densities and more diverse assemblages of nesting birds.

3.3 Wetlands

A total of 21 wetlands were identified in the OMF South study area, which are listed in Table G3.3-8 and are described further in Section 3.3.1, Wetland Descriptions. The wetland descriptions are organized consecutively, as wetlands were identified based on rights of entry and not geographically. Wetlands near the Midway Landfill Alternative site are described first, followed by those near the proposed mainline, and then by those near the South 336th Street and South 344th Street alternatives.

Of the 21 wetlands identified, 20 were fully or partially accessed during field reconnaissance and delineation surveys to assess wetland hydrology, soils, and vegetation. Of the 20 wetlands accessed in the field, 10 were formally delineated and professionally surveyed in their entirety, 3 were partially delineated due to limited access to all parcels, and 7 were characterized but not formally delineated and surveyed; the boundaries of several of the wetlands that were not formally surveyed were estimated using a handheld global positioning system device. The one wetland that was not accessed for this study was delineated for the WSDOT SR 509 Project.

Wetland determination forms and rating forms for the wetlands accessed during the field surveys are provided in Attachments G.3-4 and G.3-5, respectively. Photographs of wetlands accessed during the field surveys and from public rights-of-way are included in Attachment G.3-6. Wetland boundaries are shown on Figures G3.3-1 through G3.3-3.

Table G3.3-8 Wetlands in the Study Area

Wetland Name	HGM Classification[1]	USFWS Classification[2]	Approximate Wetland Acreage in Study Area (Acres)	Wetland Rating (Ecology)[3]	Wetland Rating Habitat Points[4]	Jurisdiction	Wetland Buffer Width (Feet)[3,5]	Accessed During Field Surveys
WL148.67L	Depressional	PEM, PSS, PFO	0.03	III	4	Kent	75	No
WFW-01	Depressional, Riverine	PFO	1.48	II	6	Federal Way	150	Yes
WFW-02	Depressional	PFO	4.15	II	4	Federal Way	100	Yes
WFW-03	Riverine	PFO	0.32	II	5	Federal Way	100	Yes
WFW-04	Depressional	PFO	0.52	III	4	Federal Way	80	Yes
WFW-05	Riverine	PFO	0.14	II	6	Federal Way	150	Yes
WFW-06	Slope	PSS	0.02	III	5	Federal Way	80	Yes
WFW-07	Riverine	PEM, PSS	0.26	III	4	Federal Way	80	Yes
WFW-08	Depressional	PEM, PSS	0.12	IV	4	Federal Way	50	Yes
WFW-09	Riverine	PSS	0.10	III	4	Federal Way	80	Yes
WFW-10	Riverine	PFO	1.04	III	5	Federal Way	80	Yes
WFW-11	Depressional	PEM, PFO	0.49	III	5	Federal Way	80	Yes
WFW-12	Riverine	PEM, PSS, PFO	0.66	III	5	Federal Way	80	Yes
WFW-13	Slope	PSS	0.04	IV	3	Federal Way	50	Yes
WFW-14	Depressional	PEM	0.02	IV	4	Federal Way	50	Yes
WFW-15	Riverine	PSS, PFO	0.27	III	5	Federal Way	80	Yes
WFW-16	Depressional	PEM, PSS	0.40	III	3	Federal Way	80	Yes
WFW-17	Depressional	PFO	0.02	III	5	Federal Way	80	Yes
WFW-18	Depressional	PSS	<0.01	III	6	Federal Way	150	Yes
WFW-21	Riverine	PSS	0.31	III	6	Federal Way	150	Yes
WFW-22	Depressional	PSS	0.04	IV	3	Federal Way	50	Yes

Notes:

(1) Hydrogeomorphic classification (Brinson 1993)

(2) PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub, PAB = palustrine aquatic bed (Cowardin et al. 1979, FGDC 2013)

(3) Wetland ratings categorize wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the functions they provide (Hruby 2014). Category I wetlands have a very high level of function; Category IV wetlands have a low level of function. Ratings and associated regulatory buffer widths are preliminary and subject to change.

(4) Habitat points represent the score that is generated from the habitat analysis section of the wetland rating (Hruby 2014). Often habitat points are used to determine wetland buffer widths for local jurisdictions.

(5) Kent City Code 11.06.600.B; Federal Way Revised Code 19.145.420, Table 1

3.3.1 Wetland Descriptions

3.3.1.1 Midway Landfill Alternative

Midway Landfill Alternative is located in Kent, primarily on the Midway Landfill site owned by Seattle Public Utilities. The site has been subject to extensive past human disturbances. The site was originally a hillslope, which was then mined as a gravel pit from 1945 to 1968. Following use as a gravel pit, the site was used as a landfill from 1966 to 1983. After methane gas was discovered in the surrounding residential area in 1984, the site was placed on the U.S. Environmental Protection Agency (EPA) Superfund National Priorities List (Opalski 2010). In response, the site was capped with a multi-layered landfill cover system, including a low-permeability silt/silty clay, a 50-mil synthetic membrane, a geonet drainage layer, 1 foot of sand, and 1 foot of topsoil planted with shallow-rooted grasses (EPA 2000). A surface water management system was completed, which consisted of site filling and grading to control surface water drainage and prevent surface water from infiltrating into the landfill. These systems were designed to greatly reduce the amount of rain that would seep into the landfill. The landfill site continues to be actively managed and monitored since initial cleanup efforts were completed in 1991. The sand layer is regularly regraded to eliminate standing water. Vegetation on the landfill is regularly mowed throughout the growing season and consists entirely of grasses and herbaceous vegetation.

This site was investigated for wetlands, and five areas that met the three parameters for wetlands were identified. Following consultation with the Corps, these areas were determined not to meet the federal criteria for jurisdictional wetlands, given that they are located on fill and the site has not been abandoned (Tong 2019 personal communication). In addition, Washington State Department of Ecology has verified that these areas are non-jurisdictional under state definitions (Gresham 2020 personal communication). As such, these areas located within the bounds of the former Midway Landfill are not mapped or discussed further in this technical report. One additional wetland at the Midway Landfill Alternative – Wetland 148.67L – is located in the WSDOT right-of-way of I-5. This wetland was not accessed during field reconnaissance surveys but was delineated as part of the WSDOT SR 509 Project.

Wetland WL148.67L

Wetland WL148.67L is a small, depressional wetland located in the WSDOT right-of-way of southbound I-5. It was delineated in April 2019 by Anchor QEA as a component of the SR 509 Completion Stage 1B Project (Anchor 2019). Dominant vegetation in forested areas includes black cottonwood; shrub areas are dominated by salmonberry, hardhack, and willow. Slough sedge and violet are present in emergent areas. Hydrology in the wetland is from surface runoff, including stormwater runoff from I-5. Soils in the wetland are primarily silt loam and meet hydric soil indicator F6, redox dark surface. Wetland WL148.67L is a closed depression and scored high for water quality and moderate for water quality functions. Given the proximity to I-5 and lack of connections to other habitats, Wetland WL148.67L scored low for habitat functions. Overall, Wetland WL148.67L received a Category III rating and a habitat score of 4. The regulated critical area buffer is 75 feet wide.

3.3.1.2 Mainline

Ten wetlands were identified within the mainline portion of the study area. Most are riverine wetlands associated with East Fork Hylebos Creek Tributary 0016A. Of these ten wetlands, five were completely delineated, three were partially delineated due to access limitations, and two

were characterized at a reconnaissance level. The mainline passes through Belmor and then continues south adjacent to I-5. Substantial residential development of the area appears to have started in the 1960s.

Wetland WFW-07

Wetland WFW-07 is a small riverine wetland located in the northeast section of Belmor adjacent to golf course greens. Within the Belmor golf course, East Fork Hylebos Creek Tributary 0016A has been channelized, and a build-up of sediment has resulted in several wetland benches that are below the OHWL.

The palustrine scrub-shrub and emergent wetland is dominated by Himalayan blackberry, hardhack, Sitka willow, reed canarygrass, and giant horsetail. Hydric soils met two indicators: depleted matrix (F3) and depleted below dark surface (A11).

Wetland WFW-07 scored moderate for water quality because it contains some trees, shrubs, and herbaceous plants that improve water quality by filtering pollutants, and because it is located within an urban growth area (UGA) and within a golf course that produces pollutants for the wetland to filter. The hydrologic function score was low due to only some plants slowing water velocities and the potential to reduce flooding is provided by its location in a UGA, which contributes to higher stream flows. The wetland scored low on habitat due to its lack of habitat complexity and lack of connections to other habitats. Overall, Wetland WFW-07 received a Category III rating and a habitat score of 4. The regulated critical area buffer is 80 feet wide.

Wetland WFW-08

Wetland WFW-08 is a small, depressional wetland located in the northeast section of Belmor adjacent to golf course greens. Wetland WFW-08 is south (downstream) of Wetland WFW-07, separated by a 48-inch concrete culvert. Wetland WFW-08 consists of several bench wetlands located below the OHWL, in which the primary source of hydrology is provided by East Fork Hylebos Creek Tributary 0016A. The stream has been channelized in this section.

The palustrine scrub-shrub and emergent wetland is dominated by Himalayan blackberry, Sitka willow, cattail, reed canarygrass, and slough sedge. Soils were dark and underlain by a restrictive layer composed of quarry spalls. Hydric soils in the scrub-shrub and emergent vegetation classes were dark, but indicators were problematic, likely due to widespread land surface modifications and site development. However, the presence of strongly hydrophytic plants, the primary indicators of wetland hydrology, and the wetland's landscape position within the active floodplain support the assumption that the soils were hydric and therefore the presence of wetland conditions.

Wetland WFW-08 scored low for water quality functions because the wetland's ability to retain water and to filter pollutants is limited. The wetland scored moderate for hydrologic functions due its moderate ability to retain water, attenuate water velocities, as well as having a moderate water input from the immediate surrounding area and contributing basin. The wetland scored low on habitat due to its lack of habitat complexity and lack of connections to other habitats. Overall, Wetland WFW-08 received a Category IV rating and a habitat score of 4. The regulated critical area buffer is 50 feet wide.

Wetland WFW-09

Wetland WFW-09 is a small riverine wetland located in the southeastern section of Belmor. Wetland WFW-09 is south (downstream) of Wetland WFW-08, separated by twin 18-inch

culverts. Wetland WFW-09 consists of several bench wetlands located below the OHWL, in which the primary source of hydrology is provided by East Fork Hylebos Creek Tributary 0016A, which has been channelized in this section.

The palustrine scrub-shrub wetland is dominated by Himalayan blackberry, hardhack, and Sitka willow. Hydric soils were dark and/or had a depleted matrix in lower layers and met the hydric soil indicators depleted matrix (F3) and depleted below dark surface (A11) within the scrub-shrub vegetation class.

Wetland WFW-09 scored moderate for water quality because trees and shrubs filter out pollutants, and because it is located within a UGA and within a golf course that produces pollutants for the wetland to filter. The hydrologic function scored moderate because trees and shrub slow water velocities and because the potential to reduce flooding is provided by its location in a UGA, which contributes to higher stream flows. The wetland scored low on habitat due to its lack of habitat complexity and lack of connections to other habitats. Overall, Wetland WFW-09 received a Category III rating and a habitat score of 4. The regulated critical area buffer is 80 feet wide.

Wetland WFW-10

Wetland WFW-10 is a riverine wetland with three wetland units (a, b, and c) located between S 330th Street and S 330rd Street on multiple parcels. Wetland WFW-10 is south (downstream) of Wetlands WFW-12 and WFW-09 and is separated from other wetlands by twin 18-inch culverts. The primary source of hydrology was provided by East Fork Hylebos Creek Tributary 0016A and a high groundwater table.

The palustrine forested wetland is dominated by western redcedar, black cottonwood, red alder, Oregon ash with Himalayan blackberry, salmonberry, lady fern, slough sedge, and Kentucky bluegrass in the understory. Hydric soils were dark and/or had a depleted matrix in lower layers. Within Unit A, hydric soils met the hydric soil indicators hydrogen sulfide (A4) and thick dark surface (A12). Hydric soils in Unit B met the hydric soil indicator redox dark surface (F6). Within Unit C, hydric soils met the indicator depleted below dark surface (A11).

The three units are rated together because of their similarity and association with East Fork Hylebos Creek Tributary 0016A. These riverine wetlands lack hydrologic constrictions or vegetation breaking larger than 50 feet that would divide them into separate rating units. Wetland WFW-10 scored moderate for water quality functions because its high density of trees and shrubs filter out pollutants, and it is located within a UGA and a dense residential area that contribute pollutants. It scored moderate for hydrologic functions as tree and shrub cover slow down water velocities, and because its potential to reduce flooding is provided by its location in a UGA, which contributes to higher stream flows. The wetland received a low score for habitat functions because it generally lacks habitat complexity and connectivity to other habitats. Overall, Wetland WFW-10 received a Category III rating and a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-11

Wetland WFW-11 is a depressional wetland located between 24th Avenue S and I-5 in Federal Way both on private land and in the WSDOT I-5 right-of-way. Wetland hydrology was supported by a high groundwater table and precipitation.

The wetland is dominated by black cottonwood, red alder, Oregon ash, Sitka willow, hardhack, and Himalayan blackberry in the forested class, and reed canarygrass in the emergent

vegetation class. Hydric soils were depleted below a dark upper layer and met the indicators depleted matrix (F3) and depleted below dark surface (A11) within the forested vegetation class and the indicators redox dark surface (F6) in the emergent vegetation class.

Wetland WFW-11 scored moderate for water quality functions because its outlet flows intermittently providing moderate retention time for filtration. Persistent plants that filter pollutants cover most of the wetland, and surrounding land within the immediate vicinity and within the watershed provide some pollution input that may be filtered by the wetland. Hydrologic functions to reduce flooding within the watershed also scored as moderate due to some water storage capacity, moderate surface water inputs, and flooding problems lower in the watershed. The wetland scored low for habitat functions due to moderate habitat complexity within the wetland and lack of connections to other habitats. Overall, Wetland WFW-11 received a Category III rating and a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-12

Wetland WFW-12 is a small riverine wetland located at the south end of Belmor and extending into two adjacent parcels. The primary sources of hydrology are flooding from East Fork Hylebos Creek Tributary 0016A and a high groundwater table. Wetland WFW-12 is south (downstream) of Wetland WFW-09, separated by a 41-inch pre-cast concrete culvert. Wetland WFW-12 consists of several bench wetlands located below the OHWL.

The palustrine emergent, scrub-shrub, and forested wetland is dominated by red alder, salmonberry, Himalayan blackberry, reed canarygrass, and creeping buttercup. Hydric soil observed in this wetland were largely depleted, but indicators were problematic, likely due to widespread land surface modifications and site development. However, the presence of hydrophytic plants and several primary indicators of wetland hydrology, combined with its landscape position within the active floodplain, support the assumption that hydric soils are present. The wetland boundary was determined by the extent of fill material and evidence of frequent inundation.

Wetland WFW-12 scored moderate for water quality because trees and shrub plants filter out pollutants, and because it is located within a UGA and within a residential area that produces pollutants for the wetland to filter. The hydrologic function score was moderate because trees and shrubs slow water velocities within the wetland, and because it has potential to reduce flooding through its location in a UGA that also has flooding problems downstream. The wetland scored low on habitat due to its combination of moderate habitat complexity and lack of connections to other habitats. Overall, Wetland WFW-12 received as a Category III rating and a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-13

Wetland WFW-13 is a small slope wetland located within a ditch in the WSDOT right-of-way east of I-5 and south of S 333rd Street. The ditch continues south where eventually it transitions to a riprap-lined ditch, then ends. Wetland WFW-13’s primary source of hydrology includes a high groundwater table and precipitation.

The palustrine scrub-shrub wetland has sparse vegetation, which is dominated by Himalayan blackberry and reed canarygrass. Hydric soils consisted of a depleted matrix overlain by dark soils, which had a restrictive layer of clay and gravel starting at 17 inches below ground level. Hydric soils met the indicators depleted matrix (F3) and depleted below dark surface (A11).

Wetland WFW-13 scored low for water quality because it lacks dense vegetation that can filter pollutants that it receives from highway runoff, and it does not contribute much value to reducing pollutants within the broader watershed. Its hydrologic function score was also low because it lacks the vegetation to slow water velocities. The wetland scored low for habitat functions because it does not have any habitat complexity and lacks connections to other habitats. Overall, Wetland WFW-13 received a Category IV rating and a habitat score of 3. The regulated critical area buffer is 50 feet wide.

Wetland WFW-14

Wetland WFW-14 is a depressional wetland located in a stormwater pond with wetland characteristics just north of S 336th Street. Its primary source of hydrology is precipitation and stormwater from the nearby apartment complex. Water from the stormwater pond flows south through a culvert and empties into East Fork Hylebos Creek Tributary 0016A at S 336th Street.

This palustrine emergent wetland is dominated by Kentucky bluegrass and creeping buttercup. Hydric soils included a depleted matrix (F3).

Wetland WFW-14 scored low for water quality functions due to the lack of persistent, ungrazed plants and low retention time for water in the wetland to filter pollutants. The wetland scored low for hydrologic functions due to the lack of ability to hold back water, even though water inputs are high in the developed contributing basin. Habitat functions are also low due to the lack of structural and habitat diversity and lack of connections to other habitats. Overall, Wetland WFW-14 received a Category IV rating and a habitat score of 4. The regulated critical area buffer is 50 feet wide.

According to King County assessor data and historic aerial imagery, the stormwater pond appears to have been created between 1998 and 1999 during construction of the associated apartment complex. It is unknown whether the stormwater pond was excavated from wetland or upland. Wetlands are not mapped at this site by NWI, Federal Way, or King County iMap, nor do historic aerial photos indicate the presence of a wetland. However, the stormwater pond's proximity to East Fork Hylebos Creek Tributary 0016A, historic topographic maps, and the abundance of nearby wetlands associated with the stream suggest the possibility that a wetland could have been present in this area historically.

Wetland WFW-15

Wetland WFW-15 is a riverine wetland associated with East Fork Hylebos Creek Tributary 0016A located north of S 336th Street. The palustrine scrub-shrub and forested wetland is dominated by salmonberry and red alder. Its primary source of hydrology includes overbank flooding from stream and a high groundwater table. The wetland boundaries and characteristics were assessed from the WSDOT and city road rights-of-way because site access was limited.

Wetland WFW-15 scored moderate for water quality because trees and shrub plants filter out pollutants, and because it is located within a UGA and within a residential area that produces pollutants for the wetland to filter. The hydrologic function score was moderate because trees and shrubs slow water velocities within the wetland, and because it has potential to reduce flooding through its location in a UGA that also has flooding problems downstream. The wetland scored low on habitat due to its combination of moderate habitat complexity and lack of connections to other habitats.

The estimated rating for Wetland WFW-15 is Category III, with a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-16

Wetland WFW-16 is a depressional wetland located at the north end of the Federal Way/S 320th Street park-and-ride. Its primary source of hydrology includes stormwater inputs, a high groundwater table, and precipitation. The palustrine emergent and scrub-shrub wetland is dominated by Himalayan blackberry, hardhack, reed canarygrass, cattail, and slough sedge. Hydric soils were depleted and met the indicators for depleted matrix (F3) and depleted below dark surface (A11).

Wetland WFW-16 scored moderate for water quality functions due to the presence of persistent, ungrazed plants and retention time for water in the wetland to filter pollutants. The wetland scored moderate for hydrologic functions due to the ability to retain water and large inputs from the developed contributing basin. Habitat functions are low due to the lack of structural and habitat diversity and lack of connections to other habitats. Overall, Wetland WFW-16 received a Category III rating and a habitat score of 3. The regulated critical area buffer is 80 feet wide.

3.3.1.3 South 336th Street and South 344th Street Alternatives

The South 336th Street and South 344th Street alternatives are both located in Federal Way. The site of the South 336th Street Alternative was largely undeveloped until 2004, when the Christian Faith Center was constructed. Portions of the South 344th Street Alternative site were developed as early as the 1960s, with substantial development occurring in the 1980s and 1990s. Both site alternatives are now occupied primarily by institutional and commercial development. An undeveloped corridor, approximately 100 to 300 feet wide, exists adjacent to I-5 where East Hylebos Creek Tributary 0016A flows south along the eastern boundary of both sites partially on private property and partially within the WSDOT right-of-way. West Fork Hylebos Creek Tributary 0014C flows through Wetland WFW-02 along the northwest corner of the South 336th Street Alternative.

All ten of the wetlands identified within the study area that encompasses the two site alternatives were accessed during field surveys. Five of these (WFW-01, WFW-03, WFW-04, WFW-05, WFW-06) were fully delineated and professionally surveyed, and five (WFW-02, WFW-17, WFW-18, WFW-21, and WFW-22) were characterized during field reconnaissance surveys. The boundaries of the latter five wetlands were estimated with a handheld global positioning system device. Most of these ten wetlands are associated with one of the streams identified above. Dominant vegetation communities are primarily forested or scrub-shrub. Six of the wetlands are rated as depressional (WFW-01, WFW-02, WFW-04, WFW-17, WFW-18, and WFW-22), three as riverine (WFW-03, WFW-05 and WFW-21), and one as a slope wetland (WFW-06).

Wetland WFW-01

Wetland WFW-01 is located west of I-5 and south of S 336th Street, along the eastern boundary of the Christian Faith Center property. The wetland is associated with a reach of East Fork Hylebos Creek Tributary 0016A and includes both riverine and depressional elements.

