

Attachment N.4E
Wetland and Stream Impacts
within the Study Area

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1 AFFECTED ENVIRONMENT

This Attachment N.4E, Wetland and Stream Impacts within the Study Area, to the *West Seattle Link Extension Ecosystems Technical Report* (Appendix N.4 of the West Seattle Link Extension Final Environmental Impact Statement) identifies wetlands and water crossings in the West Seattle Link Extension Project limits. The wetland study area includes all lands within 300 feet of the project's construction and operation footprints. The water crossings study area includes any streams or waterbodies within 200 feet of the project limits; at water crossings, the aquatic resources were reviewed 300 feet downstream and 100 feet upstream of the project limits.

Additional information can be found in other attachments to Appendix N.4. Full wetland and stream analysis methods are provided in Attachment N.4A, Ecosystems Technical Analysis Methodology. Wetland determination data forms and wetland rating forms are provided in Attachment N.4B, Wetland Determination Data Forms. Photographs of the individual wetlands and waterbodies are included in Attachment N.4D, Ecosystems Photographs.

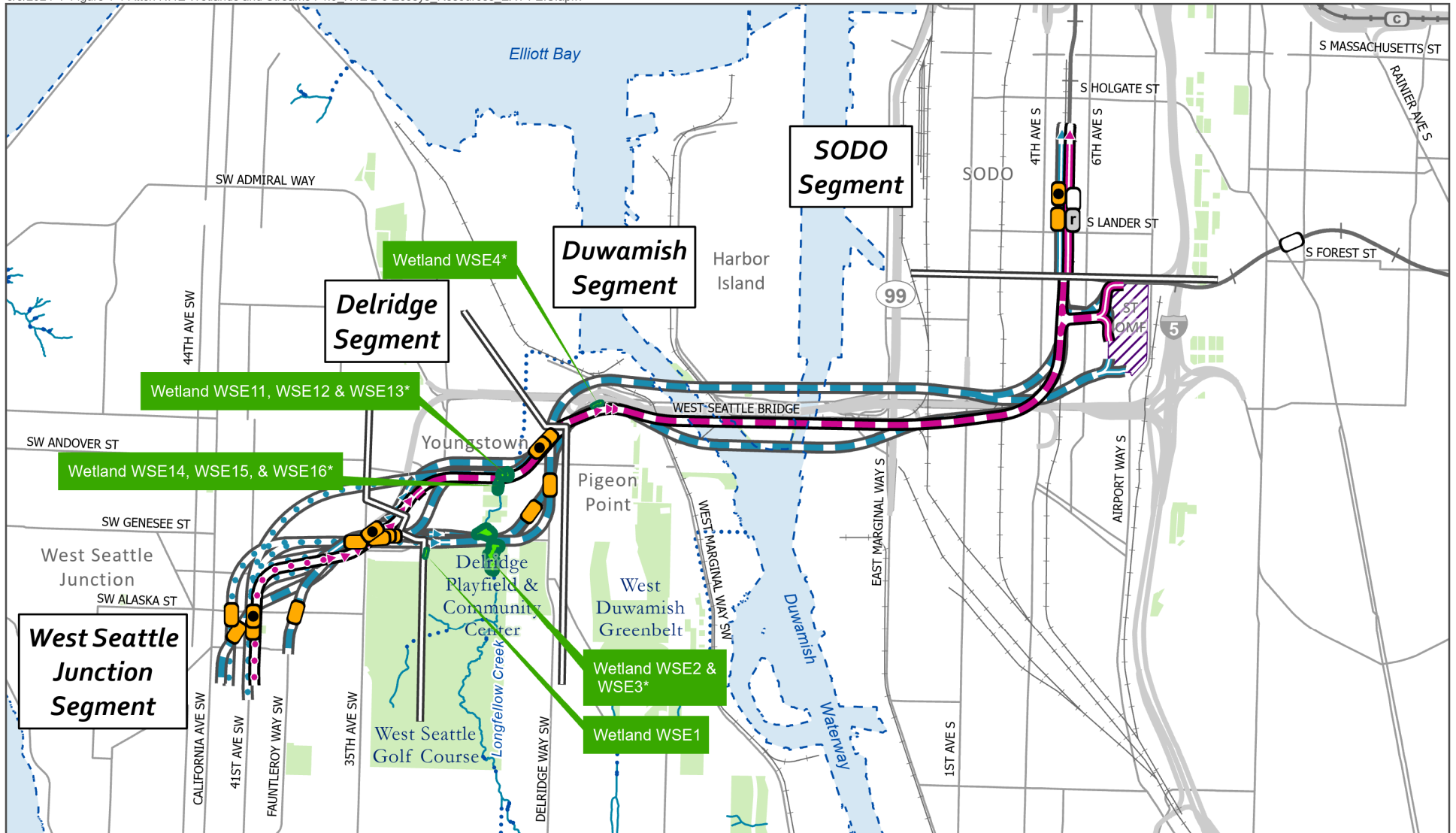
1.1 Wetlands

In the West Seattle Link Extension study area, ten wetlands were identified that meet the criteria outlined in the *Corps of Engineers Wetland Delineation Manual* (United States [U.S.] Army Corps of Engineers 1987) and its regional supplement (U.S. Army Corps of Engineers 2010). This method looks for three wetland indicators: wetland hydrology, hydric soils, and hydrophytic vegetation (Lichvar et al. 2016). To determine hydrophytic vegetation, the method refers to the wetland indicator status assigned by U.S. Department of Agriculture to each species. A site is considered to have hydrophytic vegetation when dominant plants have the indicator code of "obligate" (always found in wetlands), "facultative wetland" (usually found in wetlands), or "facultative" (found equally in wetland or upland habitats). "Facultative upland" species are usually found in uplands and can be an indicator of non-wetland conditions.

Wetland surveys took place on publicly owned property and private properties where accessible. Wetlands have been rated according to the *Washington State Wetland Rating System for Western Washington* (Washington State Department of Ecology [Ecology] 2014). At these wetlands, vegetation, soil, and hydrology conditions were documented at sample points. Wetlands were classified according to the U.S. Fish and Wildlife Service (Cowardin et al. 1979) and hydrogeomorphic (Brinson 1993) classification systems and rated according to the City of Seattle critical area ordinance and the *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014). Wetland functions were evaluated using Washington State Department of Transportation's Wetland Functions Characterization Tool for Linear Projects (Null et al. 2000). Regulatory buffers were determined based on Seattle Municipal Code Chapter 25.09. Areas surveyed that were observed to possess all three wetland indicators are included in this attachment.

Table 1-1 summarizes classification and rating information for the wetlands in the study area. Table 1-2 shows the results of the functions and values analysis. Figure 1-1 shows where these wetlands occur along the West Seattle Link Extension.

The City of Seattle maps an additional potential wetland, along the western shoreline of the Duwamish Waterway (West Waterway) just south of the 3800 West Marginal Way Southwest parcel. The National Wetlands Inventory shows this potential wetland as a 0.14-acre Estuarine and Marine Wetland. However, views from adjacent properties, aerial photographs, and on Ecology's Shoreline Photo Viewer (2016/2017 photographs) indicate that no wetland is present. Plants along this corridor do not indicate the presence of wetland.



Source: City of Seattle, King County (2023).

- | | | | |
|--|--------------|--|----------------|
| Preferred Alternative | | — Segment Line | |
| Elevated | Tunnel | Sound Transit Operations and Maintenance Facility (ST OMF) | Shoreline |
| At-Grade | Retained Cut | Existing Link Light Rail | Wetland |
| Other Alternatives | | East Link Light Rail (Under Construction) | Wetland Buffer |
| Elevated | Tunnel | Railroad | Stream |
| At-Grade | Retained Cut | Stream | Piped Stream |
| Station (● Indicates Preferred Alternative) | | Stream | Park |
| New | Relocated | Piped Stream | |
| Existing | | | |

Note: 1) *Asterisks denote wetlands subject to potential long-term impacts under one or more of the project alternatives. 2) City and federal mapping of wetlands was reviewed and field verified where possible. Mapping may differ from other public wetland mapping sources.