This wetland primarily consists of deciduous forest communities dominated by Oregon ash, red alder, and black cottonwood. Salmonberry, red-twig dogwood, and vine maple are common understory plants. Slough sedge is common in wetter portions of the wetland, including areas that appear seasonally ponded. Reed canarygrass and Himalayan blackberry are present throughout the wetland. Primary hydrology for the wetland is overbank flooding from East Fork Hylebos Creek Tributary 0016A, as well as high groundwater and stormwater runoff from nearby

impervious surfaces. Soils in Wetland WFW-01 are silt loams that meet hydric soil indicators redox dark surface (F6) and thick dark surface (A12).

Wetland WFW-01 provides moderate water quality functions because it is a forested, well-vegetated, seasonally ponded wetland with an intermittently flowing outlet, and it also receives stormwater discharges. The wetland provides moderate water quality functions due to an intermittently flowing outlet and moderate ponding depths. The wetland provides moderate habitat functions, because it has diverse hydroperiods, multiple special habitat features, and is valuable due to proximity to East Fork Hylebos Creek Tributary 0016A. Based on the above factors, Wetland WFW-01 received a Category II rating and a habitat score of 6. The regulated critical area buffer is 150 feet wide.

Wetland WFW-01 was described in the 2003 Christian Faith Center Environmental Impact Statement (where it was referred to as “Wetland B”) and includes approximately 5,400 square feet of created wetland and an additional 3,500 square feet of wetland enhancement as part of on-site mitigation from the site’s previous development (City of Federal Way 2003).

Wetland WFW-02

Wetland WFW-02 is both a riverine and depressional wetland located east of SR 99 and south of S 336th Street in the northwest corner of the Christian Faith Center parcel. Wetland WFW-02 was in the study area for the Christian Faith Center Environmental Impact Statement (in which it was called “Wetland A”). No direct impacts on the wetland occurred during construction of the Christian Faith Center. Dominant vegetation in the wetland is forested and consists primarily of mature Pacific willow and black cottonwood. Understory species include red-twig dogwood, salmonberry, and hardhack. Soils in Wetland WFW-02 are organic in nature and meet hydric soil indicator Histosol (A1). West Fork Hylebos Creek Tributary 0014C flows through Wetland WFW-02, entering through a culvert under S 336th Street on the northern wetland boundary, and exiting through a standpipe on the west. The tributary lacks a defined channel as it flows through Wetland WFW-02.

This wetland was historically modified by the City of Federal Way as part of a flood mitigation program, which resulted in construction of 4- to 6-foot-high earthen berms along the western and southern boundaries, which allow for greater stormwater storage. In addition to stormwater and stream flows, this wetland also likely receives hydrology from a locally high groundwater table. Wetland WFW-02 scored high for both water quality and hydrologic functions, primarily due to the ability to store large volumes of stormwater; however, the wetland has relatively low-quality forested habitat, and is surrounded on three sides by minimal buffers and substantial human development, resulting in a Category II wetland rating and a habitat score of 4. The regulated critical area buffer is 100 feet wide.

Wetland WFW-03

Wetland WFW-03 is a riverine wetland located along both sides of East Fork Hylebos Creek Tributary 0016A in the WSDOT right-of-way west of I-5. Hydrology for Wetland WFW-03 appears to be derived primarily from overbank flooding, as well as groundwater discharge. Wetland WFW-03 receives stormwater discharge from nearby commercial development, as well as surface runoff from I-5.

This wetland primarily consists of a palustrine deciduous forested community. Dominant species include Oregon ash, black cottonwood, and Pacific willow. Dominant understory species include salmonberry, with small pockets of slough sedge. Soils in Wetland WFW-03 meet hydric soil indicator redox dark surface (F6).

Wetland WFW-03 scored high for water quality functions due to the presence of trees and shrubs that filter pollutants and because the wetland is located within a UGA and in close proximity to I-5, which generates excess pollutants. Wetland WFW-03 scored moderate for hydrologic functions since it contains trees and shrubs that slow down water velocities during floods and is located upstream from areas with flooding problems. The wetland scored moderate for habitat functions because it has diverse hydroperiods, multiple special habitat features, and is in proximity to multiple priority habitats. Based on the above factors, Wetland WFW-03 received a Category II rating and a habitat score of 5. The regulated critical area buffer is 100 feet wide.

Wetland WFW-04

Wetland WFW-04 is a depressional wetland located at the edge of the WSDOT right-of-way near a stormwater pond west of I-5, between S 341st Place and S 344th Street. Vegetation in the wetland is dominated by Oregon ash, Pacific willow, and black cottonwood, with an understory consisting primarily of hardhack. Soils in Wetland WFW-04 are silt loam and meet hydric soil indicator depleted matrix (F3). Hydrology inputs to Wetland WFW-04 include overflow from the adjacent stormwater pond, as well as stormwater inputs from surrounding commercial properties and a high groundwater table. Wetland WFW-04 is a closed depression with no outlet, making it score high for water quality functions. Wetland WFW-04 scored moderate for hydrologic functions because it provides some storage during wet periods and is in proximity to I-5, which generates excess runoff. However, the wetland has relatively poor quality habitat and degraded buffers; it therefore scored low for habitat functions resulting in a Category III rating and a habitat score of 4. The regulated critical area buffer is 80 feet wide.

Wetland WFW-05

Wetland WFW-05 is a riverine wetland located along East Fork Hylebos Creek Tributary 0016A between S 344th Street and the offramp from southbound I-5 to Highway 18. This wetland supports both coniferous and deciduous forested communities and is dominated by western redcedar, Oregon ash, and black cottonwood, with an understory of hardhack, Sitka willow, and twinberry. Soils within the wetland are silt loam and meet hydric soil indicator thick dark surface (A12). Primary hydrology inputs for the wetland appear to be from overbank flooding of East Fork Hylebos Creek Tributary 0016A, although depressions within the wetland appear to hold water outside of flood events. Wetland WFW-05 has high potential for water quality functions due to dense tree and shrub layers within the wetland, as well as a location within an incorporated city; it has moderate hydrologic potential due to a moderate ability to reduce flood velocities, and it has moderate habitat potential due to its lack of habitat complexity and lack of accessible connections to other habitats on a broader landscape scale despite the presence of priority habitats nearby. Overall, Wetland WFW-05 received a Category II rating and a habitat score of 6. The regulated critical area buffer is 150 feet wide.

Wetland WFW-06

Wetland WFW-06 is a small slope wetland located in the WSDOT right-of-way west of I-5, between S 336th Street and S 344th Street. This wetland is located in an apparently excavated swale feature that drains stormwater from I-5 to East Fork Hylebos Creek Tributary 0016A. Although the majority of the swale does not meet the definition of wetland, the far southern end has sufficient hydrology to produce hydric soils meeting indicator redox dark surface (F6) and to support hydrophytic vegetation. The wetland is dominated by scrub-shrub vegetation, primarily salmonberry. Wetland WFW-06 is found on a relatively gentle slope with dense herbaceous vegetation in a basin where water quality is an issue; it therefore scored moderate for water

quality functions. Given the stormwater inputs to the wetland, Wetland WFW-06 scored moderate for hydrologic functions. Wetland WFW-06 scored moderate for habitat functions due to proximity to priority habitats. Overall, Wetland WFW-06 received a Category III rating and a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-17

Wetland WFW-17 is a depressional wetland located west of I-5 and south of S 344th Street. The wetland is adjacent to East Fork Hylebos Creek Tributary 0016A. Vegetation in the wetland is dominated by black cottonwood, with an understory of twinberry and salmonberry. Soils within the wetland are silt loam and meet hydric soil indicator depleted matrix (F3). Wetland WFW-17 has an intermittently flowing outlet and dense persistent vegetation, resulting in a moderate score for water quality functions. Due to intensive surrounding land uses and flooding problems downstream of the wetland, Wetland WFW-17 received a moderate score for hydrologic functions. Wetland WFW-17 scored moderate for habitat functions due to its proximity to priority habitat features. Overall, Wetland WFW-17 received a Category III rating and a habitat score of 5. The regulated critical area buffer is 80 feet wide.

Wetland WFW-18

Wetland WFW-18 is a depressional wetland located west of I-5 and south of S 344th Street and is located north of Wetland WFW-17 on the same property. Wetland WFW-18 is adjacent to East Fork Hylebos Creek Tributary 0016A. The wetland is dominated by scrub-shrub vegetation, including primarily Scouler's willow, with reed canarygrass present in emergent areas. Soils within the wetland are silt loam and meet hydric soil indicator redox dark surface (F6). Wetland WFW-18 has an intermittently flowing outlet and dense persistent vegetation, resulting in a moderate score for water quality functions. Due to the presence of widespread persistent, ungrazed plants, the wetland received a moderate score for hydrologic functions. Wetland WFW-18 scored moderate for habitat functions due to its proximity to priority habitat features, resulting in a Category III rating and a habitat score of 6. The regulated critical area buffer is 150 feet wide.

Wetland WFW-21

Wetland WFW-21 is a small, riverine wetland located off I-5 in a highway cloverleaf. Wetland WFW-21 is associated with East Fork Hylebos Creek Tributary 0016A. A culvert is the outlet from Wetland WFW-21 to East Fork Hylebos Creek Tributary 0016A downstream. The primary sources of hydrology for the wetland are flooding and a high groundwater table from the stream. Wetland WFW-21 contains a palustrine scrub-shrub vegetation community, consisting of Pacific nine-bark, Himalayan blackberry, Scouler's willow, red alder, and salmonberry. Soils found throughout Wetland WFW-21 meet hydric soil indicator redox dark surface (F6). The wetland boundary was determined by the extent of fill material and evidence of frequent inundation.

Wetland WFW-21 scored moderate for water quality functions because shrubs filter out pollutants, and because it is located within a UGA and in an area that produces pollutants for the wetland to filter. The hydrologic function score was moderate because vegetation slows water velocities within the wetland, and the wetland is located in a UGA that contributes to higher stream flows. The wetland scored moderate for habitat functions because it has some habitat complexity and multiple special habitat features, and it is near multiple priority habitats.

Wetland WFW-21 is rated Category III, with a habitat score of 6. The regulated critical area buffer is 150 feet wide.

Wetland WFW-22

Wetland WFW-22 is a small, depressional wetland located on the far western side of an I-5 cloverleaf, north of Wetland WFW-21. Wetland WFW-22 is not associated with East Fork Hylebos Creek Tributary 0016A. The wetland is a localized depression that receives its primary source of hydrology from stormwater and precipitation. Wetland WFW-22 contains a palustrine scrub-shrub community, consisting of redtwig dogwood, black cottonwood, and Himalayan blackberry. Soils sampled in Wetland WFW-22 meet the criteria for the hydric soil indicator depleted matrix (F3). The wetland boundary was determined by a change in topography and evidence of frequent inundation.

Wetland WFW-22 scored moderate for water quality functions because it receives runoff from areas that generate pollutants, and it is in a basin where water quality is an issue. Based on intensive land uses in surrounding areas, combined with flooding problems in the same sub-basin, Wetland WFW-22 received a moderate score for hydrologic functions. The wetland scored low on habitat due to its lack of habitat complexity and lack of connections to other habitats.

Wetland WFW-22 is rated Category IV, with a habitat score of 3. The regulated critical area buffer is 50 feet wide.

4 ENVIRONMENTAL IMPACTS

This section describes the potential impacts of the OMF South project alternatives on aquatic resources, terrestrial resources, and wetlands. See Section 2.4, Impact Assessment Methods and Assumptions, for a discussion of how impacts were identified and evaluated. Analyses of project-related impacts assume that the best management practices (BMPs) described in Section 5, Potential Mitigation Measures, would be implemented and would perform as expected to avoid and minimize certain impacts during construction. For each resource area, analyses of direct impacts are divided between long-term (operational) impacts and short-term (construction-related) impacts. Indirect effects are evaluated in Section 4.4; cumulative impacts are evaluated in Section 4.5.

4.1 Aquatic Species and Habitat

Analyses in this subsection address the potential long-term and temporary (i.e., construction-related) impacts of each alternative on streams, aquatic species and habitat. Actual impacts would depend on the location and design of the final alternative, the construction footprint and methods, the BMPs implemented during construction (see Section 5.1.1, Avoidance and Minimization During Design Development and Section 5.1.2, Construction Best Management Practices), and the performance of post-construction restoration.

Sound Transit considered the following potential impacts on aquatic resources:

- Permanent loss of physical habitat (fill)
- Permanent degradation of in-stream physical habitat, such as shading, chronic sedimentation, removal of boulders or large woody debris (LWD) from the channel, and loss of riparian vegetation function (loss of nutrient inputs, LWD recruitment, and shade)
- Impacts on fish passage
- Altered hydrology (higher peak flows result in increased scour/deposition downstream, decreased percolation from impervious surfaces results in lower base flows)
- Increased nighttime lighting
- Temporary or permanent degradation of water quality (increased temperature, increased turbidity, increased loading of heavy metals and hydrocarbons)
- Temporary loss of physical habitat (dewatering)
- Temporary degradation of habitat (sedimentation, removal of riparian vegetation, disturbance to stream banks)

To the extent that impacts cannot be avoided or minimized through project design changes and use of BMPs, Sound Transit would implement additional measures to reduce adverse effects and provide compensatory mitigation measures where adverse effects are unavoidable. Sound Transit has committed to achieving no net loss of ecosystem function on a project-wide basis (Sound Transit 2007). As discussed in Section 5.3, Compensatory Mitigation, compensatory mitigation would be implemented in accordance with applicable federal, state, and local requirements and guidelines.

As discussed in Section 3.1.2, Aquatic Species of Concern, no aquatic species of concern are known or expected to use habitats in the study area under current conditions. Based on intermittent flows, the lack of pools deep enough to remain wetted during dry periods, and the presence of human-created barriers to fish passage, no fish are known or expected to use either of the Hylebos Creek tributaries. However, the basin sizes, channel widths, and stream gradients of both tributaries indicate the potential to support fish in the future. There are no surface-flowing segments of North Fork McSorley Creek in the study area. Following the selection of a Preferred Alternative, compliance with the ESA would be assessed and documented through a no-effect memorandum, Biological Assessment, or other ESA documentation. The assessment would also include a review of potential effects on essential fish habitat, as required by the Magnuson-Stevens Fishery Conservation and Management Act.

4.1.1 No-Build Alternative

Under the No-Build Alternative, impacts to aquatic resources from construction or operation of OMF South would not occur. However, for the purposes of this technical report, the No-Build Alternative assumes that by the design year 2042, all planned Sound Transit 3 projects, including FWLE and TDLE, are built along with the other public and private projects planned within the study area. Because TDLE would open after OMF South, impacts associated with TDLE that would overlap with OMF South, such as the mainline tracks that would connect to the South 336th Street and South 344th Street alternatives, are addressed within the build alternative impacts discussion below.

4.1.2 Long-Term Impacts

Direct long-term impacts on aquatic resources would occur where permanent features such as project facilities (including lead tracks and mainline) permanently alter in-stream habitat (including habitat accessibility) or riparian functions. Additional impacts may occur where surface waters receive stormwater runoff from impervious surfaces created or replaced by project construction. Aquatic species may also be affected by increases in the amount of light reaching surface waters at night. These potential effects are described in greater detail below. Impacts associated with each alternative are discussed in the subsections that follow.

In-Stream Habitat Alteration

None of the stream segments in the study area are known or expected to support fish use under current conditions. Nevertheless, the loss or degradation of stream habitat would reduce the availability of prey (e.g., benthic invertebrates) for fish and other aquatic species in downstream reaches, as well as decrease the availability of stream habitats in the future if access is eventually restored through the removal of downstream fish passage barriers. Any work below the OHWL of any streams in the study area would be conducted in accordance with the terms of the Hydraulic Project Approval (HPA) and other applicable permits obtained for this project.

Sound Transit has committed to minimizing the need for streams to be enclosed in pipes or culverts and has designed the alternative OMF South sites to avoid piping any stream channels. Unavoidable impacts on streams are described in the discussions of the impacts of the alternatives, below.

Additional impacts may occur where elevated segments of mainline or lead track pass over surface-flowing streams. In addition to affecting riparian habitat vegetation (see the discussion of Vegetation Removal and Habitat Alteration, below), shade from structures placed over

streams may affect the behavior of fish that could enter the affected stream segments if access is restored in the future. Outmigrating juvenile salmonids may respond to shadows by pausing at the upstream end of the darkened area, potentially increasing their vulnerability to predation (Kemp and Williams 2008).

Evaluations of the potential impacts of the alternatives on in-stream habitat conditions are based on the length of surface-flowing streams within the project limits, as well as on the length of stream channel that would be relocated or daylighted (Table G3.4-1). Impacts are depicted in Figures G3.4-1 through G3.4-6.

Impact values in Table G3.4-1 are broken into three categories: proximity, relocation, and constriction. Proximity impacts would occur where project features (including elevated structures such as the mainline and lead tracks) are built near or over a stream. Proximity impacts may include any of those described in this section, although impacts resulting from fill or other in-stream work would be unlikely. Relocation impacts would occur where an existing stream channel would be relocated and realigned to accommodate project features; relocated stream segments would include meanders and other features that enhance the availability and diversity of aquatic habitats. Constriction impacts would occur where a fill slope is extended into a wetland area where the stream lacks a defined channel; these impacts would happen only under the South 336th Street Alternative and are described further in the discussion of the impacts of that alternative.

As discussed in Section 2.4.4, Analysis Assumptions, the impact values and areas in the table and figures represent conservative estimates of the impacts of the alternatives. Not all areas within the permanent impact footprint would be converted to structures or hard surfaces. Actual anticipated impacts would be determined when an alternative is selected to be built and (unless the No-Build Alternative is selected) the project design is sufficiently advanced to undergo permitting review.

Table G3.4-1 Potential Long-Term Impacts on Aquatic Resources

Alternative	Design Option	Project Element	Stream[1]	Stream Impact (linear feet, type)[2]	Stream Channel Daylighted (linear feet)	Stream Buffer Impact (acres)[3]
Midway Landfill	N/A	N/A	N/A	0	0	0
South 336th Street	TDLE Preferred Alternative	Site	East Fork Hylebos Creek Tributary 0016A	800 – relocation	0	3.3
			West Fork Hylebos Creek Tributary 0014C[4]	600 – constriction	0	2.6
		Mainline	East Fork Hylebos Creek Tributary 0016A	800 – relocation 900 – proximity	0	4.4
	TDLE Design Option	Site	East Fork Hylebos Creek Tributary 0016A	800 – relocation	0	3.3
			West Fork Hylebos Creek Tributary 0014C(4)	600 – constriction	0	2.6
		Mainline	East Fork Hylebos Creek Tributary 0016A	800 – relocation 1,000 – proximity	0	5.0

Table G3.4-1 Potential Long-Term Impacts on Aquatic Resources (continued)

Alternative	Design Option	Project Element	Stream[1]	Stream Impact (linear feet, type)[2]	Stream Channel Daylighted (linear feet)	Stream Buffer Impact (acres)[3]
South 344th Street	TDLE Preferred Alternative and Enchanted Parkway tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	1,200 – relocation	800	5.4
		Mainline		1,600 – relocation	0	6.4
	TDLE Design Option and I-5 tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	1,200 – relocation	800	5.4
		Mainline		1,600 – relocation 100 – proximity	0	7.7
	TDLE Design Option and Enchanted Parkway tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	1,200 – relocation	800	5.4
		Mainline		1,600 – relocation 100 – proximity	0	6.9
	TDLE Preferred Alternative and I-5 tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	1,200 – relocation	800	5.4
		Mainline		1,600 – relocation	0	7.1

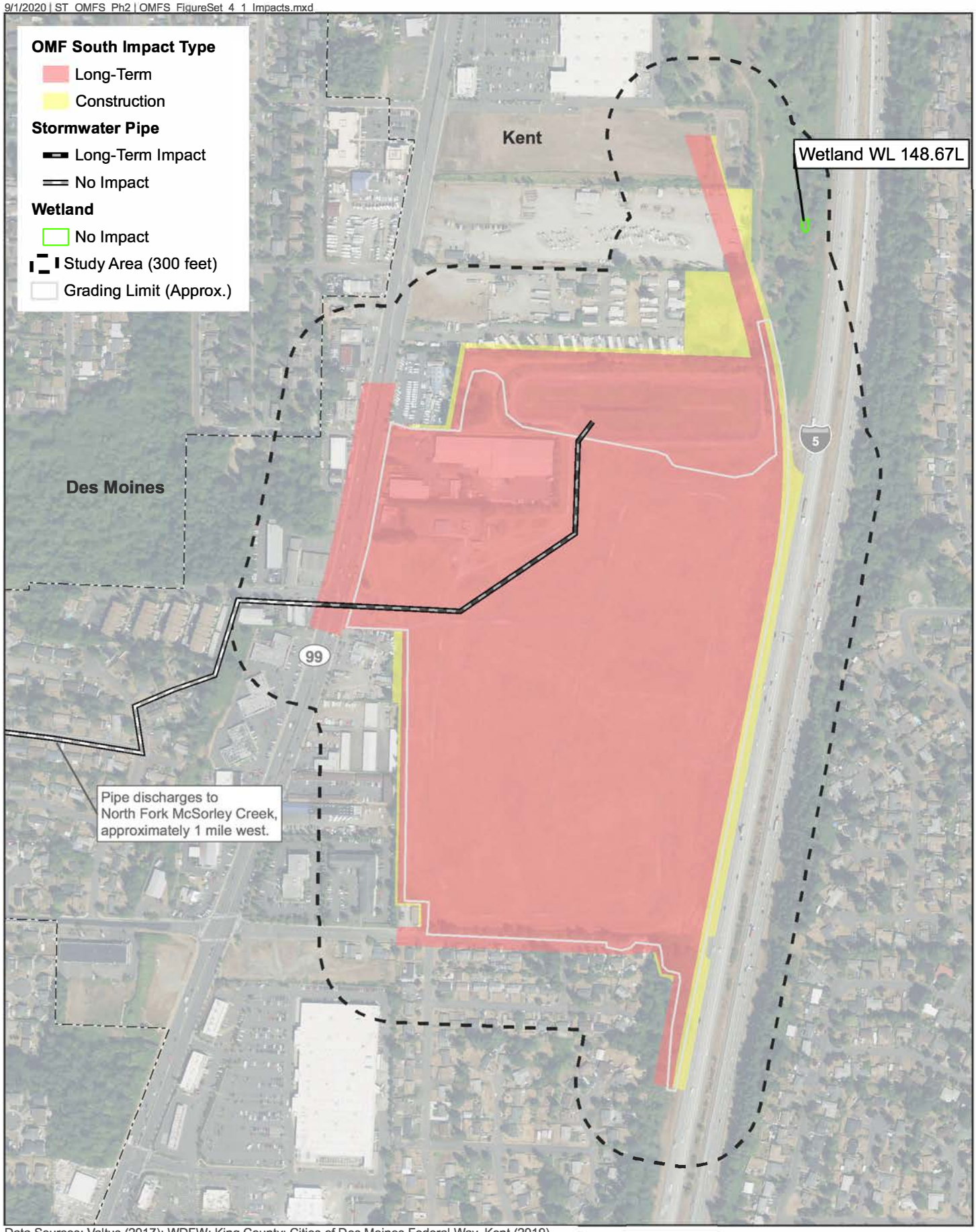
Notes:

(1) Both affected streams are Type F, per WAC 222-16-030.

(2) Includes the total length of surface-flowing stream within the permanent impact footprint defined for this analysis. Impact types: proximity = mainline or other structures near or over stream; relocation = stream channel realigned to accommodate project features; constriction = extension of fill slope into wetland area where stream lacks a defined channel. See text for details.

(3) Values presented in this table represent all affected areas inside functional stream buffers, including areas that overlap with wetland buffers.

(4) The portion of this stream in the study area lacks a defined bed and bank where it flows through Wetland WFW-02. For this reason, stream impacts are based on the approximate centerline of the mapped stream, and buffer impacts are based on the affected area of Wetland WFW-02. See text for further discussion.



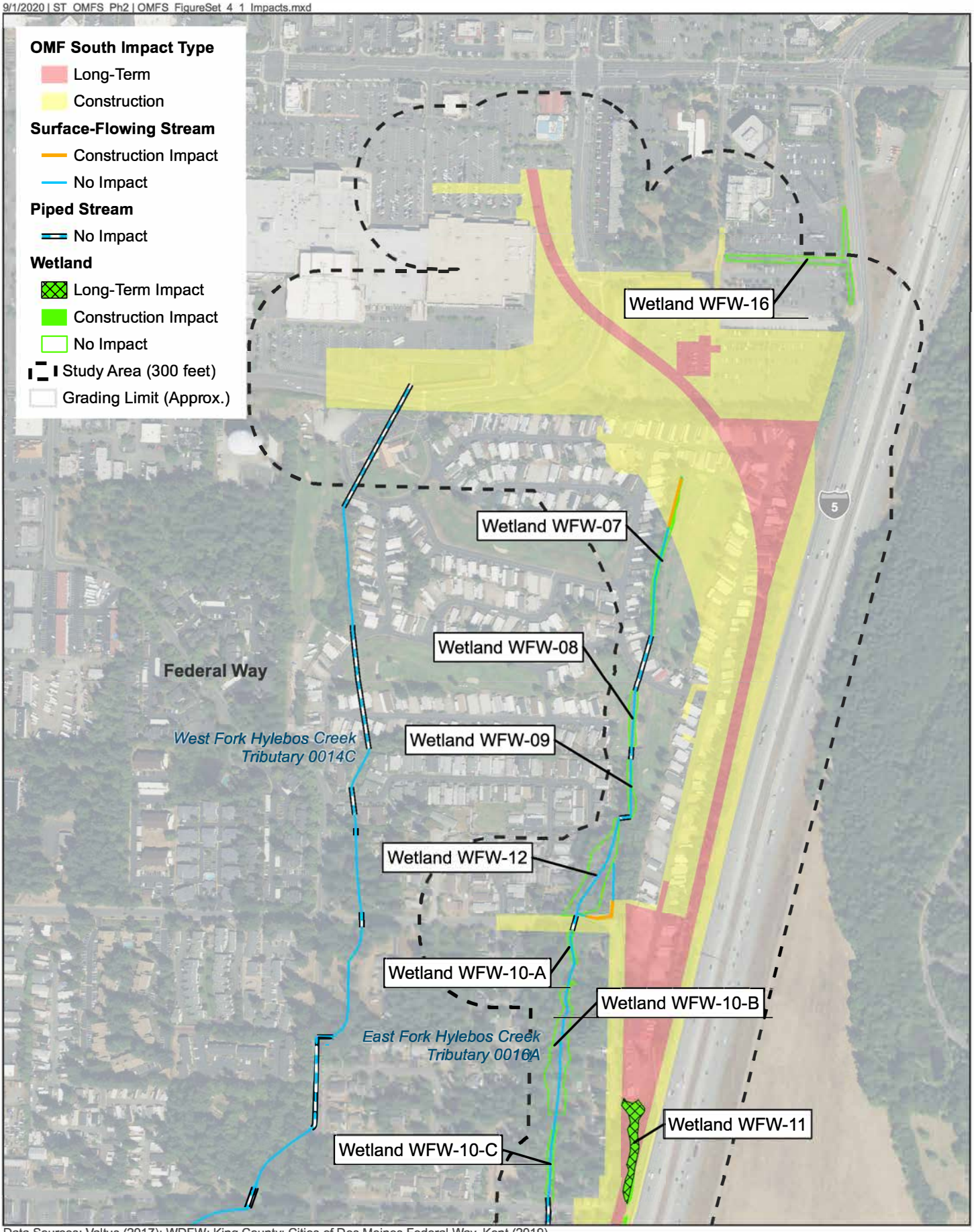
Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-1
Impacts on Wetlands and Streams
Midway Landfill Alternative

OMF South

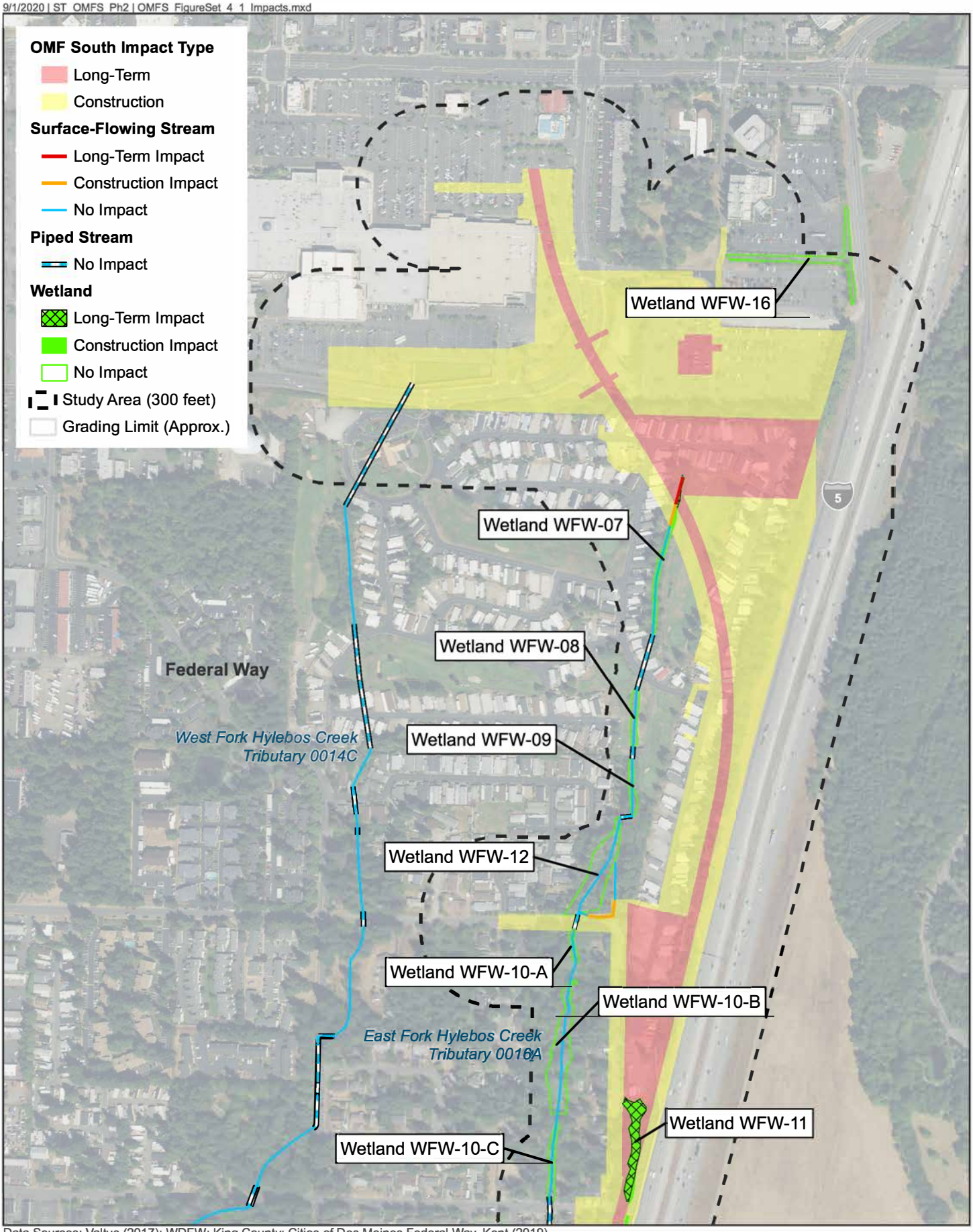


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-2
Impacts on Wetlands and Streams
South 336th Street and South 344th Street Alternatives
TDLE Preferred Alternative
OMF South

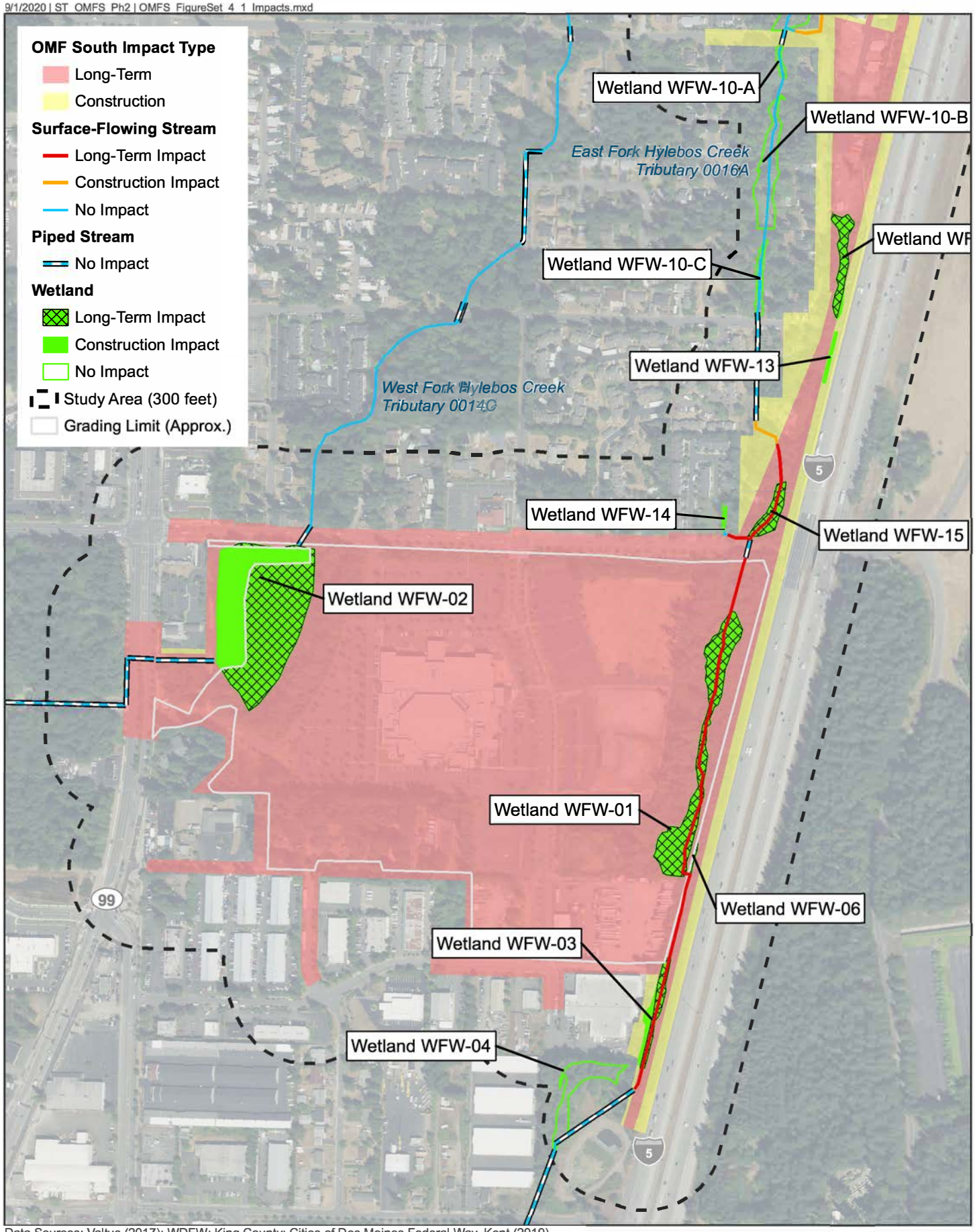


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-3
Impacts on Wetlands and Streams
South 336th Street and South 344th Street Alternatives
TDLE Design Option
OMF South



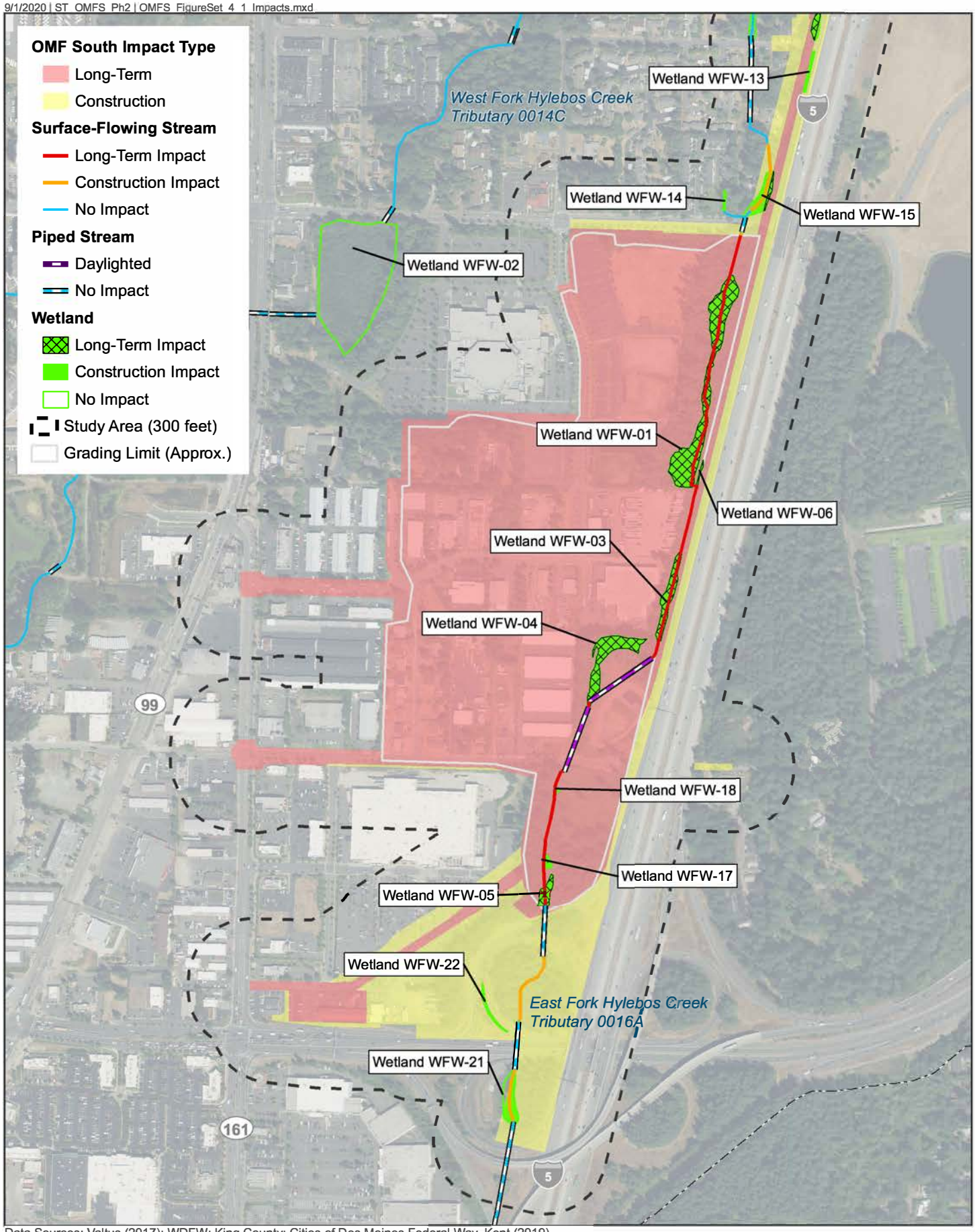
Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-4
Impacts on Wetlands and Streams
South 336th Street Alternative

OMF South

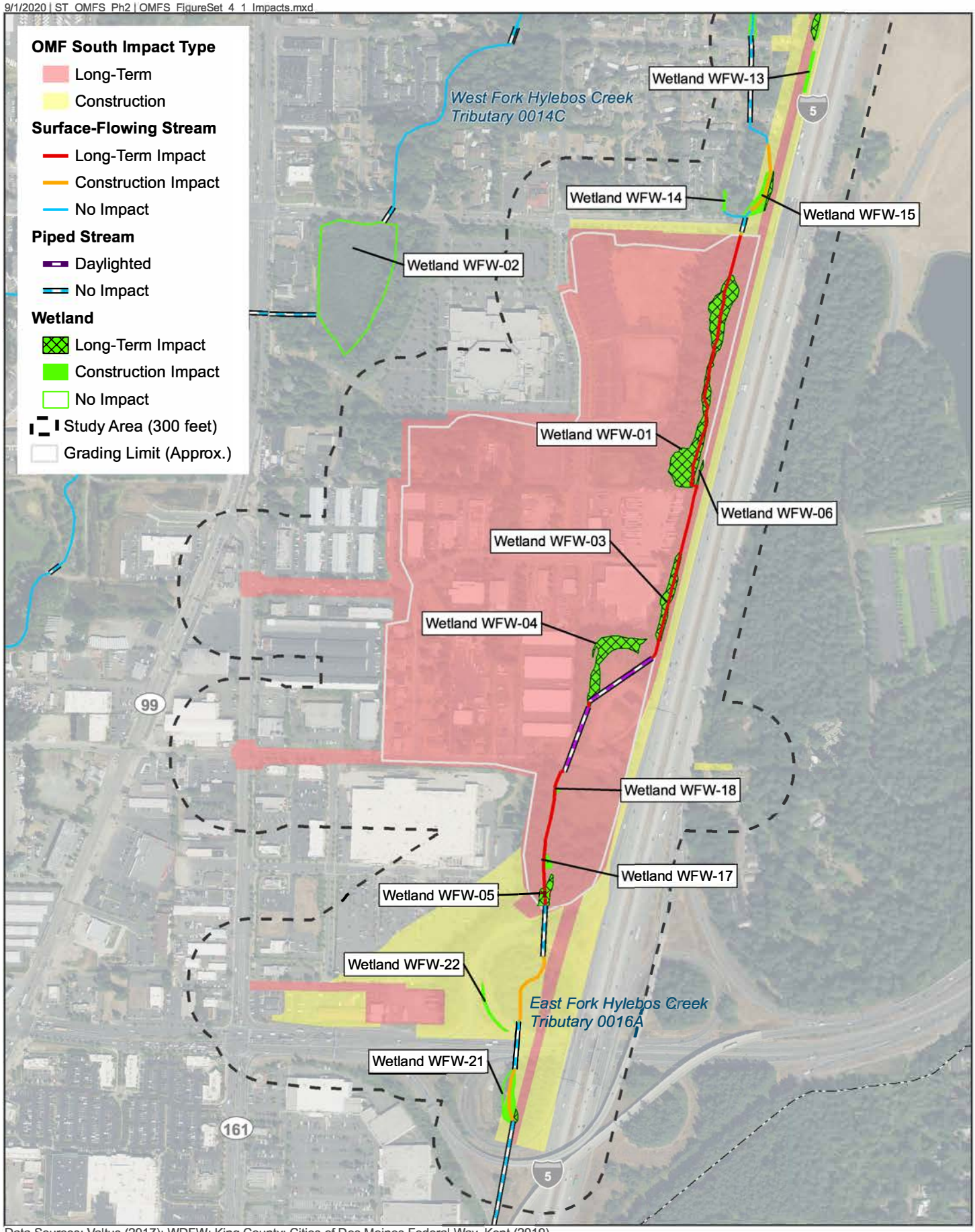


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-5
Impacts on Wetlands and Streams
South 344th Street Alternative
Enchanted Parkway Alignment
OMF South



Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-6
Impacts on Wetlands and Streams
South 344th Street Alternative
I-5 Alignment
OMF South

Fish Passage

No impacts on anadromous fish passage are anticipated because none of the stream reaches in the study area are currently accessible to anadromous fish. This analysis considers impacts that could affect the potential availability and accessibility of stream habitats in the future if access is restored through the removal of downstream fish passage barriers.