FIGURE 1-1
Wetland and Stream Locations

West Seattle Link Extension

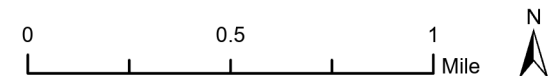


Table 1-1. Wetlands in the Study Area

Wetland ^a	Estimated Size (acre)	Cowardin Class	H.G.M. Class	Ecology ^b Seattle Rating ^c	Function Score ^d	Buffer Width ^{e, f}	Location
WSE1	0.05 ^g	palustrine emergent	Slope	IV	3 (low)	50 feet	West Seattle Golf Course
WSE2	0.45 ^g	palustrine emergent, palustrine scrub-shrub	Riverine	II	6 (moderate)	110 feet	West Seattle Golf Course along Longfellow Creek
WSE3	0.35 ^g	palustrine forested	Depressional	II	6 (moderate)	110 feet	Longfellow Creek Natural Area between Southwest Genesee and Southwest Nevada streets
WSE4	0.05	palustrine emergent, palustrine scrub-shrub	Slope	IV	4 (moderate)	50 feet	Pigeon Point under West Seattle Bridge
WSE11	<0.01	palustrine scrub-shrub	Depressional	III	5 (moderate)	110 feet	Along Longfellow Creek between Southwest Andover and Southwest Yancy streets
WSE12	0.01	palustrine emergent	Riverine	III	5 (moderate)	110 feet	Along Longfellow Creek between Southwest Andover and Southwest Yancy streets
WSE13	0.01	palustrine scrub-shrub	Depressional	III	5 (moderate)	110 feet	Along Longfellow Creek between Southwest Andover and Southwest Yancy streets
WSE14	<0.01	palustrine forested	Depressional	III	5 (moderate)	110 feet	Along Longfellow Creek between Southwest Yancy and Southwest Dakota streets.
WSE15	<0.01	palustrine emergent	Riverine	III	5 (moderate)	110 feet	Along Longfellow Creek about 100 feet south of Southwest Yancy Street
WSE16	0.02	palustrine emergent	Riverine	III	5 (moderate)	110 feet	Along Longfellow Creek about 150 feet south of Southwest Yancy Street

^a Wetlands WSE5 through WSE10 are part of the Ballard Link Extension study area and are not included in this report.

^b Ecology rating (Hruby 2014).

^c City of Seattle (2023) wetland rating

^d City of Seattle (2023) wetland buffer width based on wetland size, category, and habitat function score.

^e Seattle Municipal Code Section 25.09.160 classifies habitat function score (Ecology 2014) of 3 to 4 as low, 5 to 7 as moderate, and 8 to 9 as high.

^f Seattle Municipal Code Section 25.09.160: Category IV wetlands 1,000 square feet or more, regardless of connections to waters, receive a 50-foot buffer. Category II wetlands over 100 square feet (or of any size abutting a Type S, F, Np, or Ns water) with a moderate habitat score receive a 110-foot buffer.

^g Acreages of wetlands WSE1 through WSE3 are estimated based on Geographical Information System analysis. Acreages of wetlands WSE4 and WSE11 through WSE16 are based on boundaries provided using global positioning system during delineation.

H.G.M. = hydrogeomorphic

Table 1-2. Functions and Values of Wetlands in the Study Area

Function/Value ^a	Wetland									
	WSE1	WSE2	WSE3	WSE4	WSE11	WSE12	WSE13	WSE14	WSE15	WSE16
Water Quality Functions										
Sediment Removal	Not Present	Present; principal wetland function	Present; principal wetland function	Not Present	Present	Present	Present; principal wetland function	Present	Present	Present
Nutrient and Toxicant Removal	Present	Present; principal wetland function	Present; principal wetland function	Present	Present; principal wetland function	Present; principal wetland function	Present	Present; principal wetland function	Present; principal wetland function	Present
Hydrologic Functions										
Flood Flow Alteration	Not Present	Not Present	Present	Not Present	Present	Present	Present; principal wetland function	Present	Present	Present
Erosion Control & Shoreline Stabilization	Not Present	Present	Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present
Habitat Functions										
Production and Export of Organic Matter	Not Present	Present	Present	Not Present	Present	Not Present	Present	Present; principal wetland function	Not Present	Not Present
General Habitat Suitability	Not Present	Not Present	Present	Not Present	Present	Present	Present	Present	Present	Present
Habitat for Aquatic Invertebrates	Not Present	Present; principal wetland function	Present; principal wetland function	Not Present	Present; principal wetland function	Present	Present	Present	Not Present	Not Present

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Function/Value ^a	Wetland									
	WSE1	WSE2	WSE3	WSE4	WSE11	WSE12	WSE13	WSE14	WSE15	WSE16
Habitat for Amphibians	Not Present	Present; principal wetland function	Present; principal wetland function	Not Present	Present	Present	Present	Present	Not Present	Not Present
Habitat for Wetland-Associated Mammals	Not Present	Present; principal wetland function	Present; principal wetland function	Not Present	Not Present	Not Present	Not Present	Present	Not Present	Not Present
Habitat for Wetland-Associated Birds	Not Present	Present	Present	Not Present	Present	Present	Present	Present	Present	Present
General Fish Habitat	Not Present	Present	Present	Not Present	Not Present	Present	Not Present	Present	Present	Present
Native Plant Richness	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present
Special Characteristics										
Educational or Scientific Value	Present	Not Present	Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present
Uniqueness and Heritage	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present

Source: Null et al. 2000.

1.1.1 Wetland WSE1

Wetland WSE1 is along a slope at the northwest side of the West Seattle Golf Course, between a golf cart pathway and 31st Avenue Southwest in the Delridge Segment.

1.1.1.1 Wetland Determination

Vegetation is palustrine emergent, following the U.S. Fish and Wildlife Service/Cowardin system. Herbaceous species include field horsetail (*Equisetum arvense*, facultative) and creeping buttercup (*Ranunculus repens*, facultative). The non-native, invasive species Himalayan blackberry (*Rubus armeniacus*, facultative) was observed scattered throughout. Vegetation passed the dominance test. A site passes the wetland dominance test when dominant plants have the indicator code of obligate, facultative wetland, or facultative.

Soils were examined to a depth of 16 inches; the hydric soil indicator Depleted Below Dark Surface was present. Severely compacted soils start at 10 inches below ground surface. From 0 to 4 inches below ground surface, the soil is very dark gray gravelly, silt loam with large gravels present. From 4 inches to 16 inches below ground surface, the soil matrix is dark gray with brown redoximorphic features to 16 inches below ground surface.

Hydrology at wetland WSE1 is primarily supported by groundwater and from stormwater runoff from 31st Avenue Southwest. Saturation from 0 to 10 inches below ground surface was observed at the time of the site visit (July 15, 2019). Water collects at the toe of the slope along the eastern boundary of the wetland and flows north alongside and over the golf cart pathway that parallels the wetland's eastern boundary.

1.1.1.2 Rating and Buffers

Wetland WSE1 is a slope wetland under the hydrogeomorphic system and is regulated by the U.S. Army Corps of Engineers, Ecology, and City of Seattle as Category IV. Under Ecology's rating system (Ecology 2014), WSE1 scores 13 points (6 for water quality functions, 4 for hydrologic functions, and 3 for habitat functions). The wetland is larger than 1,000 square feet in size; the City of Seattle requires a 50-foot buffer for all Category IV wetlands 1,000 square feet or more.

The plant community in the wetland buffer consists of mowed grass in the golf course and ornamental species such as Norway spruce (*Picea abies*) and English ivy (*Hedera helix*).

1.1.1.3 Functions and Values Summary

Wetland WSE1 provides low functions and values for toxicant removal. It has little capacity to store water but is adjacent to the golf course, which may produce excess fertilizers and pesticides. This wetland has value for education due to its accessibility to golf course visitors. It might provide limited habitat for wetland-associated wildlife due to its proximity to other wetlands (WSE2 and WSE3); however, it has no permanent water available in the wetland, is isolated, and has limited cover.

1.1.2 Wetland WSE2

Wetland WSE2 is situated at the bottom of a ravine in the north side of the West Seattle Golf Course, just south of Southwest Genesee Street in the Delridge Segment. Wetland WSE2 is bisected by Longfellow Creek, a Type F (fish-bearing) watercourse (Washington Administrative Code 222.16.030 water typing), which flows south to north through the West Seattle Golf Course. Longfellow Creek passes through WSE2 until it reaches a culvert under Southwest Genesee Street.

1.1.2.1 Wetland Determination

Vegetation in Wetland WSE2 contains palustrine emergent and palustrine scrub-shrub plant communities. The emergent community is dominated by reed canarygrass (*Phalaris arundinacea*, facultative wetland); some Canada thistle (*Cirsium arvense*, facultative) is also present; both species are state-listed noxious weeds. The scrub-shrub community is dominated by Himalayan blackberry (facultative), salmonberry (*Rubus spectabilis*, facultative), and jewelweed (*Impatiens capensis*, facultative wetland). Bindweed (*Calystegia sepium*, facultative) and giant horsetail (*Equisetum telmateia*, facultative wetland) are scattered here as well. Vegetation passed the dominance test.