As discussed above, Sound Transit has committed to minimizing the need for streams to be enclosed in pipes or culverts. The possible need for one new culvert on East Fork Hylebos Creek Tributary 0016A under the South 344th Street Alternative is discussed in the analysis of the impacts of that alternative, below. If any existing culverts must be replaced to accommodate OMF facilities (including lead tracks) or mainline, they would be designed and installed in accordance with WDFW's Water Crossing Design Guidelines (Barnard et al. 2013). Decisions about culvert design would be based on the assumption that all surface-flowing stream segments in the study area have the potential to support fish use in the future. As such, culverts replaced for project construction would not impede fish access through the study area in the future, if access is restored through the removal of downstream fish passage barriers. In addition, Sound Transit would coordinate with WSDOT to ensure that the TDLE provides adequate space for any future replacement of WSDOT-owned culverts that are currently barriers to fish passage.

Vegetation Removal and Habitat Alteration

Where the permanent impact footprint overlaps a stream's riparian buffer, the ecological function of that buffer would be diminished. Substantial decreases in current riparian function would occur where areas of tree or shrub cover in a stream's riparian zone are converted to facilities or to vegetation types (e.g., lawns, ornamental landscaping) with less structural or compositional diversity. Where riparian vegetation, regardless of current condition, is removed altogether, potential future riparian functions would be eliminated. Potentially affected riparian functions and processes include fish and wildlife habitat; food chain support; water temperature maintenance; infiltration; groundwater recharge and discharge; sediment delivery, transport, and storage; organic matter input; nutrient and pathogen removal; and stream channel formation and maintenance.

Based on the urban setting of the study area and disturbed riparian corridors, comparisons of the impacts of the alternatives on riparian habitat are based on the overlap between the project limits[3] and functional stream buffers. As discussed previously, functional stream buffers are defined as standard regulatory buffers for streams that have been trimmed at the edge of existing developed areas. For the two streams addressed in this analysis, this amounts to the contiguous vegetated areas within 100 feet of surface-flowing stream segments that are interrupted by roads, buildings, and institutional or industrial complexes. This reduces the capacity of riparian functions and processes in the OMF South study area. It is widely recognized that the loss of forest habitat can adversely affect riparian functions – the recruitment of wood in particular (Knutson and Naef 1997). Moreover, studies conducted in western Washington, western Oregon, and southeastern Alaska indicate that more than 90 percent of LWD input to streams from riparian areas is recruited from the areas within approximately 100 feet of the stream's edge (Murphy and Koski 1989; McDade et al. 1990; McKinley 1997; Martin et al. 1998). Other functions, such as water quality protection, channel maintenance, and detrital input, occur primarily in the first 100 feet (Fischer and Fischenich 2000).

[3] This would include areas within the 15-foot zone that would cleared and maintained on either side of the connecting tracks.

Permanent project-related impacts on riparian habitat would also occur where segments of mainline or lead track span areas of riparian vegetation. For operational safety, trees and other tall vegetation would not be allowed to grow underneath or within 15 feet of elevated track segments. Vegetation in these areas would be converted from trees and tall shrubs to short-statured shrubs and herbaceous vegetation. In addition, the long-term presence of structures above vegetation would reduce the amount of water the vegetation receives from precipitation. Finally, elevated structures with low clearance (generally, less than 15 feet) would limit sunlight. In some areas, short-statured shrubs and herbaceous vegetation cleared from beneath such structures and allowed to grow back may not grow back. The presence of elevated structures would preclude the development of mature forest habitat in these areas, reducing the potential for the recruitment of LWD to nearby streams. Because the elevated structures would be relatively narrow (typically 20 to 30 feet wide) and generally more than 15 feet above the ground surface, shading impacts on riparian vegetation would be limited in most areas.

Sound Transit would use native vegetation to replant areas temporarily disturbed by construction. At sites where riparian zones are currently dominated by non-native species, the reintroduction of native vegetation could lead to long-term improvements in riparian habitat conditions.

Water Quality/Quantity

The development of any project alternatives would entail the creation of new impervious surfaces and the replacement of existing impervious surfaces. New impervious surfaces would include maintenance buildings, parking areas, storage and mainline tracks, train storage areas, and roadways. These new surfaces would replace a mix of existing impervious and pervious surfaces at each site. Impervious surfaces are associated with negative effects on receiving waters, affecting water quality and flow regimes, which in turn can have negative effects on aquatic life and aquatic habitat.

The sites proposed for the South 336th Street and South 344th Street alternatives currently include large amounts of pollution-generating impervious surfaces (PGIS), primarily parking lots and access roads. Some of these areas were developed before recent stormwater management requirements were in place; stormwater runoff from such sites currently receives little or no detention or treatment. Development of an operations and maintenance facility at either of the sites proposed for the South 336th Street and South 344th Street alternatives would replace some existing untreated PGIS with landscaping or other surfaces that are not pollution-generating.

Under any of the alternatives, runoff from impervious surfaces created or replaced for construction and operation of OMF South would be detained and/or treated using underground vaults in accordance with the Sound Transit Design Criteria Manual. Depending on the location of the project facilities, this would entail compliance with the City of Kent stormwater manual, the City of Federal Way addendum to the King County Surface Water Design Manual, the King County Surface Water Design Manual, and the WSDOT Highway Runoff Manual.

Other stormwater systems, such as stormwater ponds or a combination of vaults and ponds, may also be considered. Construction of stormwater ponds could result in additional impacts on streams. For example, if ponds are located in vegetated stream buffers, pond construction could result in the temporary or permanent degradation of riparian habitat. Also, the siting needs for stormwater ponds could affect the locations of reconfigured stream channels.

Given these factors, none of the project alternatives would be expected to have direct adverse effects on water quality or flow regimes. Peak stream flows would not increase because the stormwater systems built for the proposed project would be designed to simulate

predevelopment hydrology. Anticipated increases in the amount of PGIS receiving water quality treatment would reduce pollutant loading in receiving waters. Additional measures to reduce stormwater runoff, such as low-impact development or other on-site measures, would be considered at a more advanced phase of project development. Based on the above, none of the alternatives would be expected to have adverse effects on aquatic species and habitat as a result of degraded water quality or altered peak or base flows.

Nighttime Lighting

Operation of OMF South and associated mainline is not expected to result in any increases in nighttime illumination of fish-bearing waters (which could increase the risk of predation on juvenile salmonids) for several reasons. First, there are no fish-bearing waters within 200 feet of any of the OMF South project alternatives, including the mainline. Even if downstream fish passage barriers are removed and access is restored, operation of the mainline would not illuminate any surface waters because the tracks would have no overhead lighting and the train headlights would be directed parallel to the tracks. Finally, at the OMF South alternative sites, the potential for adverse effects under that future scenario would be avoided or minimized through the implementation of conservation measures for luminaires installed near surface-flowing waters, regardless of the waters' current fish-bearing status. Any luminaires within 50 feet of such waters would be shielded and directed away from the water's surface.

4.1.2.1 Midway Landfill Alternative

The Midway Landfill Alternative would have no direct impact on streams or stream channels. No streams are present on the Midway Landfill Alternative site. The closest mapped extent of North Fork McSorley Creek is approximately 2,000 feet west of the Midway Landfill Alternative and SR 99. The only project features affecting streams under this alternative relate to stormwater runoff and detention, as described below.

Compared to the other alternatives, the Midway Landfill Alternative would convert more vegetated areas to impervious land cover. However, all stormwater runoff from the site would be detained and treated in an underground vault system that would be designed in accordance with the City of Kent Stormwater Manual. The treatment vaults in turn would likely discharge to the on-site regional stormwater treatment and detention facility, which ultimately discharges to the North Fork McSorley Creek approximately 1.1 miles west of the Midway Landfill Alternative. The regional facility has been approved by both WDFW and Ecology. Treated stormwater that is discharged from the vaults would be directed to the regional treatment facility, where it would receive additional detention and treatment. As a result, an increase in the amount of impervious surfaces under this alternative would not be expected to adversely affect fish resources, stream hydrology, or aquatic habitat.

4.1.2.2 South 336th Street Alternative

The South 336th Street Alternative would affect approximately 3,100 to 3,200 linear feet of surface-flowing stream – 2,500 to 2,600 linear feet (depending on whether the TDLE Preferred Alternative or Design Option is selected; see below) of East Fork Hylebos Creek Tributary 0016A and approximately 600 linear feet of West Fork Hylebos Creek Tributary 0014C (Table G3.4-1). As a result, this alternative would have a greater impact on aquatic habitats than either the Midway Landfill Alternative or the South 344th Street Alternative. Compared to the South 344th Street Alternative (which would affect 2,800 to 2,900 linear feet), the South 336th Street Alternative would affect approximately 300 fewer linear feet of East Fork Hylebos Creek Tributary 0016A. That difference would be offset, however, by this alternative's impacts on West Fork Hylebos Creek Tributary 0014C, which would be avoided by the South 344th Street Alternative.

The South 336th Street Alternative would realign less of East Fork Hylebos Creek Tributary 0016A and would not involve any stream daylighting. These impacts are discussed below.

Approximately 2,600 linear feet of East Fork Hylebos Creek Tributary 0016A (surface-flowing) fall within the permanent impact footprint of this alternative. The affected portion of the stream extends from north of S 336th Street to the point where the stream currently enters a culvert upstream of the WSDOT stormwater facility, approximately 600 feet north of S 344th Street (Figure G3.4-4). Approximately 1,600 feet of the stream channel in this area would be relocated and realigned to include meanders and other features that enhance the availability and diversity of aquatic habitats. Approximately 800 feet of the stream relocation would occur in the site footprint, and approximately 800 feet would be associated with the mainline. The amount of the stream that is contained in pipes would not change. Approximately 900 to 1,000 linear feet of the stream would be affected by proximity impacts, depending on the design option for the curve at the northern end of the mainline (Table G3.4-1).

Currently, several segments of East Fork Hylebos Creek Tributary 0016A in this area are confined within a straight and narrow channel that lacks complexity; therefore, relocating and realigning the channel could benefit the stream by adding channel sinuosity and habitat complexity. Conversely, changing the physical characteristics of the stream could affect its hydrology and downstream sediment regimes. The impacts are considered permanent because the channel would not be returned to its previous location. The new channel would be designed to maintain flows and water quality conditions. In addition, substrate and bank conditions in the realigned channel would be improved from existing conditions. On the other hand, the presence of support columns near the stream may constrain options for natural or human-created modifications to channel configuration in the future.

Nearly all of the existing forested riparian habitat along the affected stretch of stream would be cleared for construction, and trees would not be allowed to grow back within 15 feet of the mainline and associated facilities. Replacement of mature, mixed deciduous and coniferous forest in this area with project features and non-forested vegetation would permanently reduce the capacity of this area to support riparian functions. The extent to which it would be possible to replant disturbed areas with trees will not be known until the project design has been advanced further. It is assumed for this analysis that replanting with trees would not be possible between the mainline and the OMF South site. Some riparian habitat functions would be restored through revegetation with native shrubs and other low-growing species.

Construction and operation of the South 336th Street Alternative would also affect aquatic and riparian habitats associated with West Fork Hylebos Creek Tributary 0014C. The impacts on aquatic habitats in this area are difficult to quantify because the stream lacks a defined channel where it flows through Wetland WFW-02, which serves as an in-line stormwater detention facility south of S 336th Street. For this reason, the estimated extent of project-related impacts is based on the linework obtained from the King County iMap interactive mapping tool. That source identifies approximately 600 linear feet of the stream that would fall within the permanent impact footprint of the South 336th Street Alternative. The amount of the stream that is contained in pipes would not change.

The preliminary (less than 10 percent) design indicates that the fill slope for the OMF South site under this alternative would affect the eastern portion of the wetland, reducing the area available for the stream to flow. This fill slope would constrict the flow path of the stream where it flows through the wetland. The expansion of the fill slope into the wetland could reduce the storage capacity of the combined wetland/stormwater facility, potentially increasing the magnitude and duration of peak flow events in West Fork Hylebos Creek Tributary 0014C.

Vegetation in and around Wetland WFW-02 supports riparian functions for West Fork Hylebos Creek Tributary 0014C. The wetland and its buffer are dominated by mature forest that provides high-quality riparian habitat. Clearing of these areas for project construction would reduce their capacity to support riparian functions. If the eastern portion of the wetland is converted to a fill slope, that slope may be planted with trees and other vegetation that supports many riparian functions. Given the uncertainty about the future riparian functions of vegetation on the fill slope, these impacts – which are identified for this analysis as the extent of permanent impacts on Wetland WFW-02 – are considered permanent.

The TDLE Design Option at the northern end of the mainline would affect approximately 100 linear feet more of East Fork Hylebos Creek Tributary 0016A than would the TDLE Preferred Alternative (Table G3.4-1). The TDLE Design Option would intersect the northern end of the stream in Belmor; the TDLE Preferred Alternative mainline without the option would avoid it altogether.

4.1.2.3 South 344th Street Alternative

The South 344th Street Alternative would affect approximately 2,800 to 2,900 linear feet of surface-flowing stream (Table G3.4-1). In contrast to the South 336th Street Alternative, nearly all impacts would result from relocating East Fork Hylebos Creek Tributary 0016A. Only 100 linear feet of that stream would be affected by proximity impacts (under the TDLE design option for the curve at the northern end of the mainline), and impacts on West Fork Hylebos Creek Tributary 0014C would be avoided altogether.

Between S 336th Street and the culvert upstream of the WSDOT stormwater facility, the entire surface-flowing segment of East Fork Hylebos Creek Tributary 0016A (approximately 2,100 linear feet) would be relocated (Table G3.4-1, Figures G3.4-5 and G3.4-6). An additional 700 linear feet of stream south of S 344th Street would also be relocated. The impacts of stream relocation and realignment would be similar to those described for the South 336th Street Alternative, but they would extend over a greater distance. In total, approximately 1,200 feet of the stream relocation would occur in the site footprint, and approximately 1,600 feet would be associated with the mainline (Table G3.4-1).

Similar to the South 336th Street Alternative, the loss of mature, mixed deciduous and coniferous forest would reduce the riparian functions along the affected stream reaches. By affecting reaches downstream of S 344th Street, this alternative would degrade riparian habitat along 700 more feet of the stream than would the South 336th Street Alternative.

Under this alternative, to accommodate the relocation of an existing WSDOT stormwater pond, approximately 800 linear feet of East Fork Hylebos Creek Tributary 0016A immediately north of S 344th Street would be removed from existing culverts and restored to a surface-flowing channel. Daylighting this segment would remove an existing barrier to fish passage and would increase the amount of functioning aquatic and riparian habitat available in the stream system.

Emergency vehicle access to the mainline would be needed near the location of the daylighted stream segment. One of the options under consideration may require approximately 60 feet of channel that is currently culverted (and that would otherwise be daylighted, as described above) to be placed in a new culvert. If a culvert is needed, it would be designed using the stream simulation methodology outlined in WDFW's Water Crossing Design Guidelines (Barnard et al. 2013), avoiding the potential creation of a barrier to fish passage. It may be possible to eliminate the need for a culvert through detailed design of the access and of the stream meanders. The design of the emergency vehicle access would need to be coordinated and approved by Sound Transit, WSDOT, and the City of Federal Way.

In contrast to the South 336th Street Alternative, the South 344th Street Alternative would have no impacts on West Fork Hylebos Creek Tributary 0014C or its buffer.

As with the South 336th Street Alternative, the TDLE Design Option at the northern end of the mainline would affect slightly more of East Fork Hylebos Creek Tributary 0016A than would the TDLE Preferred Alternative. The direct permanent impacts of the tail track design options on streams would be largely identical. The I-5 alignment would affect more stream/wetland buffer along East Fork Hylebos Creek Tributary 0016A than would the Enchanted Parkway alignment (Table G3.4-1).

4.1.3 Construction Impacts

Temporary, construction-related impacts on aquatic resources would occur where stream buffers are affected by clearing and ground-disturbing work but are revegetated following construction. Such areas are within the project limits (including temporary construction easements) but not within the permanent footprint of the proposed facilities (including lead tracks and mainline). The duration of such impacts would vary, depending on the existing condition of the affected area. Where clearing affects low-growing vegetation (e.g., grasses, herbaceous species) or invasive species, the riparian functions of the disturbed areas would likely be restored within one growing season of clearing and replanting. Where invasive species are cleared and replaced with native species, riparian functions may be improved. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs may require several years or decades to achieve the size and stature necessary to provide pre-construction functions such as shade and LWD recruitment.

In addition to impacts on riparian vegetation, temporary impacts on stream habitats would occur if streams are diverted or placed in temporary pipes, for example, when a stream channel is realigned and reconfigured to accommodate project features. Also, ground-disturbing work and equipment use in or near surface-flowing waters would present the risk of delivering sediment or contaminants (e.g., fuel, hydraulic fluids) to streams, temporarily degrading water quality. As discussed in Section 2.4.4, Analysis Assumptions, the estimated extent of areas that would be temporarily affected by project construction is based on mapping provided by the project design team.

The following sections outline the range of potential temporary construction impacts that could occur for each alternative. Actual impacts would depend on the final configuration and design of the Preferred Alternative, construction footprint and methods, BMPs implemented during construction (see Section 5.1.1, Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best Management Practices), and performance of post-construction restoration. Direct construction impacts would be identified and quantified during the final design and permitting of the Preferred Alternative. Although detailed construction limits have not yet been defined at this phase in the project design, potential project construction limits have been estimated (see Section 2.4.4, Analysis Assumptions). These impact areas are summarized in Table G3.4-2 and would be in addition to the long-term direct impacts.

Table G3.4-2 Potential Temporary (Construction-Related) Impacts on Aquatic Resources

Alternative	Design Option	Project Element	Stream[1]	Stream Impact (linear feet)[2]	Stream Buffer Impact (acres)[3]
Midway Landfill	N/A	N/A	N/A	0	0
South 336th Street	TDLE Preferred Alternative	Site	East Fork Hylebos Creek Tributary 0016A	150	0.5
			West Fork Hylebos Creek Tributary 0014C[4]	N/A	1.5
		Mainline	East Fork Hylebos Creek Tributary 0016A	350	3.4
	TDLE Design Option	Site	East Fork Hylebos Creek Tributary 0016A	150	0.5
			West Fork Hylebos Creek Tributary 0014C(4)	N/A	1.5
		Mainline	East Fork Hylebos Creek Tributary 0016A	250	2.8
South 344th Street	TDLE Preferred Alternative and Enchanted Parkway tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	20	0.1
		Mainline		1,350	7.3
	TDLE Design Option and I-5 tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	20	0.1
		Mainline		1,250	5.9
	TDLE Design Option and Enchanted Parkway tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	20	0.1
		Mainline		1,250	6.7
	TDLE Preferred Alternative and I-5 tail track alignment	Site	East Fork Hylebos Creek Tributary 0016A	20	0.1
		Mainline		1,350	6.5

Notes:

(1) Both affected streams are Type F, per WAC 222-16-030.

(2) Includes the total length of surface-flowing stream within the construction-related impact footprint defined for this analysis.

(3) Values presented in this table represent all affected areas inside functional stream buffers, including areas that overlap with wetland buffers.

(4) The portion of this stream in the study area lacks a defined bed and bank where if flows through Wetland WFW-02. Direct impacts on the stream are considered permanent and are discussed above. Buffer impacts are based on the affected area of Wetland WFW-02. See text for further discussion.

4.1.3.1 Midway Landfill Alternative

The Midway Landfill Alternative would have no construction-related impacts on aquatic resources.

4.1.3.2 South 336th Street Alternative

Most impacts to aquatic resources for the South 336th Street Alternative, including lead tracks and mainline, would be long-term and are discussed in Section 4.1.2, Long-Term Impacts. Approximately 500 linear feet of East Fork Hylebos Creek Tributary 0016A would fall within the temporary impacts footprint (150 linear feet in the facility site and 350 feet along the mainline; see Table G3.4-2). Impacts would include temporary loss of riparian habitat function and an elevated risk of water quality degradation, as described above. A small segment (approximately 130 feet) of the stream north of S 336th Street would likely be placed in a temporary bypass while construction is underway. Site construction would temporarily affect approximately 0.5 acre of stream buffer habitat along East Fork Hylebos Creek Tributary 0016A, and mainline construction would affect approximately 3.4 acres.

Similar to permanent impacts, direct temporary impacts on West Fork Hylebos Creek Tributary 0014C are difficult to quantify because the stream lacks a defined bed and bank in the study area. As with the analysis of permanent impacts, the estimated extent of project-related impacts is based on the linework obtained from the King County iMap interactive mapping tool. No parts of the line representing West Fork Hylebos Creek Tributary 0014C fall within the temporary impact footprint of the South 336th Street Alternative. Project construction would nevertheless have temporary impacts on the stream, such as temporary loss of riparian habitat function and an elevated risk of water quality degradation, as described above.

Vegetation in and around Wetland WFW-02 supports riparian functions for West Fork Hylebos Creek Tributary 0014C. As with the analysis of permanent impacts, temporary impacts on the stream buffer in that area are identified for this analysis as the extent of temporary impacts on Wetland WFW-02.

At the northern end of the study area, the construction-related impacts of the TDLE Preferred Alternative on East Fork Hylebos Creek Tributary 0016A would be greater than those of the TDLE Design Option. Taken together, the total extent of permanent and temporary impacts of the design options on streams and stream buffers impacts would be equal. Under the TDLE Design Option, some of those impacts would be long-term; under the TDLE Preferred Alternative, all impacts would be temporary.