Soils were examined to a depth of 18 inches; the hydric soil indicator Depleted Below Dark Surface was present. From 0 to 9 inches below ground surface, the soil is dark brown loam, with some organic matter. From 9 inches to 18 inches below ground surface, the soil matrix is dark gray loam, with strong brown redoximorphic concentrations.

Hydrology at wetland WSE2 is primarily supported by overbank flooding from Longfellow Creek. A limited amount of water might also flow from the surrounding golf cart pathway. Primary hydrology indicators observed were a high-water table (8 inches below ground surface) and oxidized rhizospheres along living roots. In July 2019, the surveying biologists observed a beaver dam. During a second visit in August 2019, Longfellow Creek had noticeably widened upstream of the beaver dam.

1.1.2.2 Rating and Buffers

Wetland WSE2 is a riverine wetland under the hydrogeomorphic system and regulated by the U.S. Army Corps of Engineers, Ecology, and City of Seattle as a Category II wetland. Under Ecology's 2014 rating system, the wetland scores a total of 21 points (8 points for water quality functions, 7 points for hydrologic functions, and 6 points for habitat functions). The City of Seattle requires a 110-foot buffer for all Category II wetlands with a habitat function score of 6 (Seattle Municipal Code Section 25.09.160.B).

The wetland buffer is dominated by bigleaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*), English ivy, Himalayan blackberry, and vine maple (*Acer circinatum*). Scotch broom (*Cytisus scoparius*) is scattered along the right bank of Longfellow Creek.

1.1.2.3 Functions and Values Summary

Wetland WSE2 provides several functions and values because of its association with Longfellow Creek, the presence of salmonids in the creek, and the plant cover and seasonal inundation present. The wetland has high potential for sediment removal, toxicant removal, and habitat for aquatic invertebrates and wetland-associated mammals (it contains evidence of beaver use). Its value as habitat may be somewhat limited because it is isolated within the mowed golf course, and plant cover is primarily non-native; however, wetland WSE2 is hydrologically connected to a greenbelt downstream.

1.1.3 Wetland WSE3

Wetland WSE3 is immediately north of Southwest Genesee Street between 26th Avenue Southwest and 30th Avenue Southwest in the Delridge Segment; it stretches from the toe of the slope at Southwest Genesee Street to a pedestrian bridge. Wetland WSE3 is also bisected by Longfellow Creek.

1.1.3.1 Wetland Determination

Vegetation in wetland WSE3 is classified as palustrine, forested. The tree layer is dominated by red alder (facultative). The shrub layer is sparsely vegetated with Pacific willow (*Salix lucida*, facultative wetland), osoberry (*Oemleria cerasiformis*, facultative), and red osier dogwood (*Cornus sericea*, facultative wetland). The herbaceous layer is dominated by creeping buttercup (facultative), with some jewelweed, water parsley (*Oenanthe sarmentosa*, obligate) and stinging nettle (*Urtica dioica*, facultative). Vegetation passed the dominance test.

Soil was examined to a depth of 20 inches. The hydric soil indicator Redox Dark Surface was present. From 0 to 8 inches below ground surface, soils are very dark gray loam with patches of fine sand. From 8 inches to 14 inches below ground surface, soils are very dark gray loam with redoximorphic concentrations (dark reddish brown) in the pore linings of roots. At 14 inches to 20 inches below ground surface, soils are silt loam with some organic matter, and concentrations of dark brown.

Hydrology is primarily supported by overbank flooding from Longfellow Creek. The creek outfalls north of Southwest Genesee Street and immediately forms a pool about 20 feet across. The creek then meanders north through wetland WSE3 until flowing under the pedestrian bridge. The meandering creek is about 6 feet to 15 feet wide with steep banks. No surface water nor a water table were observed within the wetland. Saturation was observed at 14 inches below ground surface. Two secondary hydrologic indicators were observed: a facultative-neutral test and geomorphic position (concave depression at toe of slope).

1.1.3.2 Rating and Buffers

Wetland WSE3 has two hydrogeomorphic classes (depressional and riverine) and in accordance with the 2014 Ecology rating system, was rated as depressional. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category II wetland. During rating (Ecology 2014), wetland WSE3 scored a total of 22 points (8 for water quality functions, 8 for hydrologic functions, and 6 for habitat functions). The City of Seattle requires a 110-foot buffer for all Category II wetlands with a moderate habitat function score (5 to 7 points; Seattle Municipal Code Section 25.09.160.B).

Wetland WSE3's buffer is forested with red alder, western red cedar (*Thuja plicata*), and black cottonwood (*Populus balsamifera*). The shrub layer contains tall Oregon grape (*Mahonia aquifolium*) and common snowberry (*Symphoricarpos albus*). The herbaceous layer was mostly bare ground, possibly due to recent restoration efforts.

1.1.3.3 Functions and Values Summary

Wetland WSE3 provides several functions due to its association with Longfellow Creek, salmonid presence in the creek, seasonal inundation, and vegetation present. It provides high potential for invertebrate, mammal, and fish habitat, due in part to woody debris installed, vegetation present, and evidence of beaver use. It also provides some educational value because it is situated alongside a public trail, and some sediment removal, erosion control, and production of organic matter.

1.1.4 Wetland WSE4

Wetland WSE4 is at Pigeon Point, underneath the West Seattle Bridge and adjacent to/upslope of a concrete bike path directly south of Southwest Spokane Street. It is just north of the northern edge of the West Duwamish Greenbelt in the Duwamish Segment. It stretches up the slope to just above the concrete footing for the West Seattle Bridge.

1.1.4.1 Wetland Determination

Vegetation at wetland WSE4 contains palustrine emergent and palustrine, scrub-shrub communities. Some areas are dominated by Pennsylvania pellitory (*Parietaria pennsylvanica*, facultative upland), with giant horsetail scattered within the pellitory. Pennsylvania pellitory is an aggressive upland plant that has likely out-competed native wetland vegetation. Therefore, surveyors determined that the hydrophytic vegetation indicator for sample points here is “Problematic Hydrophytic Vegetation.” In the scrub-shrub areas, vegetation is dominated by Himalayan blackberry (facultative upland), with sparse herbaceous species: giant horsetail (facultative wetland) and herb-Robert (*Geranium robertianum*, facultative upland).

Soils were examined to a depth of 18 inches. The hydric soil indicator Redox Dark Surface was present. In one portion of the wetland, one soil layer was present: black loam, with concentrations of redoximorphic features in the matrix and in pore linings. Trash was present within the soils as well, which indicates some of the soils are construction fill. In another portion of the wetland, two soil layers were described: very dark gray, sandy loam from 0 to 10 inches below ground surface, and from 10 to 16 inches below ground surface, dark gray clay loam, with redoximorphic features (dark yellowish brown).

Hydrology for wetland WSE4 is supported by surface flow from the residential area upslope (Southwest Charleston Street and 20th Avenue Southwest). Water collects at the toe of the slope and flows downhill alongside the bike path. Primary hydrologic indicators at this wetland are a high-water table (8 inches below ground surface) and saturation at the surface.

1.1.4.2 Rating and Buffers

Wetland WSE4 is classified as a slope wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category IV wetland (Ecology 2014). Wetland WSE4 scored a total of 13 points (5 points for water quality, 4 points for hydrologic functions, and 4 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 50-foot buffer for all Category IV wetlands of 1,000 square feet or more.

The buffer immediately downslope of wetland WSE4 overlaps pavement, and upslope is deciduous forest dominated by bigleaf maple, oceanspray (*Holodiscus discolor*) and red elderberry (*Sambucus racemosa*), with English ivy and sword fern (*Polystichum munitum*).

1.1.4.3 Functions and Values Summary

Wetland WSE4 provides low potential for a few functions and values: it provides limited nutrient/toxicant removal due to its herbaceous vegetation cover and its presence near paved areas. It provides some wildlife habitat due to its proximity to the West Duwamish Greenbelt (though its low, non-native vegetation and proximity to paved areas, lack of surface water, and presence of the bridge overhead may limit the likelihood of wildlife using this location).

1.1.5 Wetland WSE11

Wetland WSE11 is a small scrub-shrub wetland along Longfellow Creek between Southwest Andover and Southwest Yancy streets in the Delridge Segment.

1.1.5.1 Wetland Determination

The boundary for this depressional wetland was delineated using a change in topography and a change in vegetation. The scrub-shrub community of this wetland is dominated by climbing nightshade (*Solanum dulcamara*, facultative) with the herb layer dominated by field bindweed (*Convolvulus arvensis*, no wetland indicator status) and jewelweed (facultative wetland).

Soils were characterized as dark grayish brown gravelly loam with dark yellowish-brown redoximorphic features from 5 to 14 inches underlain by dark gray loamy sand. This soil has a depleted matrix hydric soil indicator.

Groundwater is the primary hydrology source for this depressional wetland. The water table was observed at 3 inches, and the soils were saturated to the surface during the February site visit. In early March, the wetland was ponded. The wetland hydrology indicators of high-water table, saturation, and sparsely vegetated concave surface were met at this location. WSE11 is in a localized geomorphic depression that receives drainage runoff, thus providing evidence for the secondary indicator of geomorphic position.

1.1.5.2 Rating and Buffers

Wetland WSE11 is classified as a depressional wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE11 scored a total of 17 points (7 points for water quality, 5 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category III wetlands over 100 square feet.

The buffer is constricted by the paved parking lot of the West Seattle Health Club to the west. The buffer to the north, east, and south is dominated by red alder, pacific silver fir (*Abies amabilis*), bigleaf maple, and Himalayan blackberry. The buffer is moderately disturbed but consists of a riparian corridor and in-stream habitat that provides refuge for urban plants and wildlife.

1.1.5.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. Its most significant functions are nutrient and toxicant removal, and habitat for aquatic invertebrates. The wetland also provides lower levels of functions for sediment removal, flood flow alteration, and other habitat types; the wetland is small but is contiguous with the Longfellow Creek greenbelt and adjacent to the creek itself.

1.1.6 Wetland WSE12

Wetland WSE12 is a small riverine wetland along Longfellow Creek between Southwest Andover and Southwest Yancy streets in the Delridge Segment. The wetland is partially below the ordinary high-water mark of Longfellow Creek. The dominant hydrology sources are overbank flooding from Longfellow Creek and hyporheic flow.

1.1.6.1 Wetland Determination

This riverine wetland was delineated using topographical breaks and shifts in vegetation. This wetland has sparse vegetation cover dominated by redosier dogwood (facultative wetland), small-fruited bullrush (*Scirpus microcarpus*, obligate), reed canarygrass (facultative wetland), and creeping buttercup (facultative). Site soils were characterized as a mixed matrix of very dark grayish brown and dark gray loamy sand with dark brown redoximorphic features from 8 to 17 inches below ground surface. A depleted matrix hydric soil indicator was observed at this site.

The wetland is partially below the ordinary high-water mark of Longfellow Creek. The dominant hydrology sources are overbank flooding from Longfellow Creek and hyporheic flow. The water table at this wetland was detected 14 inches below ground surface, but the soil was saturated to the surface. An absence of leaf litter or small woody debris provided evidence of drainage patterns. The geomorphic position of WSE12 is within the floodplain of Longfellow Creek. This wetland also passes the FAC-neutral test.

1.1.6.2 Rating and Buffers

Wetland WSE12 is classified as a riverine wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE12 scored a total of 16 points (7 points for water quality, 4 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category III wetlands over 100 square feet.

The buffer of WSE12 is constricted to the east by the parking lot belonging to 4025 Delridge Way Southwest. Within the buffer, the vegetation consists of Himalayan blackberry, red osier, red alder, bigleaf maple, and pacific silver fir. The habitat in the buffer offers an in-stream, riparian habitat corridor for fish and wildlife. Evidence of recent beaver activity (chew, tracks, and potential bank dens) was observed throughout the buffer and the surrounding habitat.

1.1.6.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. Its most significant function is nutrient and toxicant removal. It also provides lower levels of sediment removal, flood flow alteration, and habitat; the wetland is small but is contiguous with the Longfellow Creek greenbelt and is adjacent to the creek itself.

1.1.7 Wetland WSE13

Wetland WSE13 is a small scrub-shrub wetland along Longfellow Creek between Southwest Andover and Southwest Yancy streets in the Delridge Segment. WSE13 is a closed depression that is fed by stormwater runoff and groundwater.

1.1.7.1 Wetland Determination

This depressional wetland was delineated based on a slight change in topography and a vegetational shift. The wetland boundary follows a difference in soils evident by saturation in the wetland and no saturation in the upland. WSE13 is a palustrine scrub-shrub wetland community dominated by redosier dogwood (facultative wetland) and reed canarygrass (facultative wetland). Himalayan blackberry (facultative) was also observed at this wetland.

Observed soils were characterized as very dark grayish brown loam to at least 15 inches below ground surface with dark brown redoximorphic features starting 13 inches below ground surface. Hydric soil indicators were not observed and might have been difficult to observe due to the high groundwater table; however, hydric soil is assumed based on the presence of wetland hydrology and hydrophytic vegetation.

WSE13 is a closed depression that is fed by stormwater runoff and groundwater. Saturation was observed at the ground surface and a high-water table was observed at 3 inches below ground surface. WSE13 passes the FAC-neutral test.

1.1.7.2 Rating and Buffers

Wetland WSE13 is classified as a depressional wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE13 scored a total of 17 points (7 points for water quality, 5 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category III wetlands over 100 square feet.

The buffer is constricted by the parking lot belonging to 4025 Delridge Way Southwest to the east and by Southwest Yancy Street to the south. The vegetation within the 110-foot buffer of WSE13 consists of a mix between native and non-native species. Himalayan blackberry dominates much of the understory punctuated by red osier. Red alder, bigleaf maple, and pacific silver fir comprise the tree stratum.

1.1.7.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. Its most significant functions are sediment removal and flood flow alteration due to its presence adjacent to Longfellow Creek. It also provides lower levels of nutrient and toxicant removal, organic matter, and general habitat; the wetland is small but is contiguous with the Longfellow Creek greenbelt and adjacent to the creek itself.

1.1.8 Wetland WSE14

Wetland WSE14 is a small, forested wetland along Longfellow Creek between Southwest Yancy and Southwest Dakota streets in the Delridge Segment. WSE14 is a closed depression with an outlet into Longfellow Creek.

1.1.8.1 Wetland Determination

WSE14 is a depressional wetland with hydrophytic vegetation and hydric soils, and much of it is permanently ponded. This feature likely formed in an excavated depression. The area of ponding is approximately 10 feet wide and 20 feet long. The wetland boundary was determined by soil changes related to topography and a minor shift in vegetation composition. Red alder (facultative) dominates this palustrine forested wetland. No other species were detected in the understory during the February survey, but herbaceous annual species likely emerge later in the growing season.

Observed soils were characterized as dark gray gravelly sandy loam with dark yellowish brown redoximorphic features from 4 to 12 inches below ground surface. The hydric soil indicator identified in this wetland is a loamy gleyed matrix.

WSE14 is a closed depression with an outlet into Longfellow Creek. Surface water is present in the permanently ponded section of the wetland. Surface runoff and ground water feed this wetland contributing to the high-water table at 5 inches below ground surface and a high soil saturation at 3 inches.

1.1.8.2 Rating and Buffers

Wetland WSE14 is classified as a depressional wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE14 scored a total of 17 points (7 points for water quality, 5 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category

III wetlands over 100 square feet. The buffer is partially constricted to the northwest by the pavement of Southwest Yancy Street and the gravel right-of-way to the north. Within the buffer, the habitat is dominated by red alder, western red cedar, and bigleaf maple with an understory of osoberry, common snowberry, Himalayan blackberry, and Oregon grape.

1.1.8.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. Its most significant functions are nutrient and toxicant removal and production and export of organic matter. It also provides low levels of sediment removal, flood flow alteration, and wildlife and invertebrate habitat.

1.1.9 Wetland WSE15

Wetland WSE11 is a small riverine wetland along Longfellow Creek about 100 feet south of Southwest Yancy street in the Delridge Segment. This riverine wetland receives occasional bank overflow from Longfellow Creek.

1.1.9.1 Wetland Determination

This site is a riverine wetland with hydrophytic emergent vegetation growing in hydric soil. The wetland occurs on a terrace approximately 15 feet long and 6 feet wide. The wetland has clear indicators of hydrology typically found in wetlands that receive bank overflow from an adjacent creek. The boundary of the wetland is identifiable along a topographic change coupled with a vegetation transition. Vegetation cover at WSE15 is composed of an herbaceous stratum. The dominant species are creeping buttercup (facultative) and reed canarygrass (facultative wetland).