4.1.3.3 South 344th Street Alternative

Mainline construction for the South 344th Street Alternative would temporary affect approximately 1,350 linear feet of East Fork Hylebos Creek Tributary 0016A (Table G3.4-2). Impacts would include temporary loss of riparian habitat function and an elevated risk of water quality degradation, as described above. Similar to the South 336th Street Alternative, this would include temporarily placing approximately 130 feet of the stream in a bypass while construction is underway. This alternative would have no temporary impacts on West Fork Hylebos Creek Tributary 0014C. Site construction would temporarily affect approximately 0.1 acre of stream buffer habitat along East Fork Hylebos Creek Tributary 0016A, and mainline construction would affect approximately 5.9 to 7.3 acres, depending on the design option.

As with the South 336th Street Alternative, the TDLE Preferred Alternative at the northern end of the mainline would have a larger construction-related impact on the northern end of East Fork Hylebos Creek Tributary 0016A, compared to the TDLE Design Option. The direct temporary impacts of the tail track design options on streams would be largely identical. The I-5 alignment would affect more stream/wetland buffer along East Fork Hylebos Creek Tributary 0016A than would the Enchanted Parkway alignment (Table G3.4-2).

4.2 Vegetation, Wildlife, and Wildlife Habitat

Construction and operation of OMF South could adversely affect vegetation and terrestrial wildlife. Analyses in this subsection address the potential long-term and construction-related impacts of each alternative on vegetation, wildlife, and wildlife habitat. All the project alternatives are near existing highways and commercial, institutional, or industrial areas and have relatively disturbed habitats compared to less-developed sites in rural areas. Despite the overall matrix of sparse ecosystem resources in the study area, remnant patches of natural vegetation may provide travel corridors or islands of habitat, allowing some wildlife populations to persist in the urban landscape. Actual impacts would depend on final alternative selection and design, construction footprint and methods, BMPs implemented during construction (see Section 5.1.1, Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best

Management Practices), and performance of post-construction restoration, including revegetation of disturbed areas and mitigation measures for areas protected under local critical areas ordinances.

As discussed in Section 3.2.3, Species and Habitats of Concern, no ESA-listed or state-listed plant or wildlife species are known or expected to be present in the study area. Similarly, WDFW (2019a) does not identify any documented occurrences of state priority species in the study area. Forested areas however may provide suitable habitat for some priority species. Reductions in the amount of the forested cover type could have adverse effects on those species.

The only priority habitats known or expected to be present in the study area are mature forests, wetlands, and riparian areas. Potential impacts on mature forests are discussed in the following subsections. Potential impacts on wetlands are analyzed in Section 4.3, Wetlands. Potential impacts on riparian areas are analyzed in Section 4.1, Aquatic Species and Habitat.

4.2.1 No-Build Alternative

Under the No-Build Alternative, impacts to vegetation, wildlife, and wildlife habitat from construction or operation of OMF South would not occur. However, for the purposes of this technical report, the No-Build Alternative assumes that by the design year 2042, all planned Sound Transit 3 projects, including FWLE and TDLE, are built along with the other public and private projects planned within the study area. Because TDLE would open after OMF South, impacts associated with TDLE that would overlap with OMF South, such as the mainline tracks that would connect to the South 336th Street and South 344th Street alternatives, are addressed within the Build alternative impacts discussion below.

4.2.2 Long-Term Impacts

Potential direct long-term impacts would occur where project construction converts vegetation or other wildlife habitat features to project facilities (including lead tracks and mainline). Noise, light, and human activity associated with operation of OMF South may also have long-term impacts on wildlife. These potential effects are described in greater detail below. Impacts associated with each alternative are discussed in the subsections that follow.

Vegetation Removal and Habitat Alteration

Any of the project alternatives would affect vegetation and wildlife, including species of concern, through the loss or degradation of habitat. Existing vegetation in the project footprint would be removed and replaced with tracks, buildings, parking lots, and other impervious surfaces. Table G3.4-3 presents a comparison of the project alternatives' potential impacts on vegetation in the study area, based on the amount of each land cover type in the permanent impact footprint. The geographic distribution and configuration of impact areas are depicted in Figures G3.4-7 through G3.4-12.

As discussed in Section 2.4.4, Analysis Assumptions. the impact values and areas in the table and figures represent conservative estimates of the impacts of the alternatives. Not all areas within the project footprint would be converted to structures or hard surfaces. Actual anticipated impacts would be determined when an alternative is selected to be built and the project design is sufficiently advanced to undergo permitting review.

Table G3.4-3 Potential Long-Term Impacts on Vegetation

Alternative	Design Option	Land Cover Type									
		Commercial	Residential	Grassland	Invasive Brush	Non-native Forest	Mature Native Forest	Other Native Forest	Stream/ Wetland	Stormwater Pond	Total
OMF Site Impacts (acres)											
Midway Landfill	N/A	9	1	57	1	1	0	4	0	5	**78**
South 336th Street	N/A	37	4	4	3	1	12	3	5	1	**70**
South 344th Street	N/A	38	7	4	5	<0.5	6	6	2	2	**70**
Mainline Impacts (acres)											
Midway Landfill(1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
South 336th Street	TDLE Preferred Alternative	2	7	<0.5	<0.5	0	3	3	2	0	**17**
	TDLE Design Option	2	7	1	<0.5	0	3	3	2	0	**18**
South 344th Street	TDLE Preferred Alternative and Enchanted Parkway tail track alignment	5	6	<0.5	2	0	4	5	2	1	**25**
	TDLE Design Option and I-5 tail track alignment	4	7	1	2	0	4	6	2	1	**27**
	TDLE Design Option and Enchanted Parkway tail track alignment	5	7	1	2	0	4	5	2	1	**27**
	TDLE Preferred Alternative and I-5 tail track alignment	5	6	<0.5	2	0	4	6	2	1	**26**

Note:

(1) The Midway Landfill Alternative would not include any mainline construction.

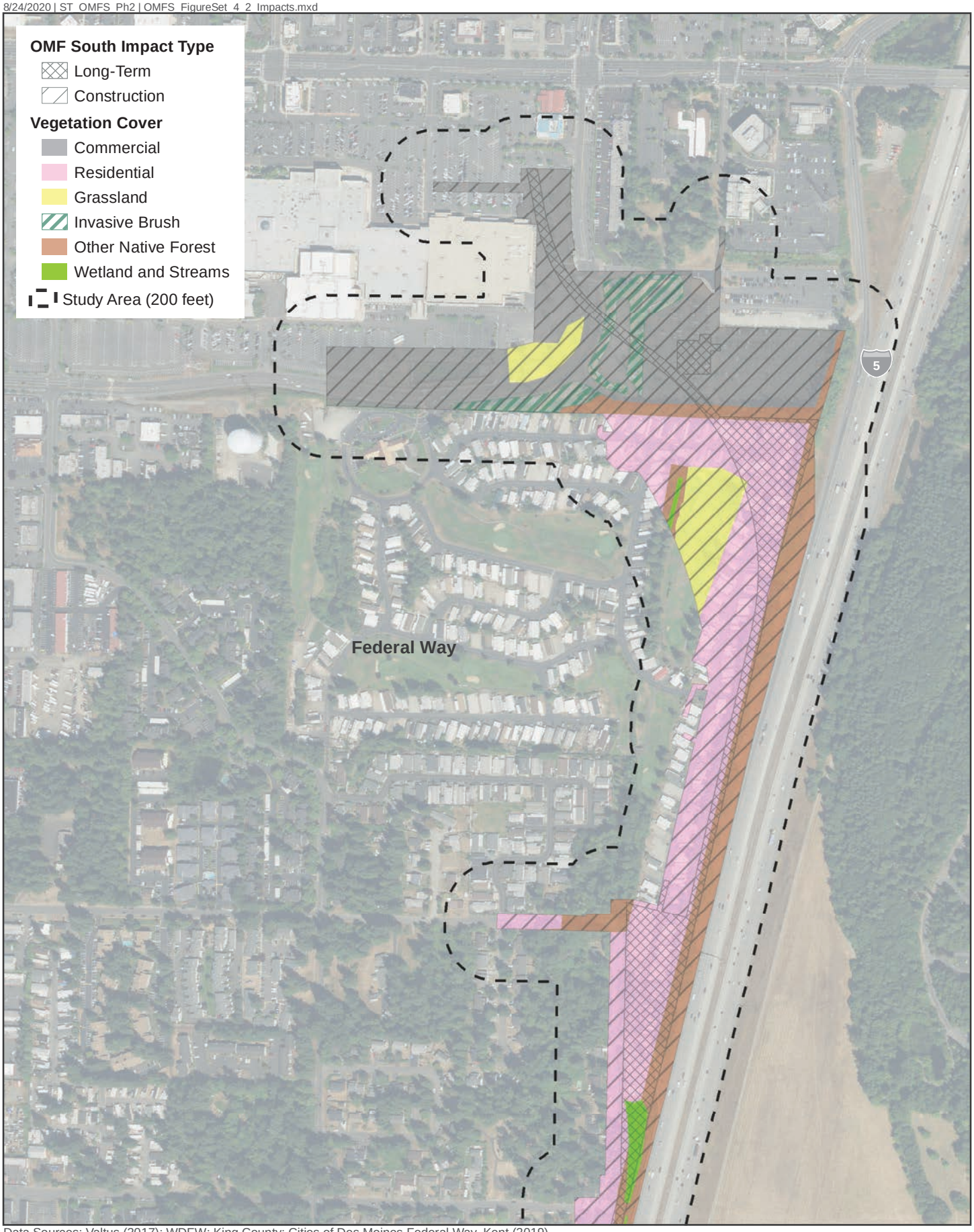
Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-7
Impacts to Vegetation Cover
Midway Landfill Alternative

OMF South

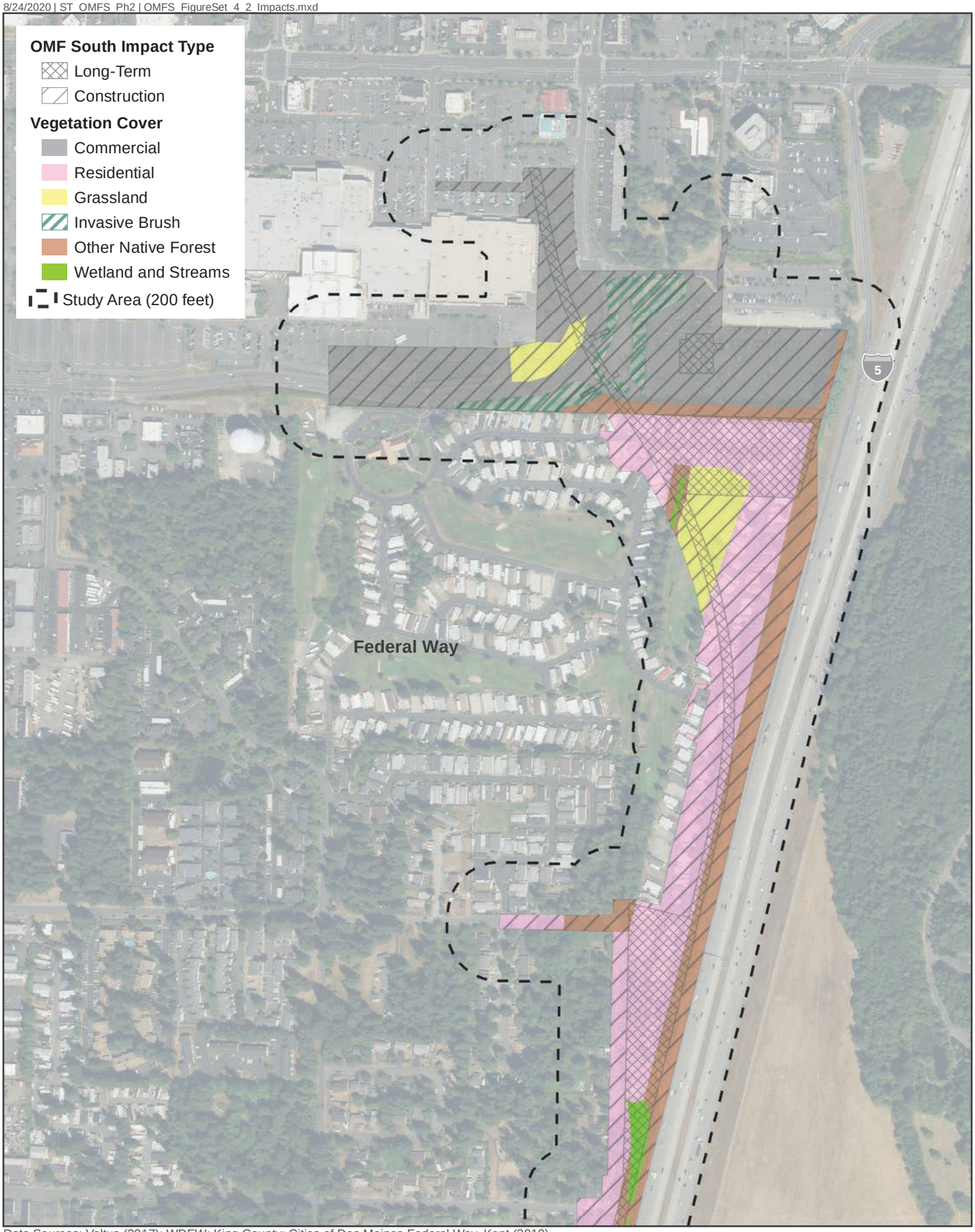


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-8
Impacts to Vegetation Cover
South 336th Street and South 344th Street Alternatives
TDLE Preferred Alternative
OMF South

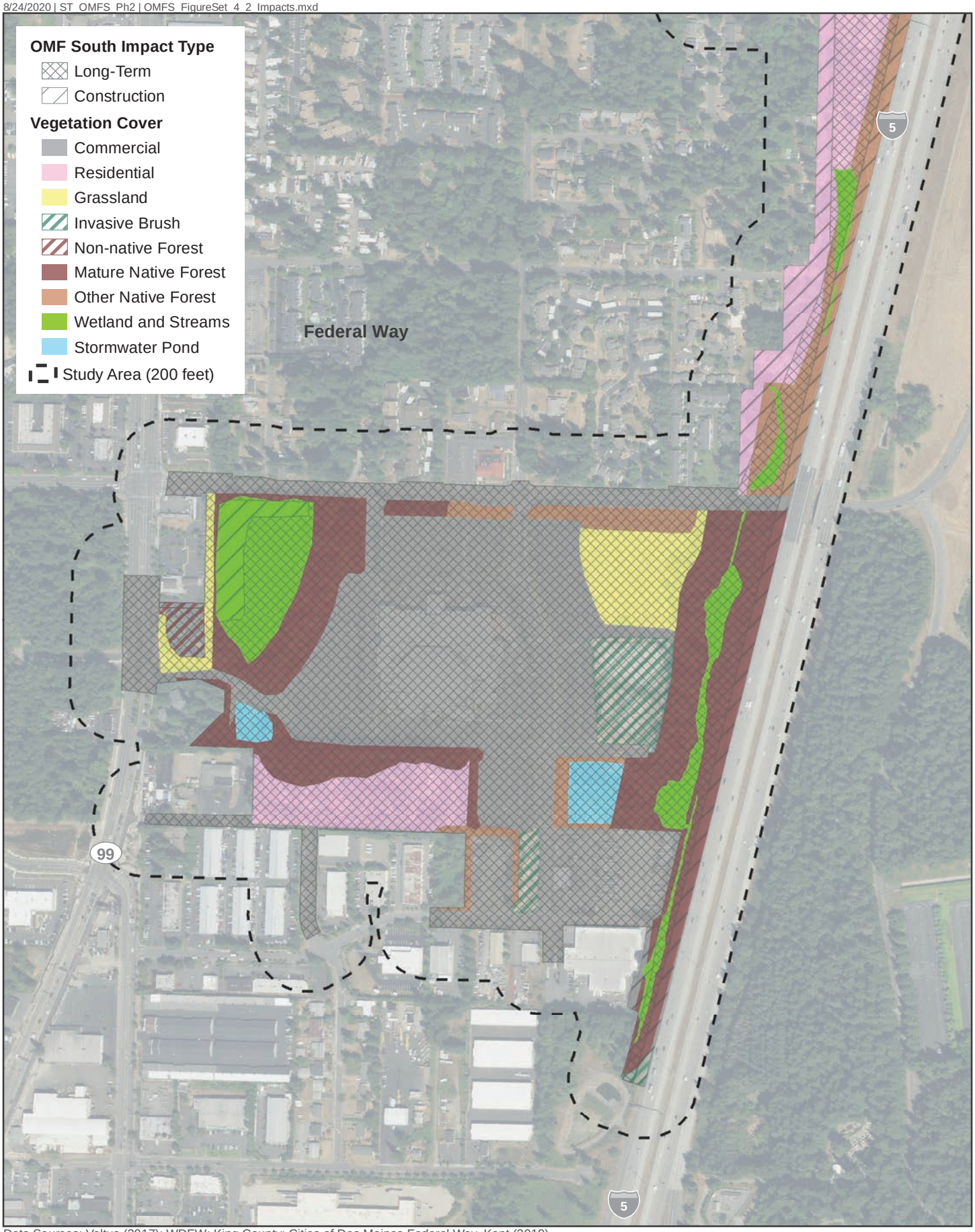


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

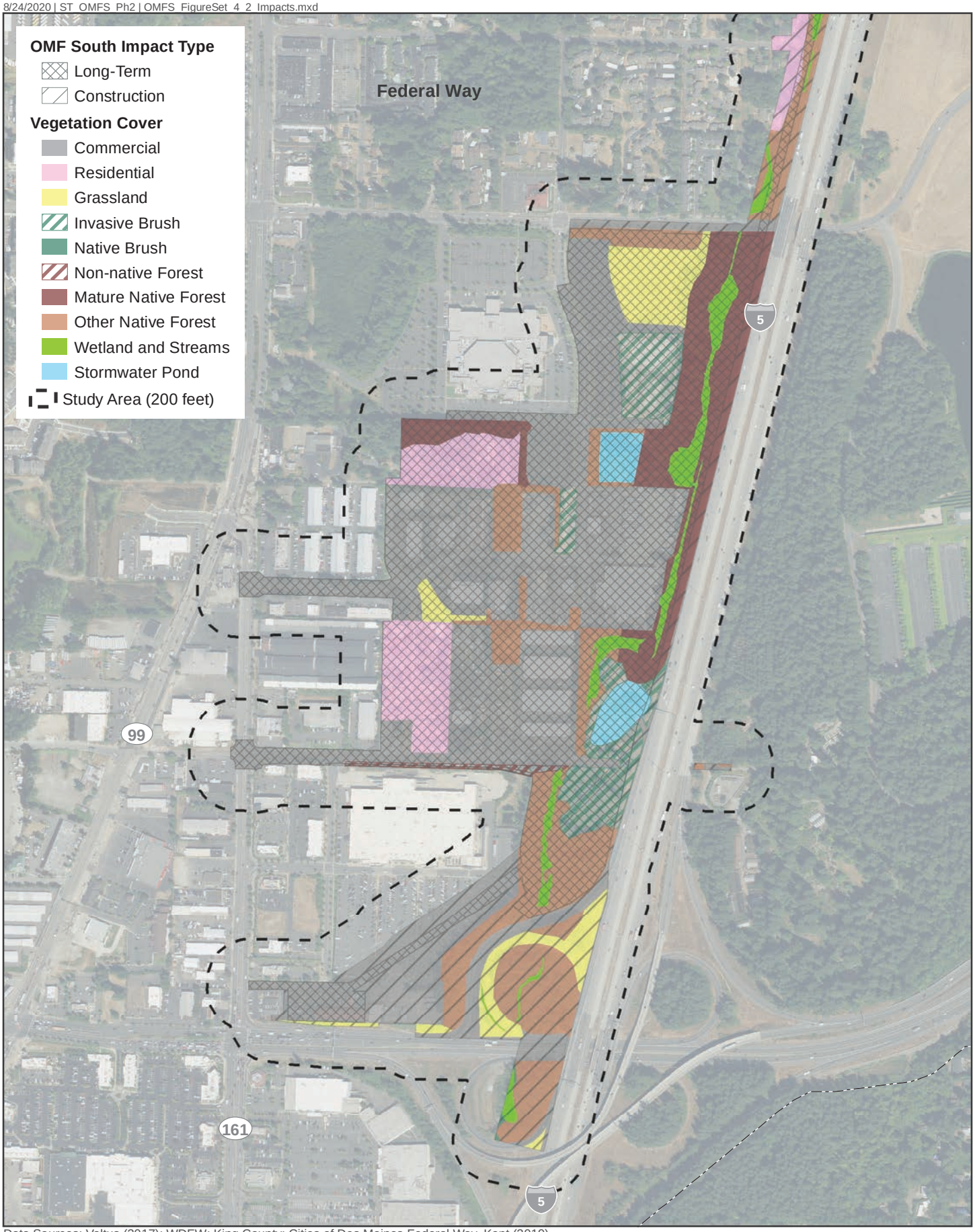
FIGURE G3.4-9
Impacts to Vegetation Cover
South 336th Street and South 344th Street Alternatives
TDLE Design Option
OMF South



Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

FIGURE G3.4-10
Impacts to Vegetation Cover
South 336th Street Alternative

OMF South

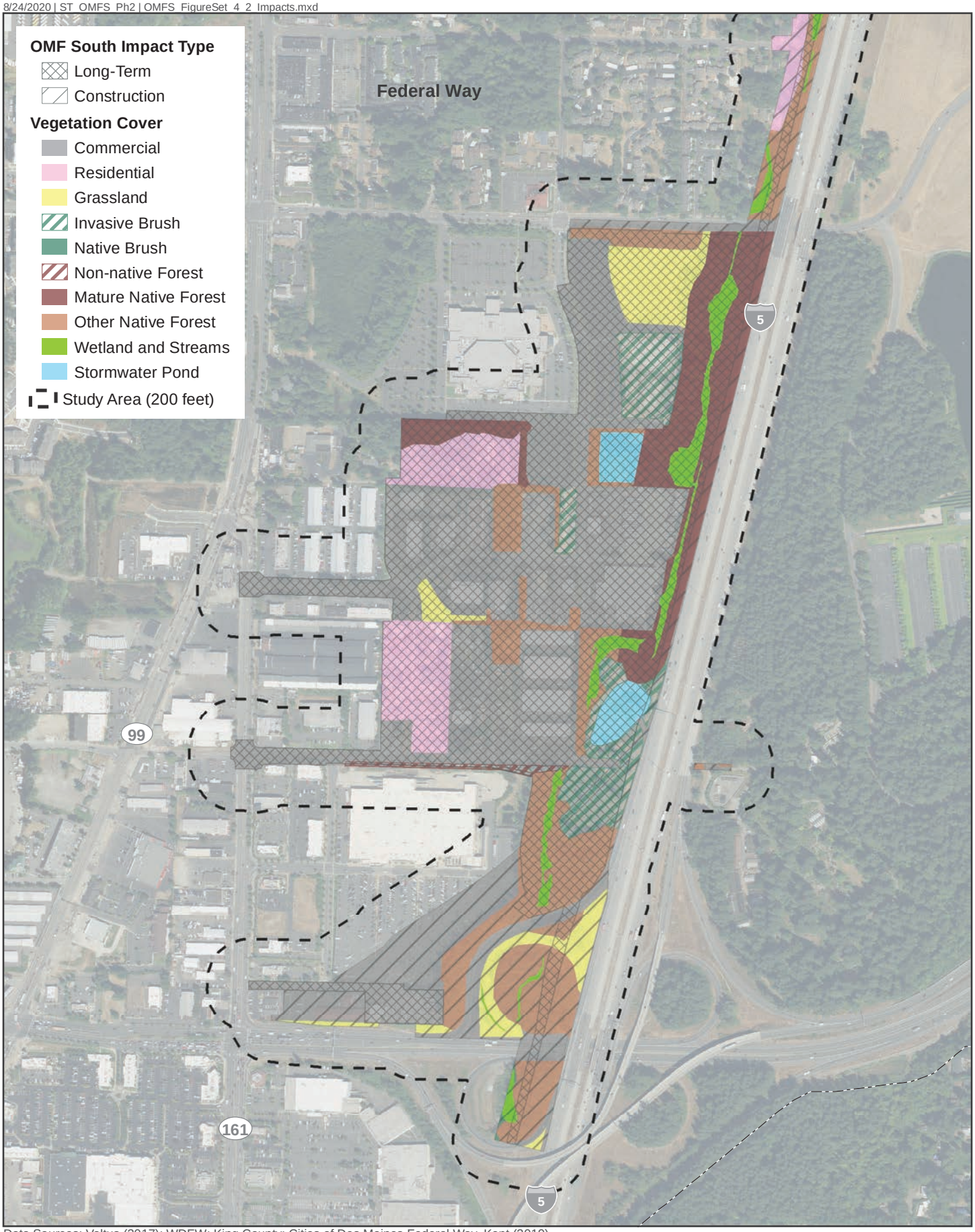


Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-11
Impacts to Vegetation Cover
South 344th Street Alternative
Enchanted Parkway alignment
OMF South



Data Sources: Valtus (2017); WDFW; King County; Cities of Des Moines,Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G3.4-12
Impacts to Vegetation Cover
South 344th Street Alternative
I-5 Alignment
OMF South

The impacts of project operation on vegetation and wildlife habitat would vary, depending on the affected land cover type. In much of the study area (e.g., in areas classified as the Commercial or Residential land cover types), the replacement of existing impervious surfaces and structures would constitute a minimal change in ecological functions such as the capacity to support wildlife.

The severity of impacts would be greater where cover types dominated by native or structurally complex vegetation (i.e., the mature native forest, other native forest, or wetland/stream cover types) are affected. Removing trees, snags, and understory vegetation would eliminate nesting and foraging sites for birds, roosting sites for bats, and hiding cover for small mammals. Alternatives that affect a greater area of such habitat types would have a higher likelihood of adverse effects on vegetation and wildlife.

Noise, Light, and Human Disturbance

Operation of OMF South would entail moderate to high levels of human activity and associated noise and light. Notably, all three project alternatives are adjacent to I-5 and are in developed areas with relatively high levels of human activity. In addition to the noise, light, and vehicle traffic on the highway, regular human activity associated with residential, commercial, institutional, and industrial development is a common feature of the landscape throughout the study area. Wildlife that use habitats in or near the project alternatives are regularly exposed to human activity, noise, and light.

The extent of project-related impacts is based on changes in activity levels. The intensity of each alternative's effects would depend on existing activity patterns and lighting regimes at the site under consideration; these differences are described in the discussions of individual alternatives, below. The potential for adverse effects would be greatest where facilities are constructed near important habitat areas, including forests, wetlands, and riparian areas.

Noise and human activity have been demonstrated to displace wildlife from occupied habitats and to disrupt normal behaviors (e.g., territorial singing of songbirds, mating and alarm calls of amphibians and small mammals, and foraging activities of raptors). Artificial night lighting can adversely affect wildlife by disrupting foraging behavior, circadian rhythms, and dispersal movements (including migration). Potential adverse effects associated with artificial lighting would be minimized through compliance with applicable local lighting standards and BMPs, such as screening and directing lights away from the night sky and nearby residential and natural areas.

If activity or noise levels at the maintenance facility noticeably exceed current conditions, affected animals may be displaced from otherwise suitable habitat, potentially leading to competition with animals that occupy suitable habitat at other sites with less disturbance. Such competition may produce increased stress and decreased reproductive success for affected individuals. Adverse behavioral responses to increased night lighting may have similar consequences. Animals displaced from areas of suitable habitat may be exposed to an elevated risk of predation or vehicle collisions while they are seeking new areas of suitable habitat. Based on the limited amount of area that would be affected under any of the alternatives, such effects would not be expected to measurably reduce the regional populations of any wildlife species. None of the project alternatives is within 0.25 mile of a known breeding area or other sensitive site for any wildlife species of concern.

4.2.2.1 Midway Landfill Alternative

Compared to the other project alternatives, the Midway Landfill Alternative would have minimal effects on native or complex habitats (i.e., the mature native forest, other native forest, and

wetland/stream cover types). Most of the permanently affected area consists of the grassland cover type. Only 4 acres of other native forest would be affected, and no mature native forest or wetland/stream would be affected (Table G3.4-3), primarily because these cover types are not abundant at the Midway Landfill Alternative site (Table G3.3-6).

OMF South operations at the Midway Landfill site would result in a greater increase in human activity and associated noise and light, compared to the other build alternatives. This is because most of the site is currently fenced to limit access to the landfill. In contrast, the South 336th Street and South 344th Street alternative sites are surrounded by commercial and residential areas with relatively high levels of human activity under current conditions. Compared to the other two alternatives, however, the Midway Landfill Alternative would have a lower potential for adverse effects on wildlife, because it would affect fewer acres of structurally complex habitat types.

4.2.2.2 South 336th Street Alternative

The extent of this alternative's effects on the mature native forest, other native forest, and wetland/ stream cover types would be greater than the Midway Landfill Alternative and approximately equal to the South 344th Street Alternative. Under this alternative (with either design option), construction and operation of the facility, including lead tracks and mainline, would result in permanent impacts on approximately 15 acres of mature native forest, 6 acres of other native forest, and 7 acres of the wetland/stream cover type (Table G3.4-3). Most impacts (12 of 15 acres) on the mature native forest cover type would be associated with the facility site rather than the mainline. Approximately 5 acres of mature native forest habitat surrounding Wetland WFW-02 would fall within the permanent impact area of the facility, as would approximately 7 acres along the eastern edge of the facility.

Compared to the South 344th Street Alternative, the South 336th Street Alternative would affect less of the forested wetland and riparian habitats associated with East Fork Hylebos Creek Tributary 0016A. The impacts of TDLE Design Option at the northern end of the mainline would be essentially identical to those of the TDLE Preferred Alternative (see Table G3.4-3).

Based on the prevalence of the Commercial and Residential cover types in the surrounding study area (see Table G3.3-7), OMF South operations at the South 336th Street Alternative site would probably result in a less noticeable increase in human activity and associated noise and light, compared to the Midway Landfill Alternative. By affecting more areas of complex and native cover types, however, this alternative would likely degrade or eliminate more areas that currently provide resting and hiding cover for wildlife. As such, the potential for long-term behavioral disruption or displacement from suitable habitats may be greater under this alternative than under the Midway Landfill Alternative.

4.2.2.3 South 344th Street Alternative

The extent of the South 344th Street Alternative's effects on native and complex habitats would be similar to but lower than that of the South 336th Street Alternative. Differences between these two alternatives arise primarily from the exclusion of Wetland WFW-02 and surrounding forested areas from the impact area of the South 344th Street Alternative. Compared to the South 336th Street Alternative, this alternative would affect fewer acres of the mature native forest (10 acres, compared to 15) and wetland/stream (4 acres, compared to 7) cover types. This alternative would affect 5 to 6 more acres of other native forest than the South 336th Street Alternative, depending on the tail track design option. Similar to the South 336th Street Alternative, most of the impacts on mature native forest would be associated with the facility site, not the mainline (Table G3.4-3).

The impacts of the TDLE Design Option for the curve at the northern end of the mainline would be essentially identical to those of the TDLE Preferred Alternative (see Table G3.4-3). At the southern end of the facility, the design options for the tail tracks would have essentially identical impacts on the mature native forest and wetland/stream cover types, while the I-5 alignment would have slightly more impacts on other native forest, compared to the Enchanted Parkway alignment (see Table G3.4-3).

Based on the smaller extent of impacts on complex and native cover types (and the similar degree of existing development in the study area), this alternative would likely have a lower potential to disturb wildlife over the long term, compared to the South 336th Street Alternative.

4.2.3 Construction Impacts

Construction-related impacts include temporary loss or degradation of terrestrial habitats, as well as disturbance due to construction-related noise, light, and human activity. Clearing for project construction would also increase the risk of contributing to the spread of noxious or invasive weed species. As discussed in Section 2.4.4, Analysis Assumptions, the estimated extent of areas that would be temporarily affected by project construction is based on mapping provided by the project design team.

Noxious weeds and invasive plants rapidly colonize disturbed sites, such as construction areas, preventing native species from becoming reestablished following ground disturbance. Noxious weeds and invasive plants also spread into undisturbed areas and provide poor habitat or forage for wildlife. Several of the BMPs that would be implemented during project construction are intended to avoid, reduce, and control new infestations of noxious weeds (see Section 5.1.1, Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best Management Practices). These BMPs would likely reduce but may not eliminate the potential for noxious weeds and invasive plants to colonize sites disturbed by construction. The risk of colonization would be proportional to the amount of area temporarily disturbed by construction: an alternative with a greater extent of ground disturbance would pose a higher risk of contributing to the establishment or spread of noxious weeds and invasive plants.

In disturbed areas, any of the project alternatives would provide the opportunity to at least temporarily reduce invasive species such as Himalayan blackberry through vegetation removal. In some areas, noxious weeds may be eradicated because cover types dominated by invasive species (e.g., Commercial, Invasive Brush) would be converted to maintenance facilities, landscaping, and other areas where invasive species would not able to grow. In areas where invasive species are replaced with native species, construction-related impacts may result in improved habitat function.

The duration of temporary impacts would vary depending on the type of vegetation that is affected. Impacts on grasses and areas dominated by fast-growing invasive species would generally be short-lived, with functions typically returning to pre-impact levels within one growing season. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs require several years or decades to achieve the size and stature necessary to provide pre-impact functions, such as canopy habitat.

The following sections outline the range of potential temporary construction impacts that could occur for each alternative. These impact areas are summarized in Table G3.4-4 and would be in addition to the long-term direct impacts described in Section 4.2.2, Long-Term Impacts. Actual impacts would depend on the final configuration and design of the Preferred Alternative, construction footprint and methods, BMPs implemented during construction (see Section 5.1.1,

Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best Management Practices), and performance of post-construction restoration. Direct construction impacts would be identified and quantified during the final design and permitting of the Preferred Alternative.

Table G3.4-4 Potential Temporary (Construction-Related) Impacts on Vegetation

Alternative	Design Option	Land Cover Type									
		Commercial	Residential	Grassland	Invasive Brush	Non-native Forest	Mature Native	Other Native	Stream/ Wetland	Stormwater Pond	Total
OMF Site Impacts (acres)											
Midway Landfill	N/A	1	<0.5	2	2	0	0	1	0	<0.5	**7**
South 336th Street	N/A	0	1	<0.5	0	<0.5	0	<0.5	<0.5	0	**2**
South 344th Street	N/A	1	0	<0.5	0	<0.5	<0.5	<0.5	<0.5	0	**1**
Mainline Impacts (acres)											
Midway Landfill[(1)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
South 336th Street	TDLE Preferred Alternative	14	10	3	2	0	2	7	<0.5	<0.5	**38**
	TDLE Design Option	14	9	2	2	0	2	7	<0.5	<0.5	**36**
South 344th Street	TDLE Preferred Alternative and Enchanted Parkway tail track alignment	22	10	6	3	0	2	14	1	<0.5	**58**
	TDLE Design Option and I-5 tail track alignment	22	9	5	3	0	2	13	1	<0.5	**55**
	TDLE Design Option and Enchanted Parkway tail track alignment	22	9	5	3	0	2	14	1	<0.5	**56**
	TDLE Preferred Alternative and I-5 tail track alignment	22	10	5	3	0	2	13	1	<0.5	**56**

Note:

(1) The Midway Landfill Alternative would not include any mainline construction.

4.2.3.1 Midway Landfill Alternative

The extent of temporary, construction-related impacts would be substantially smaller under the Midway Landfill Alternative than under the other build alternatives (Table G3.4-4). Also, much less of the other native forest cover type (and no mature native forest or wetland/stream) is within the temporary impact area of this alternative, compared to the other two project alternatives. As such, this alternative would have the lowest potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction. Based on the small size of the temporary disturbance area, this alternative would have the lowest risk of contributing to the establishment and spread of noxious weeds and invasive plants.

4.2.3.2 South 336th Street Alternative

The construction footprint for this alternative includes a large amount of clearing at the northern end of the mainline to accommodate staging, stockpiling, and other construction activities (Figure G3.4-9). Most of the affected area would consist of the commercial or residential cover types (Table G3.4-4).

The extent of temporary, construction-related impacts on the mature native forest and wetland/stream cover types would be less than that of the South 344th Street Alternative and greater than the Midway Landfill Alternative (Table G3.4-4). Nearly all temporary impacts on vegetation would be associated with construction of the mainline, not the facility site. The associated potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction would thus be slightly lower than that of the South 344th Street Alternative. The temporary impacts of the South 336th Street Alternative and the South 344th Street Alternative on the mature native forest cover type would be similar.

Based on the total extent of temporary, construction-related impacts, the risk of contributing to the establishment and spread of noxious weeds and invasive plants under this alternative would be less than that of the South 344th Street Alternative and substantially greater than that of the Midway Landfill Alternative.

The TDLE Preferred Alternative would have a slightly larger area of temporary impacts, compared to the TDLE Design Option. This difference reflects areas at the northern end of the connecting track segment that would be affected permanently under the TDLE Design Option but only temporarily under the TDLE Preferred Alternative. As such, the TDLE Preferred Alternative would have a slightly higher potential for temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction, as well as a slightly higher risk of contributing to the establishment and spread of noxious weeds and invasive plants.

4.2.3.3 South 344th Street Alternative

Similar to the South 336th Street Alternative, the construction footprint for this alternative includes a large amount of clearing at the northern end of the mainline to accommodate staging, stockpiling, and other construction activities. In addition, the construction footprint for this alternative extends farther south than that of the South 336th Street Alternative, affecting areas around the I-5/SR 18 interchange (see Figure G3.4-11 and Figure G3.4-12). As a result, the total extent of temporary, construction-related impacts under the South 344th Street Alternative would be greater than either of the other build alternatives. As with the South 336th Street Alternative, most of the affected area would consist of the commercial or residential cover types (Table G3.4-4).

The extent of temporary, construction-related impacts on the other native forest, and wetland/stream cover types would be greater than that of the South 336th Street Alternative (Table G3.4-4), resulting in a greater temporary loss or degradation of terrestrial habitats and disturbance of sensitive wildlife species during construction. The temporary impacts of the South 344th Street Alternative and the South 336th Street Alternative on the mature native forest cover type would be equivalent.

The extent of temporary, construction-related impacts – and the associated risk of contributing to the establishment and spread of noxious weeds and invasive plants – would be greater than that of the South 336th Street Alternative (Table G3.4-4).

The differences between the TDLE Preferred Alternative and the TDLE Design Option would be as described for the South 336th Street Alternative. At the southern end of the facility, the design options for the tail tracks would have essentially identical temporary impacts on the mature native forest and wetland/stream cover types, while the Enchanted Parkway alignment would have slightly more impacts on other native forest, compared to the I-5 alignment (see Table G3.4-4).

4.3 Wetlands

Analyses in this subsection address the potential long-term and temporary (i.e., construction-related) impacts of each alternative on wetlands and wetland buffers. Actual impacts would depend on the location and final design of the preferred alternative, the construction footprint and methods, the BMPs implemented during construction (see Section 5.1.1, Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best Management Practices), and the performance of post-construction restoration.

To the extent that impacts cannot be avoided or minimized during the design process or reduced through BMPs, Sound Transit would implement additional measures to offset adverse effects and provide compensatory mitigation measures where adverse effects are unavoidable. Sound Transit has committed to achieving no net loss of ecosystem function on a project-wide basis (Sound Transit 2007). As discussed in Section 5.3, Compensatory Mitigation, compensatory mitigation would be implemented in accordance with applicable federal, state, and local requirements and guidelines.

4.3.1 No-Build Alternative

Under the No-Build Alternative, impacts to wetlands from construction or operation of OMF South would not occur. However, for the purposes of this technical report, the No-Build Alternative assumes that by the design year 2042, all planned Sound Transit 3 projects, including FWLE and TDLE, are built along with the other public and private projects planned within the study area. Because TDLE would open after OMF South, impacts associated with TDLE that would overlap with OMF South, such as the mainline tracks that would connect to the South 336th Street and South 344th Street alternatives, are addressed within the build alternative impacts discussion below.

Construction of FWLE will temporarily affect the buffer of Wetland WL 148.67L in the Midway Landfill Alternative study area. Neither this wetland nor its buffer would be affected by any of the OMF South build alternatives.

4.3.2 Long-Term Impacts

Under any of the project alternatives, direct long-term impacts on wetland resources would occur where permanent features such as project facilities (including lead tracks and mainline) overlap wetlands or wetland buffers.

Filling, excavating, or clearing within wetlands or wetland buffers would diminish wetland functions through the loss of area, changes to surface or subsurface water flows, or long-term changes to vegetation. Project actions that may entail such impacts include construction of buildings, roadways, mainline or lead tracks (including support columns), train storage areas, retaining walls, parking areas, and stormwater facilities.

Not all wetlands underneath elevated structures (e.g., lead tracks and the mainline) would be permanently filled. However, trees and other tall vegetation would not be allowed to grow underneath or within 15 feet of elevated track segments. This would result in the permanent conversion from trees and tall shrubs to short-statured shrubs and herbaceous vegetation. In addition, the long-term presence of structures above vegetation would reduce the amount of sunlight and precipitation the plants receive, potentially making these areas more sparsely vegetated. Also, the interception of precipitation by overhead structures would have the potential for long-term impacts on wetland hydrology. For any given wetland, the severity of those impacts would depend on the proportion of the wetland that is affected, as well as the extent to which precipitation contributes to wetland hydrology at that site.

For these reasons, comparisons of the impacts of the alternatives are based on the overlap between any project features (including elevated structures) and wetlands or wetland buffers. In some cases (for example, where the impact area of an alternative would overlap a substantial proportion of a wetland), impacts that do not encompass an entire wetland may degrade wetland functions to such an extent that the entire wetland would be considered a loss. Such determinations will be based on professional judgment and will be made after the Preferred Alternative has been selected by the Sound Transit Board. Wetland impact areas are summarized in Table G3.4-5 and are depicted in Figures G3.4-1 through G3.4-6. Wetland buffer impacts are summarized in Table G3.4-6. Impacts associated with each alternative, including tabular summaries of impacts on individual wetlands, are discussed in the subsections that follow. The impacts of the mainline track options on wetlands and wetland buffers would be almost identical and are, therefore, addressed together for the South 336th Street and South 344th Street alternatives.

As discussed in Section 2.4.4, Analysis Assumptions, the impact values and areas in the table and figures represent conservative estimates of the impacts of the alternatives. Not all areas within the project footprint would be converted to structures or hard surfaces. Actual anticipated impacts will be determined when an alternative is selected to be built and the project design is sufficiently advanced to undergo permitting review.

Table G3.4-5 Potential Long-Term Wetland Impacts

Wetland Rating[1]	Alternative		
	Midway Landfill	South 336th Street[2]	South 344th Street[3]
OMF Site Impacts			
Category II Wetlands	0	3.5	0.9
Category III Wetlands	0	<0.05	0.5
Total Site Impacts	*0*	*3.5*	*1.4*
Mainline Impacts[3]			
Category II Wetlands	0	0.8	1.0
Category III Wetlands	0	0.6	0.4
Total Mainline Impacts	*0*	*1.4*	*1.5*
Total Impacts	***0***	***4.9***	***2.9***

Notes:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities.