Soils observed in WSE15 are characterized as a layer from 0 to 5 inches; the soil is a dark grayish brown loamy sand with dark yellowish brown redoximorphic features to 5 inches below ground surface, underlain by a layer of very dark brown loamy sand with dark reddish brown redoximorphic features to 22 inches below ground surface. The soil meets the depleted matrix and redox dark surface hydric soil indicators.

This is a riverine wetland that receives occasional bank overflow from Longfellow Creek. Flooding of the wetland is evident from water marks found at the site. Other indicators observed include drainage patterns such as an absence of leaf litter, and some water- stained leaves along the wetland edges. No water table was detected despite digging to 22 inches deep. Soil saturation was detected, but only at 14 inches below the ground surface. WSE15 passes the FAC-neutral test, has a geomorphic position within the Longfellow Creek floodplain, and has drainage patterns such as an absence of leaf litter or small woody debris.

1.1.9.2 Rating and Buffers

Wetland WSE15 is classified as a riverine wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE14 scored a total of 16 points (7 points for water quality, 4 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category III wetlands over 100 square feet.

The buffer is constricted to the northwest by a commercial property, to the east by residential property. The buffer is partially forested with red alder, western red cedar, bigleaf maple and Sitka spruce (*Picea sitchensis*, saplings, mostly). The understory is dominated by Himalayan blackberry, osoberry, common snowberry, and Oregon grape.

1.1.9.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. Its most significant function is nutrient and toxicant removal. It also provides low functions of sediment removal, flood flow alteration, general habitat, and fish habitat due to its position alongside Longfellow Creek; these functions are low due to the wetland's small size and lack of diverse vegetation.

1.1.10 Wetland WSE16

Wetland WSE11 is a small riverine wetland along Longfellow Creek about 150 feet south of Southwest Yancy Street in the Delridge Segment. This wetland receives overbank flooding from the adjacent Longfellow Creek.

1.1.10.1 Wetland Determination

Hydrophytic vegetation and wetland hydrology are clearly present in this 18-foot long, 10-foot-wide terraced wetland. The soil did not show any obvious hydric indicators, but hydric soils were assumed based on the other evidence at the site. The wetland boundary was determined at a topographic change and a vegetation transition. Pacific water parsley (*Oenanthe sarmentosa*, obligate), common nipplewort (*Lapsana communis*, facultative upland), and fringecup (*Tellima grandiflora*, facultative upland) were dominant plants observed in this palustrine emergent wetland. Redosier dogwood (facultative wetland) and common snowberry (facultative upland) are the dominant shrub species but not dense enough to classify the wetland as having a scrub-shrub class.

Soils observed are characterized as very dark brown loam 9 inches below ground surface underlain by a very dark gray loamy sand to 18 inches below ground surface. No redoximorphic features were observed in either layer, but hydric soils are assumed at this site due to prevalence of hydrophytic vegetation and wetland hydrology.

This wetland receives overbank flooding from the adjacent Longfellow Creek. Portions of the wetland show signs of drainage patterns where leaf litter has been cleared due to flowing water near the water's edge. A more definitive hydrology indicator observed was the high saturation in the soil 9 inches below ground surface. WSE16 passes the FAC-neutral test and had an absence of leaf litter or small woody debris that provides evidence of drainage patterns.

1.1.10.2 Rating and Buffers

Wetland WSE16 is classified as a riverine wetland under the hydrogeomorphic system. It is regulated by the U.S. Army Corps of Engineers, Ecology, and the City of Seattle as a Category III wetland (Ecology 2014). Wetland WSE16 scored a total of 16 points (7 points for water quality, 4 points for hydrologic functions, and 5 points for habitat functions). The City of Seattle (Seattle Municipal Code Section 25.09.160.B.) requires a 110-foot buffer for all Category III wetlands over 100 square feet. The buffer at WSE16 is constrained in nearly all directions. Dense residential properties constrict the buffer to the east. To the south, it is constricted by the Southwest Dakota Street footbridge. Commercial properties constrict the buffer to the northwest. WSE16 lies within the riparian corridor of Longfellow Creek. This moderately dense forested area is dominated by red alder, bigleaf maple, western red cedar, and Sitka spruce. The shrub layer in the buffer contains osoberry, Himalayan blackberry, common snowberry, and Oregon grape.

1.1.10.3 Functions and Values Summary

This wetland's functions and values are shown in Table 1-2. It provides limited functions of sediment removal, nutrient and toxicant removal, and flood flow alteration; these functions are present due to the wetland's proximity to Longfellow Creek but are limited by the wetland's small size. The wetland also provides limited fish habitat and general habitat due to its presence within the Longfellow Creek Natural Area.

1.2 Streams and Waterbodies

The West Seattle Link Extension crosses two streams or waterbodies:

- The Duwamish Waterway, which is a Shoreline of the State (Type S) with a 200-foot buffer and mapped as estuary habitat by Washington Department of Fish and Wildlife's Priority Habitats and Species database
- Longfellow Creek, which is a Type F stream with a 100-foot buffer (riparian management area) per City of Seattle regulations, including a limited development area 75 to 100 feet from the creek

1.2.1 Duwamish Waterway

The Duwamish Waterway is a Shoreline of the State. The City of Seattle regulates in-water or over-water development at the waterway and on uplands within 200 feet of the waterway. The Duwamish Waterway provides open water habitat, pockets of shoreline habitat in between industrial uses, and estuary habitat where it merges with Elliott Bay. The waterway flows through a heavily developed industrial area; very little natural estuarine habitat or intertidal shoreline habitat remains within the study area. Conditions include bulkheads and steep shorelines that are rocky, graveled, or rock with silty areas. Some of the shoreline is hidden by over-water structures, and little vegetation is present. Below-water substrates include sand/mud, gravel, or rock, with limited aquatic vegetation.

1.2.2 Longfellow Creek

Longfellow Creek is an approximately 4-mile-long, Type F perennial stream that drains into the Duwamish Waterway. Its watershed drains 2,685 acres of West Seattle. The upper 0.9 mile of the creek (upstream of the study area) has been diverted into underground pipes, and roughly one-third of the total creek flow drains through pipes beneath shopping centers, houses, and roads (City of Seattle 2007). The middle portion of the creek, including the portion within the study area, include daylighted (uncovered) sections with riparian vegetation and large, deep pools that can support fish. The lowest portion of the creek flows about 0.5 mile through underground pipes from just south of Southwest Andover Street to a grated outlet near Terminal 5 where it outfalls to the Duwamish Waterway.

The City of Seattle regulates any development in or over the stream. The City regulates the creek as a riparian watercourse, and the stream and creek together as a fish and wildlife habitat conservation area. This conservation area is designated 100 feet perpendicular from the stream; piped areas are excluded (Seattle Municipal Code Sections 25.09.015 and 25.09.200). Some development is allowed in a zone 75 to 100 feet from the stream (the limited development area) if the development meets specific standards, including that it is limited to 35 percent or less of the total limited development area, and complies with requirements for restoration or mitigation (Seattle Municipal Code Section 25.09.200(3)d).

South of Southwest Genesee Street, Longfellow Creek passes through the West Seattle Golf Course flowing south to north, and ranges from 25 feet to 35 feet wide and is about 4 feet deep. Within the golf course, barriers block anadromous salmon from reaching the creek upstream of the study area (Washington Department of Fish and Wildlife 2019). The creek meanders through patches of reed canarygrass before reaching a beaver dam within wetland WSE2. The water is turbid with glide characteristics (shallow stream with water velocity less than 20 centimeters per second, without surface turbulence) until the beaver dam. The stream below the dam is more channelized. A few pieces of large woody debris are present along this reach. The banks of Longfellow Creek south of Southwest Genesee Street are stable, with beaver slides present. Vegetation on the stream banks consists of Pacific willow, bigleaf maple saplings, Himalayan blackberry, Canada thistle, jewelweed, reed canarygrass, horsetail, and black cottonwood saplings.

Below the beaver dam, the creek flows into an approximately 3-foot-diameter culvert under Southwest Genesee Street. Flooding likely occurs at least 1 foot over the top of the culvert, based on observed water and sediment marks.

North of Southwest Genesee Street, the creek exits the culvert into a pool about 20 feet wide. The left bank of the pool is slightly undercut. Riparian vegetation along the pool is sparse and consists of red alder trees. North of the pool, the creek continues into a glide channel that is 6 feet to 15 feet wide, with steep banks. Moderate riparian vegetation along this reach is provided by willows and red alder. Jewelweed, bittersweet nightshade, reed canarygrass, willows, and slough sedge are present along the banks of the pool and channel. Within the channel, three to four pieces of large woody debris appear to have been installed. The channel widens out before crossing underneath a pedestrian bridge about 100 north of Southwest Genesee Street.

Fines (fine-grained sediment) and cobbles are present in the 25-foot-long stream section just after the pedestrian bridge. Riparian vegetation north of the pedestrian bridge is absent. The creek then enters a series of pools, each about 20 feet long; the ordinary high-water marks on the east and west side of the pools are about 40 feet apart at each pool. The drop between each pool is about 18 inches and separated by installed large woody debris. Within each step pool, large cobbles with fines are present. Signs of beaver activity (such as gnawed trees) were observed in Longfellow Creek north of Southwest Genesee Street.

Longfellow Creek continues as an open channel through forested habitat until about 70 feet south of Southwest Andover Street, where it enters underground pipes under Southwest Andover Street and continues underground until its outlet into the Duwamish Waterway near Terminal 5. The open channel reach upstream (south) of Southwest Andover Street is on private property.

In 2023 Jacobs conducted a qualitative assessment of about 1,490 linear feet of Longfellow Creek between Southwest Genesee Street and Southwest Andover Street. This section of Longfellow Creek flows along a 1.2 percent gradient. Bankfull width of the stream is approximately 14 feet wide, though the stream widens out to 25 feet upstream of a beaver dam near the Southwest Dakota Street foot bridge. The stream offers habitat for fish and wildlife with numerous deep pools, large woody debris, root balls, undercut banks, and large boulders along a sandy, gravely stream bed. Ample evidence of beaver activity was observed along Longfellow Creek including beaver chew, two dams, and several beaver bank lodges that were recently active. The surrounding riparian zone consists of a moderately-dense tree layer and a dense shrub layer. The dominant vegetation includes red alder, Douglas-fir (*Pseudotsuga menziesii*), western red cedar, bigleaf maple and Sitka spruce. In the understory, red-osier dogwood, Himalayan blackberry, osoberry, common snowberry and reed canarygrass are the dominant species. Additional details of this portion of stream are provided in the June 2023 West Seattle Link Extension Wetland and Stream Delineation Report (Sound Transit 2023).

2 DIRECT IMPACTS

This section describes direct impacts that would occur to wetlands and wetland buffers in the study area, including both long-term impacts from the operation of the project and short-term impacts during construction.

Regulatory buffers for wetlands were determined based on Seattle Municipal Code Chapter 25.09. Note that wetland buffer analyses included paved areas within the buffer. The City of Seattle sometimes requires mitigation for changes to such paved areas within a buffer, and addresses these on a case-by-case basis. Wetland buffers may not extend into paved areas when permitting is complete.

2.1 Impacts to Wetlands

There would be no direct impacts to wetlands in the SODO Segment because there are no wetlands in the study area for this segment.

Impacts in the West Seattle Junction Segment would be limited to 0.002 acre of construction impact to the buffer of wetland WSE1, which is not expected to occur when permitting is complete because it would be in a paved area of the buffer.

Impacts to wetlands in the Duwamish and Delridge segments are shown in Tables 2-1 and 2-2. Figures 2-1a through 2-1c, Figures 2-2a and 2-2b, Figures 2-3a and 2-3b, and Figures 2-4a through 2-4c show wetland impacts for each alternative in the West Seattle Link Extension corridor.

Table 2-1. Summary of Direct Impacts to Wetlands – Duwamish Segment

Alternative Name	Alternative Identification	Long-term Wetland Impacts (acres)	Construction-related Wetland Impacts (acres) ^a	Long-term Wetland Buffer Impacts (acres) ^a	Construction-related Wetland Buffer Impacts (acres) ^b	Wetlands Affected
Preferred South Crossing Alternative	DUW-1a	<0.1 ^c	0 to <0.1 ^d	<0.1 to 0.3 ^d	0 to 0.1 ^d	WSE4
South Crossing South Edge Crossing Alignment Option	DUW-1b	0	0	<0.1	0.1	WSE4
North Crossing Alternative	DUW-2	0	0	0	0	Not Applicable

^a These metrics may include paved areas within wetland buffer; these may be removed from impact metrics following coordination with the City of Seattle.

^b Construction impacts represent areas temporarily impacted by the project, outside of the long-term project footprint.

^c Impacts are assumed to the entire wetland due to changes in hydrology upslope of the wetland.

^d Ranges of impacts indicate differences from connecting to different alternatives in adjacent segment.