(2) The impacts of the design options for the curve at the northern end of the mainline would differ by less than 0.05 acre.

(3) The impacts of the design options for the mainline, including the tail tracks, for the South 344th Street Alternative would range from 2.8 to 2.9 acres; see Table G3.4-8 for details.

Table G3.4-6 Potential Long-Term Wetland Buffer Impacts

Alternative / Mainline Design Option		Wetland Buffer Impacts (acres)[1,2]	Affected Wetland Buffers
OMF Site Impacts[3]			
Midway Landfill		0	N/A
South 336th Street		7.7	WFW-01, WFW-02, WFW-03, WFW-06, WFW-14, WFW-15
South 344th Street		6.6	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-17, WFW-18
Mainline Impacts			
South 336th Street	With TDLE Preferred Alternative	4.0	WFW-01, WFW-03, WFW-04, WFW-06, WFW-11, WFW-13, WFW-15
	With TDLE Design Option	4.5	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15
South 344th Street	With TDLE Preferred Alternative and Enchanted Parkway tail track alignment	6.1	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-11, WFW-13, WFW-15, WFW-17
	With TDLE Design Option and I-5 tail track alignment	6.9	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15, WFW-17, WFW-21
	With TDLE Design Option and Enchanted Parkway tail track alignment	6.6	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-07, WFW-11, WFW-13, WFW-15, WFW-17
	With TDLE Preferred Alternative and I-5 tail track alignment	6.5	WFW-01, WFW-03, WFW-04, WFW-05, WFW-06, WFW-11, WFW-13, WFW-15, WFW-17, WFW-21

Note:

(1) Values presented in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream area and stream buffers.

(2) Values in this table likely overestimate the extent of buffer impact areas. These values include all areas within wetland buffers, including the buffers on wetlands that may be permanently eliminated by project construction. If a wetland is eliminated, the surrounding area no longer serves as a wetland buffer, and impacts on that surrounding area do not constitute wetland buffer impacts. If one of the build alternatives is selected, actual buffer impacts would be determined through the permitting process.

(3) The design options for the curve at the northern end of the mainline and for the tail tracks do not influence the impact footprint of the OMF sites; therefore, only one set of impact values is presented for each OMF site.

4.3.2.1 Midway Landfill Alternative

The Midway Landfill Alternative would have no long-term impacts on wetlands because there are no regulated wetlands or wetland buffers within the temporary or permanent impact footprints of this alternative (see Section 3.3.1.1, Midway Landfill Alternative).

4.3.2.2 South 336th Street Alternative

The South 336th Street Alternative, including the mainline, would have the greatest extent of long-term impacts on wetlands and wetland buffers among the project alternatives (Tables G3.4-5 and G3.4-6). Impacts on individual wetlands are shown in Table G3.4-7.

Table G3.4-7 Potential Long-Term Impacts of the South 336th Street Alternative on Wetlands

Wetland ID[1]	TDLE Preferred Alternative	TDLE Design Option
OMF Site Impacts[2]		
Category II Wetlands		
WFW-01	0.9	
WFW-02	2.6	
Category II Subtotal	*3.5*	
Category III Wetlands		
WFW-15	<0.05	
Category III Subtotal	*<0.05*	
Total Site Impacts	**3.5**	
Mainline Impacts		
Category II Wetlands		
WFW-01	0.6	0.6
WFW-03	0.2	0.2
Category II Subtotal	*0.8*	*0.8*
Category III Wetlands		
WFW-06	<0.05	<0.05
WFW-07	0	<0.05
WFW-11	0.3	0.3
WFW-15	0.2	0.2
Category III Subtotal	*0.5*	*0.6*
Total Mainline Impacts	**1.3**	**1.4**
Total Impacts	***4.8***	***4.9***

Notes:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities. See Table G3.3-8 for information about the size and rating of individual wetlands.

(2) The design options for the curve at the northern end of the mainline do not influence the impact footprint of the OMF site; therefore, only one set of impact values is presented for the OMF site.

Most of the total wetland impact area (2.6 acres of 4.9 acres total) would occur in Wetland WFW-02, a Category II forested wetland that is associated with West Fork Hylebos Creek Tributary 0014C and contained within a stormwater facility in the northwestern portion of the proposed OMF South footprint. The preliminary facility design in this area shows a fill slope extending into the eastern portion of the wetland and a retaining wall along the northern edge. The fill slope would have a slope ratio of 3:1 (i.e., 1 foot of vertical difference for every 3 horizontal feet) and would be able to support trees and other vegetation that provide substantial ecological functions in the wetland buffer. As discussed in Section 5.1.1, Avoidance and Minimization During Design Development, Sound Transit is exploring options to further avoid and minimize impacts on wetlands during the design development process, to the extent feasible.

Most of the other impacted wetlands are riverine wetlands associated with East Fork Hylebos Creek Tributary 0016A (Wetlands WFW-01, WFW-03, WFW-06, WFW-07, and WFW-15). The largest of these is Wetland WFW-01, which lies entirely within the permanent impact footprint. The other wetland intersected by the permanent impact footprint is Wetland WFW-11, which lies partially within the WSDOT I-5 right-of-way.

Wetlands WFW-01 and WFW-15 straddle the boundary between the facility site and the mainline and would be affected by both. Wetland WFW-02 would be affected by the site only. Wetlands WFW-03, WFW-06, WFW-07, and WFW-11 would be affected by the mainline only (Table G3.4-5).

Wetlands WFW-01, WFW-06, and WFW-15 would be affected by lead tracks. With the possible exception of support columns for the lead tracks, no permanent structures would likely be placed within any of these wetlands, or within Wetland WFW-03 (which would be affected by the southern tail tracks). Project-related impacts would primarily be associated with vegetation clearing and the interception of sunlight and precipitation by overhead structures.

This alternative would have permanent impacts on the buffers of all the wetlands identified above, as well as the buffers of three additional wetlands (WFW-04, WFW-13, and WFW-14). The buffers of Wetlands WFW-01, WFW-03, WFW-06, and WFW-15 straddle the boundary between the facility site and the mainline and would be affected by both. Buffers for Wetlands WFW-02 and WFW-14 would be affected by the site only. Buffers for Wetlands WFW-04, WFW-07, WFW-11, and WFW-13 would be affected by the mainline only (Table G3.4-6).

Impacts on Wetland WFW-07 would vary with the mainline track option. The TDLE Design Option would intersect a small portion of the wetland (less than 0.05 acre); the TDLE Preferred Alternative would avoid long-term impacts on it – and its buffer – altogether.

4.3.2.3 South 344th Street Alternative

The extent of long-term direct impacts on wetlands under the South 344th Street Alternative, would be substantially less (2.8 to 2.9 acres) than under the South 336th Street Alternative (4.8 to 4.9 acres), primarily because the facility site would not impact Wetland WFW-02 (Table G3.4-5; impacts of this alternative on individual wetlands are shown in Table G3.4-8). The impacts of the mainline would be similar in scale to those of the South 336th Street Alternative. Long-term impacts on most of Wetland WFW-15 would also be avoided. The long-term impact footprint of this alternative would include five wetlands (WFW-04, WFW-05, WFW-17, WFW-18, and [if the I-5 tail track alignment is used] WFW-21) that would not be impacted by the South 336th Street Alternative, as well as a greater extent of Wetland WFW-03. Wetlands WFW-01 and WFW-03 would be affected by lead tracks. Impacts on Wetlands WFW-01, WFW-06, and WFW-11 would be identical to those of the South 336th Street Alternative.

Table G3.4-8 Potential Long-Term Impacts of the South 344th Street Alternative on Wetlands

Wetland ID[1]	TDLE Preferred Alternative and Enchanted Parkway Tail Track Alignment	TDLE Design Option and I-5 Tail Track Alignment	TDLE Design Option and Enchanted Parkway Tail Track Alignment	TDLE Preferred Alternative and I-5 Tail Track Alignment
OMF Site Impacts[2]				
Category II Wetlands				
WFW-01	0.9			
Category II Subtotal	*0.9*			
Category III Wetlands				
WFW-04	0.5			
WFW-18	<0.05			
Category III Subtotal	*0.5*			
Total Site Impacts	**1.4**			
Mainline Impacts				
Category II Wetlands				
WFW-01	0.6	0.6	0.6	0.6
WFW-03	0.3	0.3	0.3	0.3
WFW-05	0.1	0.1	0.1	0.1
Category II Subtotal	*1.0*	*1.0*	*1.0*	*1.0*

Table G3.4-8 Potential Long-Term Impacts of the South 344th Street Alternative on Wetlands (continued)

Wetland ID[1]	TDLE Preferred Alternative and Enchanted Parkway Tail Track Alignment	TDLE Design Option and I-5 Tail Track Alignment	TDLE Design Option and Enchanted Parkway Tail Track Alignment	TDLE Preferred Alternative and I-5 Tail Track Alignment
Category III Wetlands				
WFW-04	<0.05	<0.05	<0.05	<0.05
WFW-06	<0.05	<0.05	<0.05	<0.05
WFW-07	0	<0.05	<0.05	0
WFW-11	0.3	0.3	0.3	0.3
WFW-15	<0.05	<0.05	<0.05	<0.05
WFW-17	<0.05	<0.05	<0.05	<0.05
WFW-21	0	<0.05	0	<0.05
Category III Subtotal	*0.4*	*0.5*	*0.4*	*0.4*
Total Mainline Impacts	**1.4**	**1.5**	**1.4**	**1.4**
Total Impacts	***2.8***	***2.9***	***2.8***	***2.8***

Notes:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities. See Table G3.3-8 for information about the size and rating of individual wetlands.

(2) The design options for the curve at the northern end of the mainline and for the tail tracks do not influence the impact footprint of the OMF site; therefore, only one set of impact values is presented for the OMF site.

Wetlands WFW-01 and WFW-04 straddle the boundary between the facility site and the mainline and would be affected by both. Wetland WFW-18 would be affected by the site only. Wetlands WFW-03, WFW-05, WFW-06, WFW-07, WFW-11, WFW-15, WFW-17, and WFW-21 would be affected by the mainline only (Table G3.4-5).

This alternative would have permanent impacts on the buffers of all the wetlands identified above, as well as the buffers of three additional wetlands (WFW-13, WFW-18, and WFW-21; see Table G3.4-6).

The direct long-term impacts of the design options on wetlands would be essentially identical. As under the South 336th Street Alternative, the TDLE Preferred Alternative would avoid long-term impacts on Wetland WFW-07 and its buffer. The only difference between the impacts of the tail track options is that the I-5 alignment would affect Wetland WFW-21, while the Enchanted Parkway alignment would avoid that wetland (Table G3.4-5). These differences would be less than 0.05 acre.

4.3.3 Construction Impacts

Although detailed construction limits have not yet been defined at this phase in the project design, potential project construction limits have been estimated (see Section 2.4.4, Analysis Assumptions). These temporarily impacted areas are summarized in Tables G3.4-7 and G3.4-8 and would be in addition to the long-term direct impacts described in Section 4.1.1, No-Build Alternative.

Table G3.4-9 Potential Temporary (Construction-Related) Impacts on Wetlands

Wetland Rating[1]	Alternative		
	Midway Landfill	South 336th Street[2]	South 344th Street[2,3]
OMF Site Impacts			
Category II Wetlands	0	1.5	0
Total Site Impacts	*0*	*1.5*	*0*
Mainline Impacts			
Category II Wetlands	0	0.1	0
Category III Wetlands	0	0.1	0.5
Category IV Wetlands	0	<0.05	0.1
Total Mainline Impacts	*0*	*0.2*	*0.6*
Total Impacts	***0***	***1.7***	***0.6***

Notes:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities.

(2) The design options for the curve at the northern end of the mainline would have essentially identical impacts (less than 0.05-acre difference) on wetlands.

(3) The impacts of the design options for the tail tracks at the southern end of the South 344th Street Alternative would range from 0.5 to 0.6 acre; see Table G3.4-12 for details.

Table G3.4-10 Potential Temporary (Construction-Related) Impacts on Wetland Buffers

Alternative/Mainline Design Option		Wetland Buffer Impacts (acres)[1]	Affected Wetland Buffers
OMF Site Impacts			
Midway Landfill		0	N/A
South 336th Street		0.1	WFW-02, WFW-14, WFW-15
South 344th Street		0	N/A
Mainline Impacts			
South 336th Street	With TDLE Preferred Alternative	4.1	WFW-01, WFW-03, WFW-04, WFW-06, WFW-07, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16
	With TDLE Design Option	3.6	
South 344th Street	With TDLE Preferred Alternative and Enchanted Parkway tail track alignment	6.6	WFW-01, WFW-03, WFW-05, WFW-06, WFW-07, WFW-10a, WFW-11, WFW-12, WFW-13, WFW-15, WFW-16, WFW-21, WFW-22
	With TDLE Design Option and I-5 tail track alignment	5.7	
	With TDLE Design Option and Enchanted Parkway tail track alignment	6.1	
	With TDLE Preferred Alternative and I-5 tail track alignment	6.2	

Note:

(1) Values presented in this table represent all affected areas inside functional wetland buffers, including areas that overlap with stream area and stream buffers.

Temporary, construction-related impacts on wetland resources would occur where wetlands or wetland buffers are affected by clearing and ground-disturbing work but are restored following construction. Such areas are within the project limits (including temporary construction easements) but not within the permanent footprint of the proposed facilities (including lead tracks and mainline). Temporary impacts may include temporary alteration of wetland area, soils, hydrology, vegetation, or type.

Temporary impacts on wetlands may result from the use of staging areas, temporary work areas, access roads, stream relocations, cofferdams, clearing, stockpiles, erosion and sediment controls, or other temporary structures necessary to complete construction of the permanent facilities. Construction-related dewatering may temporarily alter groundwater discharge to wetlands. Wetland and wetland buffer functions could also be impacted by soil compaction, accidental spills of hazardous substances, noise and other human-caused disturbances, sedimentation, and introduction of invasive species.

The duration of temporary impacts on wetlands would vary depending on the type of vegetation that is affected. For instance, temporary impacts on emergent wetlands are generally short-lived, with functions typically returning to pre-impact performance within one growing season. In contrast, temporary impacts on woody vegetation generally last longer because trees and/or shrubs may require several years or decades to achieve the size and stature necessary to provide pre-construction functions such as canopy habitat.

The following sections outline the range of potential temporary construction impacts that could occur under each alternative. Actual impacts would depend on the final configuration and design of the Preferred Alternative, construction footprint and methods, BMPs implemented during construction (see Section 5.1.1, Avoidance and Minimization During Design Development, and Section 5.1.2, Construction Best Management Practices), and performance of post-construction restoration. Direct construction impacts would be identified and quantified during the final design and permitting of the Preferred Alternative.

4.3.3.1 Midway Landfill Alternative

The Midway Landfill Alternative would have no temporary, construction-related impacts on wetlands because there are no federally or state-regulated wetlands or wetland buffers within the temporary impact footprint of this alternative.

4.3.3.2 South 336th Street Alternative

Overall, temporary (construction-related) impacts on wetlands under the South 336th Street Alternative would be greater than under the South 344th Street Alternative, primarily because this alternative would affect Wetland WFW-02 while the South 344th Street Alternative would not (Table G3.4-7, Table G3.4-11). The extent of temporary, construction-related impacts on wetlands and wetland buffers would be substantially less than the extent of long-term impacts, because the temporary impact footprint is smaller and intersects fewer wetlands than the permanent impact footprint.

Table G3.4-11 Potential Temporary (Construction-Related) Impacts of the South 336th Street Alternative on Wetlands

Wetland ID[1]	TDLE Preferred Alternative	TDLE Design Option
OMF Site Impacts[2]		
Category II Wetlands		
WFW-02	1.5	
Category II Subtotal	*1.5*	
Total Site Impacts	**1.5**	
Mainline Impacts		
Category II Wetlands		
WFW-03	0.1	0.1
Category II Subtotal	*0.1*	*0.1*

Table G3.4-11 Potential Temporary Impacts of the South 336th Street Alternative on Wetlands (continued)

Wetland ID[1]	TDLE Preferred Alternative	TDLE Design Option
Category III Wetlands		
WFW-07	<0.05	<0.05
WFW-10a	<0.05	<0.05
WFW-11	<0.05	<0.05
Category III Subtotal	*0.1*	*<0.05*
Category IV Wetlands		
WFW-13	<0.05	<0.05
Category IV Subtotal	*<0.05*	*<0.05*
Total Mainline Impacts	**0.2**	**0.2**
Total Impacts	***1.7***	***1.7***

Notes:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities. See Table G3.3-8 for information about the size and rating of individual wetlands.

(2) The design options for the curve at the northern end of the mainline do not influence the impact footprint of the OMF site; therefore, only one set of impact values is presented for the OMF site.

Other than Wetland WFW-02 (which would be affected by site construction), the only temporary impacts on wetlands would result from construction of the mainline or tail track. Mainline construction would affect the northern end of Wetland WFW-07, the northern tip of Wetland WFW-10a, the eastern edge of Wetland WFW-11, and the entirety of Wetland WFW-13. Tail track construction would affect Wetland WFW-03. Construction of the facility and the mainline would temporarily affect the buffers of all of the wetlands identified above, as well as the buffers of several additional wetlands (WFW-01, WFW-05, WFW-06, WFW-12, WFW-13, WFW-16, and WFW-22).

The direct temporary impacts of the design options for the curve at the northern end of the mainline would be essentially indistinguishable (Table G3.4-11). The design options would differ in their impacts on wetland buffers, with the TDLE Preferred Alternative affecting more of the buffer of Wetland WFW-07 as compared to the TDLE Design Option.

4.3.3.3 South 344th Street Alternative

The extent of temporary, construction-related impacts on wetlands and wetland buffers under the South 344th Street Alternative would be substantially less than under the South 336th Street Alternative, primarily because this alternative would not impact Wetlands WFW-02 and WFW-03. Although this alternative would affect three wetlands that would be avoided by the South 336th Street Alternative (Wetlands WFW-15, WFW-21, and WFW-22), the total area of those impacts would be smaller than the extent of temporary impacts on Wetland WFW-02. Site construction would have no temporary impacts on wetlands or wetland buffers; all temporary impacts would be associated with mainline construction.

Project construction would result in temporary impacts on the buffers of all directly affected wetlands, as well as the buffers of several additional wetlands (WFW-01, WFW-03, WFW-05, WFW-06, WFW-12, and WFW-16; see Table G3.4-8).

As with the South 336th Street Alternative, the TDLE Preferred Alternative at its northern end would have a larger construction-related impact on the buffer Wetland WFW-07 as compared to the TDLE Design Option. The temporary impacts of the tail track design options would be largely identical (Table G3.4-12), although the I-5 alignment would affect more of Wetland WFW-21's buffer than would the Enchanted Parkway alignment (Table G3.4-8).

Table G3.4-12 Potential Temporary (Construction-Related) Impacts of the South 344th Street Alternative on Wetlands

Wetland ID[1]	TDLE Preferred Alternative and Enchanted Parkway Tail Track Alignment	TDLE Design Option and I-5 Tail Track Alignment	TDLE Design Option and Enchanted Parkway Tail Track Alignment	TDLE Preferred Alternative and I-5 Tail Track Alignment
OMF Site Impacts				
Total Site Impacts	0			
Mainline Impacts				
Category III Wetlands				
WFW-07	<0.05	<0.05	<0.05	<0.05
WFW-10 Unit A	<0.05	<0.05	<0.05	<0.05
WFW-11	<0.05	<0.05	<0.05	<0.05
WFW-15	0.2	0.2	0.2	0.2
WFW-21	0.2	0.2	0.2	0.2
Category III Subtotal	*0.5*	*0.5*	*0.5*	*0.5*
Category IV Wetlands				
WFW-13	<0.05	<0.05	<0.05	<0.05
WFW-22	<0.05	<0.05	<0.05	<0.05
Category IV Subtotal	*0.1*	*0.1*	*0.1*	*0.1*
Total Mainline Impacts	**0.6**	**0.6**	**0.6**	**0.6**
Total Impacts	***0.6***	***0.6***	***0.6***	***0.6***

Note:

(1) Wetland ratings (Hruby 2014) are preliminary and subject to review by permitting authorities. See Appendix G3, Ecosystem Resources Technical Report, for information about the size and rating of individual wetlands.

4.4 Indirect Impacts

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

For aquatic species and habitat, indirect impacts would be minimal because the surrounding areas are already heavily developed. OMF South is not expected to interfere with future projects that may provide habitat improvements, such as road projects that may improve fish passage or projects that may enhance vegetated and wetland areas in the project corridor. OMF South would be designed to ensure that it would not preclude future culvert replacement(s) by WSDOT to provide fish passage.

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

Indirect impacts from OMF South may result in long-term wetland degradation from stormwater discharges and alterations in wetland hydrology; however, stormwater detention and treatment activities would minimize long-term indirect water quality impacts on wetlands.

4.5 Cumulative Impacts

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

Permitted impacts for FWLE are 0.9 acre of wetland, 4.5 acres of wetland buffer, and 0.2 acre of riparian forest buffer (Sound Transit 2020). In addition, the Final Environmental Impact Statement for FWLE identified impacts on 35 acres of forested habitat (Sound Transit 2016a). That Environmental Impact Statement also analyzed impacts associated with the relocation of approximately 1,000 linear feet of stream channel (Bingaman Creek, which will be rerouted to meander around the columns supporting the elevated mainline). These impacts have been mitigated through permitting process with regulatory agencies and local jurisdictions. FTA (2017) determined that FWLE will not impact fish passage in Bingaman Creek or elsewhere; the project was designed to allow WSDOT to implement fish passage improvements on Bingaman Creek in the future, if necessary. In addition, by complying with WSDOT's and local jurisdictions' rules concerning tree replacement and the maintenance of visual quality, FWLE is expected to increase the amount of vegetated area over the long term.