Table 2-2. Summary of Direct Impacts to Wetlands – Delridge Segment

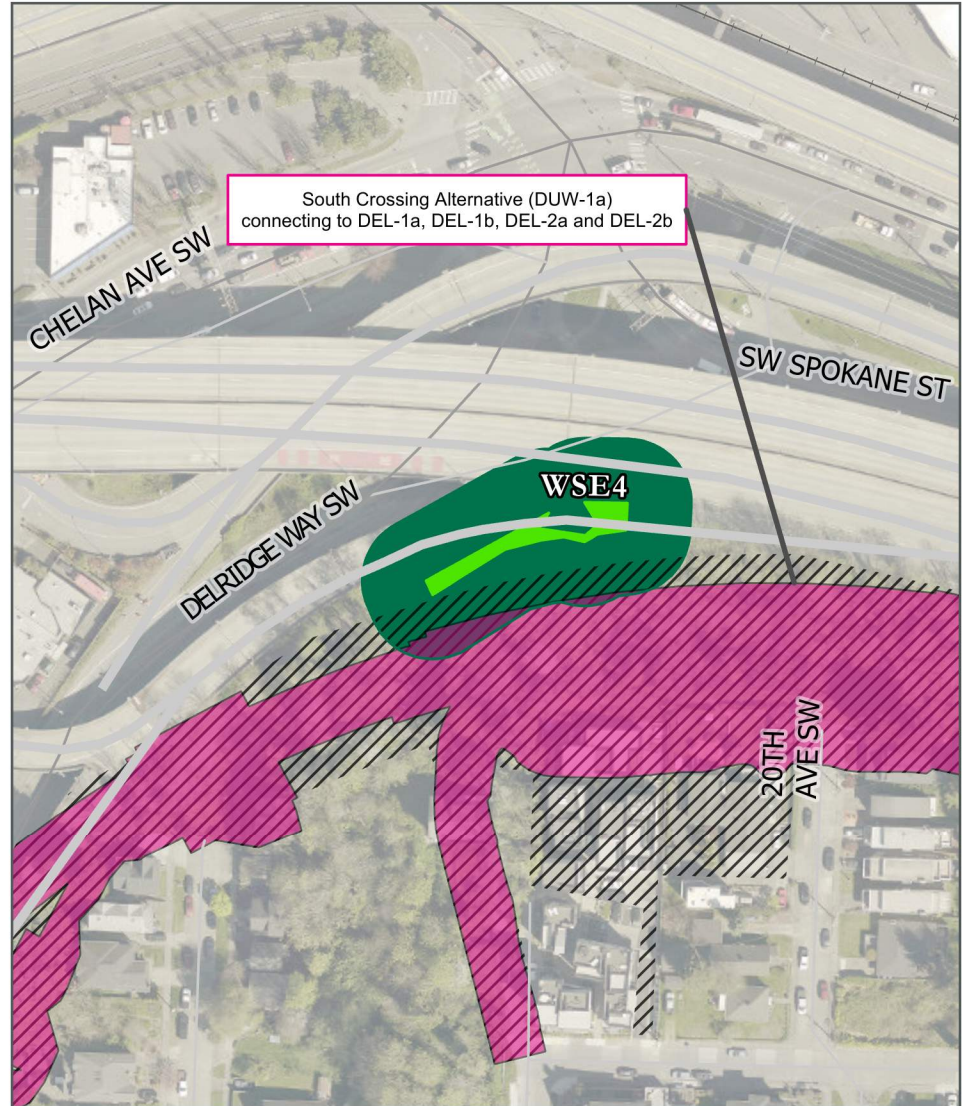
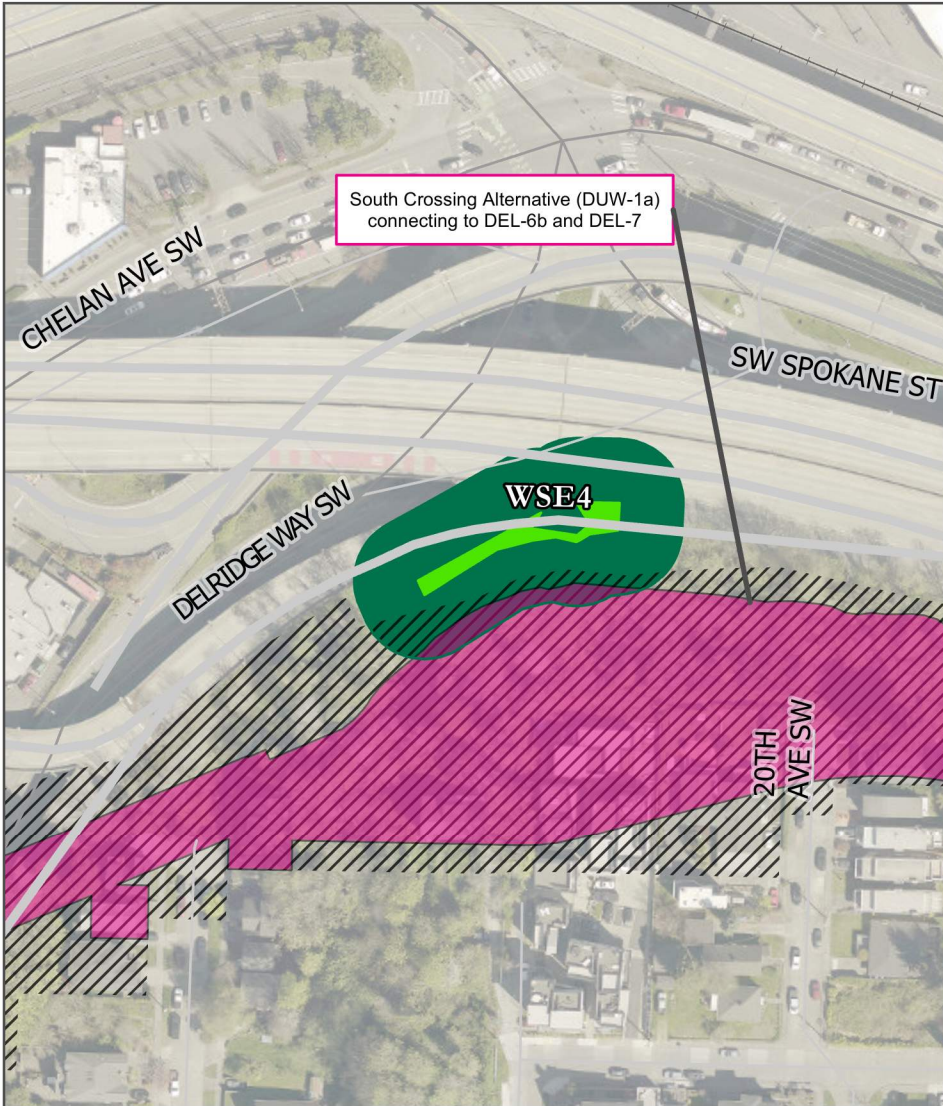
Alternative Name	Alternative Identification	Long-term Wetland Impacts (acres)	Construction-related Wetland Impacts (acres) ^a	Long-term Wetland Buffer Impacts (acres) ^b	Construction-related Wetland Buffer Impacts (acres) ^{a, b}	Wetlands Affected
Preferred Andover Street Station Lower Height South Alignment Option	DEL-6b	<0.1	0	0.2	0.4	WSE11, WSE12, WSE13
Dakota Street Station Alternative	DEL-1a	0	0	0.5	0.4	WSE2, WSE3
Dakota Street Station North Alignment Option	DEL-1b	0	0	0.8	0.4	WSE2, WSE3
Dakota Street Station Lower Height Alternative	DEL-2a	0	0	0.4	0.4	WSE1, WSE2, WSE3
Dakota Street Station Lower Height North Alignment Option	DEL-2b	0	<0.1	0.6	0.4	WSE2, WSE3
Delridge Way Station Alternative	DEL-3	0	0	0.6	0.4	WSE2, WSE3
Delridge Way Station Lower Height Alternative	DEL-4	0	0	0.4	0.3	WSE1, WSE2, WSE3

Attachment N.4E Wetland and Stream Impacts within the Study Area

Alternative Name	Alternative Identification	Long-term Wetland Impacts (acres)	Construction-related Wetland Impacts (acres) ^a	Long-term Wetland Buffer Impacts (acres) ^b	Construction-related Wetland Buffer Impacts (acres) ^{a, b}	Wetlands Affected
Andover Street Station Alternative	DEL-5	0	0	0	0.4	WSE11, WSE12, WSE13
Andover Street Station Lower Height Alternative	DEL-6a	0	0	0	0.4	WSE11, WSE12, WSE13
Andover Street Station Lower Height No Avalon Station Tunnel Connection Alternative	DEL-7	<0.1	<0.1	0.2	0.4	WSE11, WSE12, WSE13



^a Construction impacts represent areas temporarily impacted by the project, outside of the long-term project footprint.

^b Buffers includes paved areas that may not be regulated as buffer once permitting is complete.



Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).

Operations Footprint

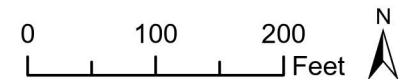
-  Operation Footprint South Crossing Alternative (DUW-1a) connecting to DEL-6b and DEL-7
-  Operation Footprint South Crossing Alternative (DUW-1a) connecting to DEL-1a, DEL-1b, DEL-2a and DEL-2b