Other reasonably foreseeable future projects that could adversely affect ecosystem resources in the study area include TDLE, the City of Federal Way's City Center Access project, and WSDOT's SR 509 Completion project. All these projects are largely on developed or partially developed parcels. Nevertheless, possible short-term and long-term impacts of these projects include loss or degradation of vegetation, wildlife habitat, streams, wetlands, and associated buffer areas. Impacts of TDLE would contribute to those of the South 336th Street Alternative or the South 344th Street Alternative. Similarly, impacts of the Federal Way City Center Access project would contribute to those associated with construction of the mainline north of the of the South 336th Street Alternative or the South 344th Street Alternative. The SR 509 Completion project area extends along I-5 as far south as the Midway Landfill Alternative, but the only proposed project element near the Midway Landfill site is an auxiliary lane on southbound I-5. Construction of an auxiliary lane would be unlikely to adversely affect ecosystem resources at or near the Midway Landfill Alternative.

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

5 POTENTIAL MITIGATION MEASURES

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

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

5.1 Avoidance and Minimization

The project alternatives incorporate the avoidance and minimization of impacts as a guiding principle during preliminary and final design. The build alternatives for the proposed project would avoid or minimize potential impacts on ecosystems resources whenever practicable. Sound Transit would comply with standard specifications, BMPs, and applicable federal, state, and local mitigation requirements during design, construction, and post-construction activities. Sound Transit would meet all regulatory requirements and continue to implement proactive avoidance and minimization measures related to these BMPs in adherence with federal, state, and local regulations.

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

5.1.1 Avoidance and Minimization During Design Development

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

Most of the project has been located within heavily developed areas and/or along major road corridors (i.e., I-5, SR 99), thereby avoiding impacts on large patches of undisturbed habitat. To minimize impacts on remnant habitat patches, the project abuts these major roads with the minimum margin allowed under transportation safety and planning requirements.

Sound Transit has committed to minimizing the need for streams to be enclosed in pipes or culverts and has designed the alternative OMF South sites to avoid piping any stream channels.

As discussed in Section 4.1.2.3, South 344th Street Alternative, the only site where a new culvert could possibly be needed is at a location under consideration for an emergency vehicle access route to the TDLE mainline under the South 344th Street Alternative. If a culvert is needed at that location, it would be designed and installed in accordance with WDFW's Water Crossing Design Guidelines (Barnard et al. 2013), avoiding the potential creation of a barrier to fish passage. In addition, the 60-foot culvert would be installed in an area where the South 344th Street Alternative would daylight approximately 800 feet of stream that is currently enclosed in pipes that are a barrier to fish passage. The need for a culvert at this site is not certain. If it is needed, there would still be a 740-foot gain of surface-flowing stream.

Detailed delineations of stream and wetland features along Hylebos Creek and its tributaries were prepared by Sound Transit and used by project designers to avoid and minimize impacts on these resources, where feasible. The project design was adjusted to avoid and minimize impacts on streams, riparian areas, wetlands, and mature forested areas, particularly along East Fork Hylebos Creek Tributary 0016A. For example, the proposed design of the South 336th Street Alternative includes a retaining wall along the eastern boundary of the OMF South site to minimize impacts on the stream and associated wetlands in that area.

In addition, Sound Transit placed priority on minimizing impacts on West Fork Hylebos Creek Tributary 0014C and Wetland WFW-02 in the northwestern corner of the South 336th Street Alternative OMF South site. The design team determined that it would not be possible to completely avoid impacts in that area without severely compromising operations at the OMF South site. Working with that constraint, the design team developed a site layout that would affect a smaller area of the wetland. Sound Transit is actively exploring options (such as the use of a retaining wall instead of a fill slope) for further reductions of the project footprint in that area.

Vegetation clearing and related habitat impacts were avoided and minimized to the degree feasible by focusing design elements, particularly staging and lay-down areas, in locations that are already developed or heavily disturbed.

5.1.2 Construction Best Management Practices

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

5.1.2.1 General BMPs for All Sensitive Areas

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

Sound Transit would also implement appropriate measures to minimize the risk of introduction and spread of noxious and invasive plant and animal species. To minimize the risk of harm to

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

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

5.1.2.2 Fish and Aquatic Habitat Protection

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

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

Any culverts installed in waters of the state would comply with the fish passage requirements specified in WAC 220-110-070 and would be designed using the stream simulation methodology outlined in WDFW's Water Crossing Design Guidelines (Barnard et al. 2013). Any affected streambeds or stream banks adjacent to culverts would be permanently restored with plantings of native or approved woody and herbaceous species within one year of completion of each phase of construction. Bank protection, if required, would follow the guidelines set forth in Washington State's Integrated Streambank Protection Guidelines (Cramer et al. 2003).

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

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

- Operating heavy equipment above the OHWL, except as specifically authorized under the HPA issued for the project.
- Covering temporarily stored materials with plastic or other impervious material during rain events to prevent sediments from being washed from the storage area to surface waters.

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

5.1.3 Design and Operation Best Management Practices

The project would install permanent stormwater runoff treatment and flow control facilities where needed according to the requirements of applicable stormwater and surface water design manuals. Where applicable and feasible, the project would incorporate stormwater conveyance and management facilities that promote infiltration. Sound Transit would design and construct permanent stormwater treatment facilities and flow-control measures to minimize impacts on stream water quality and flow.

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

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

5.2 Rectifying and Reducing Impacts over Time

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

Under the South 336th Street Alternative or the South 344th Street Alternative, construction of the OMF and associated elevated mainline would necessitate the realignment of the stream channel for East Fork Hylebos Creek Tributary 0016A. The stream channel in this area would be reconfigured to include meanders and other features that enhance the availability and diversity of aquatic habitats. The new channel would be designed to maintain flows and water quality conditions. Substrate and bank conditions in the realigned channel would be improved from existing conditions.

5.3 Compensatory Mitigation

For unavoidable long-term impacts on wetlands, streams, and their buffers, Sound Transit would develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal, state, and local requirements and guidelines. These guidelines and regulatory standards include the federal Final Compensatory Mitigation Rule (40 Code of Federal Regulations [CFR] Part 230); interagency guidance (Ecology et al. 2006 or as updated); and the applicable local critical areas ordinances. Where the project affects any fish-bearing streams or fish passage structures, Sound Transit would coordinate with the appropriate tribes and agencies (e.g., WSDOT, WDFW) on mitigation concepts, restoration priorities and methods.

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

Sound Transit plans to follow the federal mitigation hierarchy (Corps and EPA 2008), which prioritizes approved mitigation banks and in-lieu fee programs, where available.

5.3.1 Approved Mitigation Bank

The Port of Tacoma's Upper Clear Creek mitigation bank was certified in June 2020 and could be available for use to offset project impacts in the Hylebos Creek watershed if credits are available at the time of permitting.

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

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

5.3.3 Project-Specific Mitigation Developed by Sound Transit

Sound Transit has committed to achieving no net loss of wetland function and area on a project-wide basis. Sound Transit might be required to mitigate for unavoidable impacts on wetlands through permittee-responsible, project-specific mitigation in accordance with the federal Final Compensatory Mitigation Rule (40 CFR Part 230) and joint guidance developed by Ecology, the Corps, and the EPA (Ecology et al. 2006 or as updated). This guidance supports the implementation of a watershed approach to selecting mitigation sites. This approach allows for a greater degree of flexibility in selecting mitigation sites and potentially greater value created for

the watershed than the previous regulatory focus on onsite mitigation. Sound Transit anticipates using this approach to determine the appropriate location, amount, and types of compensatory mitigation to compensate for the specific type and degree of functions affected by the project.

Opportunities for wetland and stream mitigation may occur in the study area and within the greater project vicinity. In cooperation with resource agencies and tribes, Sound Transit would develop plans to mitigate the effects of the project on wetlands, streams, and regulatory buffers on a watershed basis. To the extent possible, compensatory mitigation sites would be identified and compensate for lost values in-kind. It may be necessary to use several sites and mitigation approaches given the project size, the variety of impacts, complexity of identifying mitigation opportunities, and mitigation requirements.

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

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

6 REFERENCES

Anchor (Anchor QEA). 2019. SR 509 Completion – SR 509 Stage 1b Project Wetland Assessment Report. Prepared by Anchor QEA, July 2019. 339 pp.

Anderson, H.E., and S.F. Pearson. 2015. Streaked Horned Lark habitat characteristics. Center for Natural Lands Management and Washington Department of Fish and Wildlife.

Barnard, R.J., J. Johnson, P. Brooks, K. M. Bates, B. Heiner, J.P. Klavas, D.C. Ponder, P.D. Smith, and P.D. Powers. 2013. Water crossings design guidelines. Washington Department of Fish and Wildlife, Olympia, Washington.

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. Wetlands Research Program Technical Report WRP-DE-4. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

City of Federal Way. 2003. Christian Faith Center Draft Environmental Impact Statement. Prepared by Parametrix, Inc. November 2003.

City of Federal Way. 2016. City of Federal Way Critical Areas Map. Available at: https://www.cityoffederalway.com/sites/default/files/maps/sensitive_2016.pdf. Accessed November 6, 2020.

Corps (U.S. Army Corps of Engineers). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Corps and EPA. 2008. Compensatory Mitigation for Losses of Aquatic Resources; Final Rule. Available at: https://www.epa.gov/sites/production/files/2015-08/documents/compensatory_mitigation_factsheet.pdf. Accessed November 6, 2020.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-70/31, U.S. Fish and Wildlife Service, Washington, DC.

Cramer, M., K. Bates, D. Miller, K. Boyd, L. Fotherby, P. Skidmore, and T. Hoitsma. 2003. Integrated streambank protection guidelines. Co-published by the Washington departments of Fish & Wildlife, Ecology, and Transportation. Olympia, Washington.

EarthCorps. 2016. Hylebos Watershed Plan. July 2016. Seattle, WA. 62 pp.

eBird. 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. Accessed October 2019.

Ecology (Washington State Department of Ecology). 2020. Washington State Water Quality Assessment 303(d)/305(b) List. Available at: https://apps.ecology.wa.gov/ApprovedWQA/ApprovedPages/ApprovedSearch.aspx. Accessed November 6, 2020.

Ecology (Washington State Department of Ecology), Corps (U.S. Army Corps of Engineers) Seattle District, and EPA (U.S. Environmental Protection Agency) Region 10. 2006. Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance (Version 1). Washington State Department of Ecology Publication #06-06-011a. Olympia, WA.

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1, Environmental Laboratory, Department of the Army, Waterways Experiment Station, Vicksburg, MS.

EPA. 2000. Record of Decision, Midway Landfill, Kent, Washington. September 6, 2000. Available from: https://semspub.epa.gov/work/10/500010018.pdf.

FGDC (Federal Geographic Data Committee). 2013. Classification of Wetlands and Deepwater Habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC. Fischer, M. 1999. City of Federal Way final wetland inventory report. Prepared for K. McClung, Deputy Director of Community Development Services. July 19, 1999.

Fischer, R.A. and J.C. Fischenich. 2000. Design recommendations for riparian corridors and vegetated buffer strips. U.S. Army Engineer Research and Development Center, Vicksburg, MS. ERDC TN-EMRRP-SR-24.

FTA (Federal Transit Authority). 2017. Record of Decision, Federal Way Link Extension. March 2017. Seattle, WA.

Gresham, Doug. 2020. Personal communication of March 17, 2020. Wetland specialist, Washington State Department of Ecology, Bellevue WA.

HDR. 2014. City of Federal Way Hylebos Creek fish use and habitat technical memorandum. December 2014.

Hendry, A. P., T. P. Quinn, and F. M. Utter. 1996. Genetic evidence for the persistence and divergence of native and introduced sockeye salmon (Oncorhynchus nerka) within Lake Washington, Washington. Can. J. Fish. Aquatic Sci. 53:823–832.

Hruby, T., K. Harper, and S. Stanley. 2009. Selecting wetland mitigation sites using a watershed approach. Olympia, WA: Washington State Department of Ecology. Publication #09-06-032.

Hruby, T. 2014. Washington State wetland rating system for Western Washington: 2014 update. Washington State Department of Ecology Publication #14-06-029. Olympia, WA.

Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). *In*: Poole, A. and F. Gill (editors). The Birds of North America, No. 148. The Birds of North America, Inc., Philadelphia, PA.

Johnson, D.H. and T.A. O'Neil (managing directors). 2001. Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press. Corvallis, OR.

Kemp, P.S. and J.G. Williams. 2008. Response of migrating Chinook salmon (*Oncorhynchus tshawytscha*) smolts to in stream structure associated with culverts. River Research and Applications, 24(5), pp. 571-579.

Kerwin, J. 1999. Salmon Habitat Limiting Factors for the Puyallup River Basin (WRIA 10). Prepared by John Kerwin for the Washington Conservation Commission, Olympia, Washington. Included as Appendix E of Volume II, Puyallup River Plan as part of the Puget Sound Salmon Recovery Plan. Available at: http://www.psp.wa.gov/SR_map.php.

King County. 1990. Hylebos Creek and Lower Puget Sound Watershed, Current and Future Conditions Report. Prepared by King County Surface Water Management Division for the City of Federal Way in Cooperation with Pierce County, Cities of Des Moines, Fife, Kent, Milton, and Tacoma. July 1990. 28 pp.

King County. 2011. King County Mitigation Reserves Program - In Lieu Fee Program Instrument. Prepared by King County Department of Natural Resources and Parks. October 13, 2011. Seattle, Washington. 171 pp.

King County. 2018. iMap Interactive Mapping Tool. Available at: https://gismaps.kingcounty.gov/iMap/. Accessed 2020.

King County. 2019. Aerial Imagery. Available at: https://gismaps.kingcounty.gov/arcgis/rest/services/BaseMaps/KingCo_Aerial_2019/MapServer. Accessed 2020.

Knutson, K. L., and V. L. Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Washington Department of Fish and Wildlife, Olympia, WA. 181 pp.

LeClair, L. 1999. Larry LeClair, Washington Department of Fish and Wildlife. Memorandum to John Kerwin, Washington Conservation Commission. Olympia, WA.

Martin, D. J., M. E. Robinson, and R. A. Grotefendt. 1998. The effectiveness of riparian buffer zones for protection of salmonid habitat in Alaska coastal streams. Alaska Forest Association, Ketchikan, AK. 85 pp.

McDade, M. H., F. J. Swanson, W. A. McKee, J. F. Franklin, and J. Van Sickle. 1990. Source distances for coarse woody debris entering small streams in western Oregon and Washington. Canadian Journal of Forest Research. Volume 20, pp. 326–330.

McKinley, M. 1997. Large woody debris source distances for western Washington Cascade streams. Unpublished report. Undergraduate senior research project, College of Forest Resources, University of Washington, Seattle, WA. 36 pp.

Murphy, M. L. and K. V. Koski. 1989. Input and depletion of woody debris in Alaska streams and implications for streamside management. North American Journal of Fisheries Management. Volume 9(4), pp. 427–436.

NMFS (National Marine Fisheries Service). 2021. List of ESA-listed species under the jurisdiction of the National Marine Fisheries Service. Available at: https://www.fisheries.noaa.gov/species-directory/threatened-endangered?title=&species_category=any&species_status=any&regions=1000001126&items_per_page=all&sort=. Accessed January 13, 2021.

NRCS (Natural Resources Conservation Service). 2019. Web Soil Survey. Available at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed October 4, 2019.

Opalski, Daniel D. 2010. Second Five-Year Review Report for Midway Landfill Superfund Site. Report, United States Environmental Protection Agency, Region 10. Richland, Washington. 111 pp.

Opperman, H., K.M. Cassidy, T. Aversa, E.S. Hunn, and B. Senturia. 2006. Sound to Sage: Breeding Bird Atlas of Island, King, Kitsap, and Kittitas Counties, Washington. Published at http://www.soundtosage.org by the Seattle Audubon Society. Version 1.1, September 2006.

Platts, W.S., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. General Technical Report INT-138, U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, Odgen, UT.

Seattle Audubon Society. 2019. Birdweb: Seattle Audubon's guide to the birds of Washington State. Available at http://birdweb.org/Birdweb/. Accessed October 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2007. Establishing a Sustainability Initiative. https://www.soundtransit.org/sites/default/files/documents/pdf/about/environment/executiveorderno1_sustainability.pdf.

Sound Transit (Central Puget Sound Regional Transit Authority). 2016a. Federal Way Link Extension Final EIS Appendix G2: Ecosystems Technical Report. Prepared by Prepared by HDR Engineering, Inc., and CH2M HILL. November 2016.

Sound Transit (Central Puget Sound Regional Transit Authority). 2016b. Sound Transit 3: The Regional Transit System Plan for Central Puget Sound.

Sound Transit (Central Puget Sound Regional Transit Authority). 2016c. Sound Transit Stream Habitat Assessment Guidelines.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019a. OMF South scoping summary report. May 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019b. Technical Memorandum: OMF South environment & community resources for alternatives development. Prepared by HDR Engineering, Inc., and Parametrix, Inc. August 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019c. Tacoma Dome Link Extension Pre-Screening and Level 1 Alternatives Evaluation Report. Prepared by HDR Engineering, Inc., and Parametrix, Inc. February 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019d. Tacoma Dome Link Extension Level 2 Alternatives Evaluation Report. Prepared by HDR Engineering, Inc., and Parametrix, Inc. August 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019e. Tacoma Dome Link Extension Scoping Summary Report. May 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2019f. Sustainability Plan – 2019 Update. January 2019. https://www.soundtransit.org/sites/default/files/documents/2019-sustainability-plan.pdf

Sound Transit (Central Puget Sound Regional Transit Authority). 2019g. Operations and Maintenance Facility South environmental methodology report. October 2019.

Sound Transit (Central Puget Sound Regional Transit Authority). 2020. Memorandum from Ellie Ziegler, Sound Transit, to Kristin McDermott, U.S. Army Corps of Engineers, Permit Reverification, Federal Way Link Extension, NWS-2013-687. August 3, 2020.

StreamNet. 2019. Fish distribution - all species combined. Spatial data set, updated January 2019. Available at https://www.streamnet.org/data/interactive-maps-and-gis-data/. Accessed October 4, 2019.

Tong, Kristina. 2019. Personal communication of October 30, 2019. Project manager, U.S. Army Corps of Engineers.

USFWS (U.S. Fish and Wildlife Service). 2020a. National Wetlands Inventory (NWI) website. Available at: https://www.fws.gov/wetlands/index.html. Accessed 2020.

USFWS. 2020b. Information for Planning and Consultation (IPaC) List of ESA-listed species and critical habitats. Obtained 2020.

USGS (U.S. Geological Survey). 2020. Poverty Bay and Des Moines quadrangles, Washington [maps]. 1:24,000. 7.5 Minute Series. Available at: https://www.usgs.gov/products/maps/topo-maps. Accessed 2020.

Washington Trout. 2003. Water Type Survey Results South King County May/June 2003. Available at: http://www.moonlitgeo.com/legacy_maps/kcpuget/map.html?tile=22N04E21NW&bw=false&culvert=true&habitat=true&fish=true&chanmod=true&stream=true&topo=false&streamid=true&ortho=true&road=false.

WDFW (Washington Department of Fish and Wildlife). 2008. Priority Habitat and Species list. Updated January 2019. Olympia, Washington. 292 pp.

WDFW (Washington Department of Fish and Wildlife). 2019a. PHS on the Web: An interactive map of WDFW priority habitats and species information for project review. Available at: http://apps.wdfw.wa.gov/phsontheweb/.

WDFW (Washington Department of Fish and Wildlife). 2019b. SalmonScape fish database and mapping application. Available at: http://apps.wdfw.wa.gov/salmonscape/.

WDFW (Washington Department of Fish and Wildlife). 2019c. Species in Washington. Available at: https://wdfw.wa.gov/species-habitats/species.

WDFW (Washington Department of Fish and Wildlife). 2020. WDFW Fish Passage and Diversion Screening Inventory Database. Available at: https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html.

WDFW (Washington Department of Fish and Wildlife) and WWTT (Western Washington Treaty Indian Tribes). 1994. Salmon and Steelhead Stock Inventory (SASSI). Appendix 1 South Puget Sound Stocks. Olympia Washington.

WDNR (Washington Department of Natural Resources). 2019. Washington Natural Heritage Program geographic information system data set. Data current as of July 26, 2019. Obtained October 22, 2019.

WDNR. 2020. DNR Water Type Maps. Available at: https://www.dnr.wa.gov/forest-practices-water-typing. Accessed 2020.

Williams, R.W., R.M. Laramie, and J.J. Ames. 1975. A catalog of Washington streams and salmon utilization, Volume 1, Puget Sound. Washington Department of Fisheries, Olympia, WA.

WSDOT. 2020. WSDOT Fish Passage Inventory. Available at: https://wsdot.wa.gov/data/tools/geoportal/?config=fish-passage-barriers. Accessed 2020.

WSDOT (Washington State Department of Transportation) and FHWA (Federal Highway Administration). 2009. I-5, SR 161/SR 18 Interchange Improvements Final Phase 1 Hydraulics Report. 32pp + appendices.

CONTACT US

Visit our webpage and sign up for project news www.soundtransit.org/omfs

Email omfsouth@soundtransit.org

Call 206-398-5453

SOUNDTRANSIT