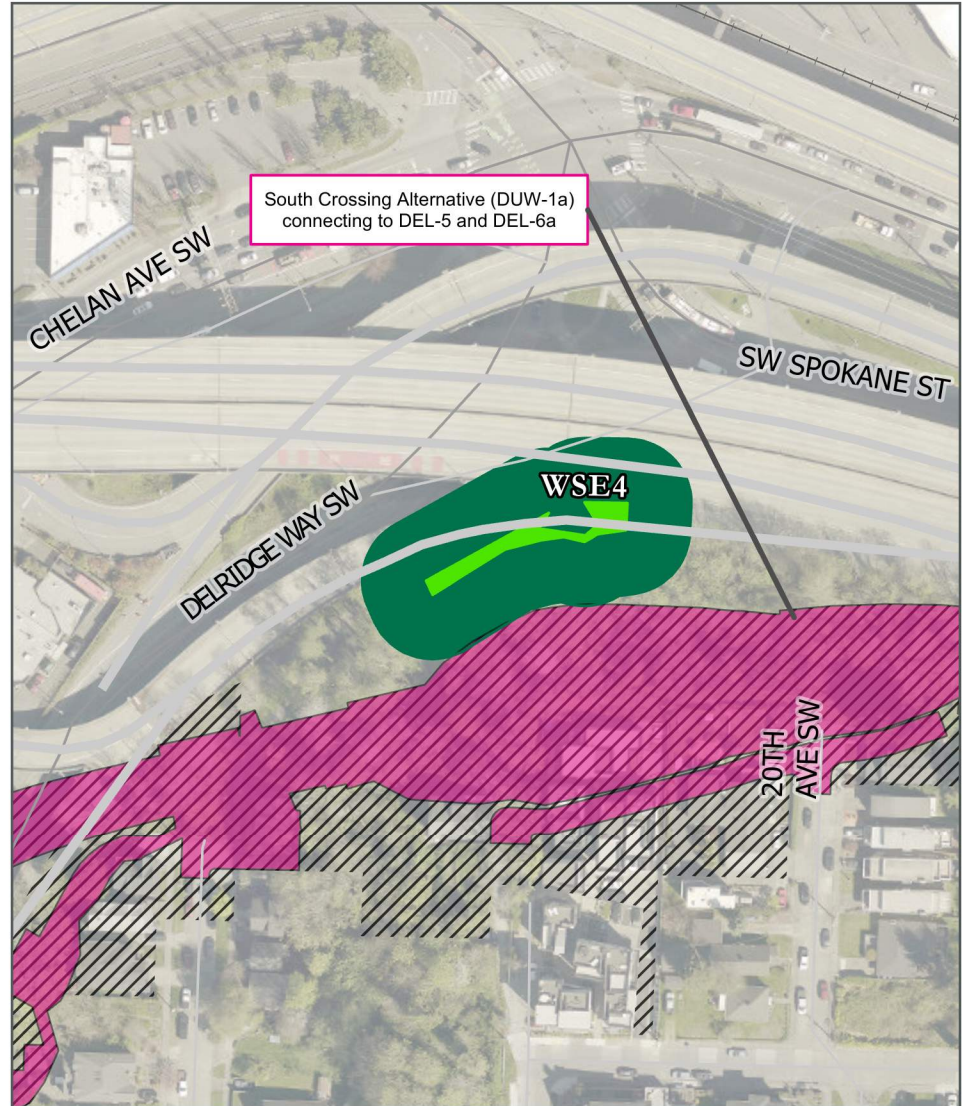
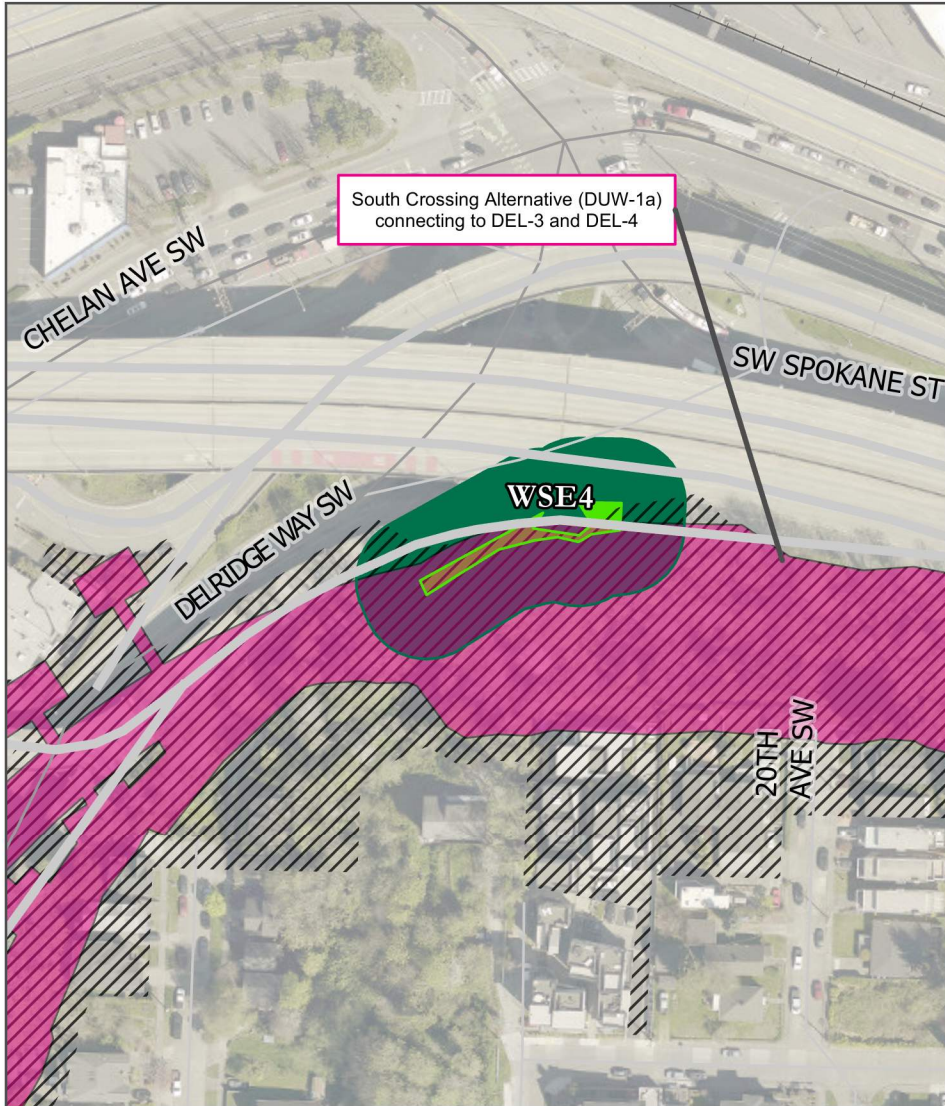
 Construction Footprint

-  Wetland
-  Wetland Buffer

FIGURE 2-1a
Direct Impacts to Wetland WSE4
Duwamish Segment



West Seattle Link Extension





Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).

Operations Footprint

-  South Crossing Alternative (DUW-1a) connecting to DEL-3 and DEL-4
-  South Crossing Alternative (DUW-1a) connecting to DEL-5 and DEL-6a

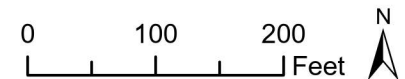
 Construction Footprint

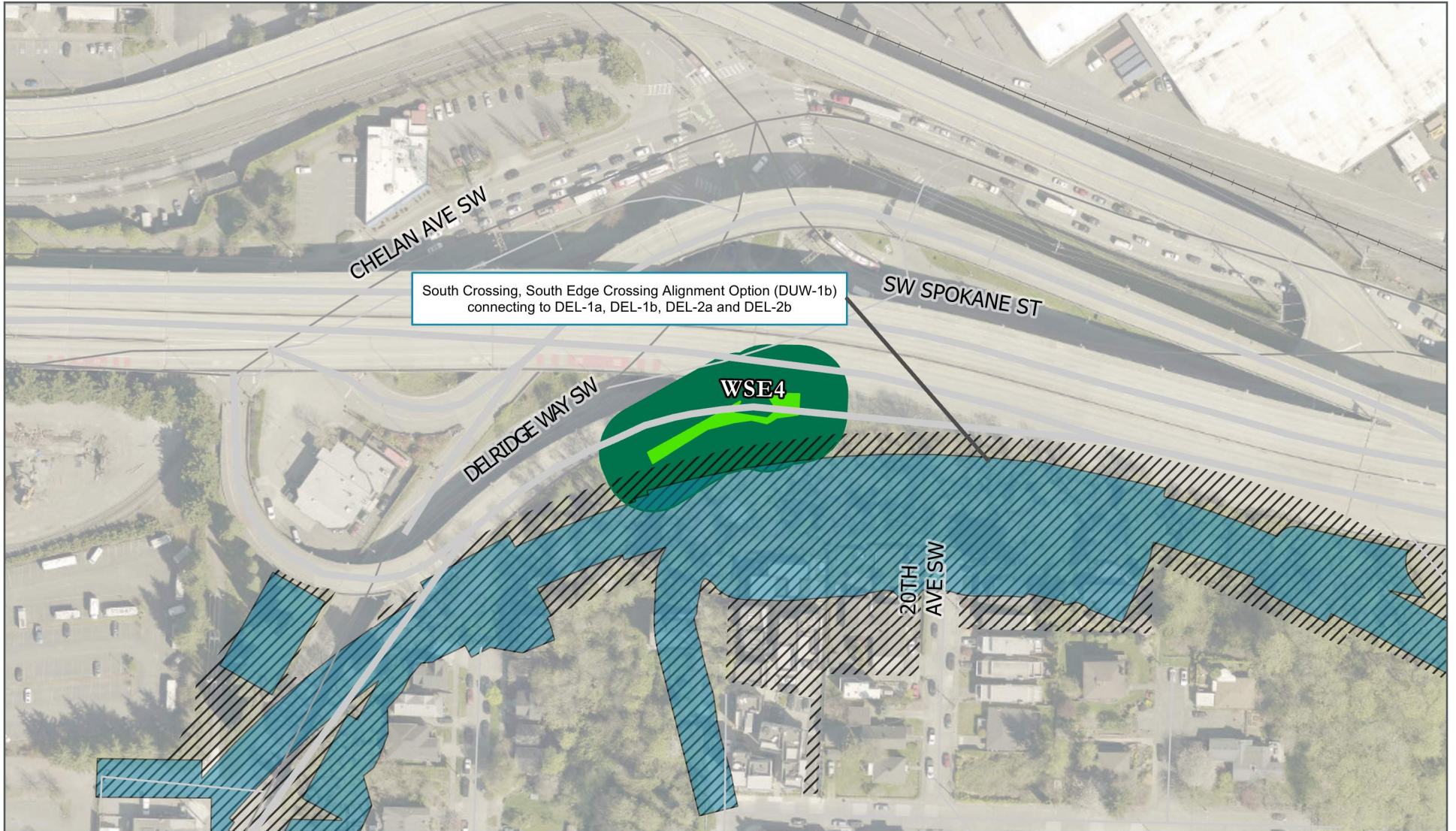
 Wetland

 Wetland Buffer

FIGURE 2-1b
Direct Impacts to Wetland WSE4
Duwamish Segment


West Seattle Link Extension





Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).

Operations Footprint

 South Crossing, South Edge Crossing Alignment Option (DUW-1b) connecting to DEL-1a, DEL-1b, DEL-2a and DEL-2b

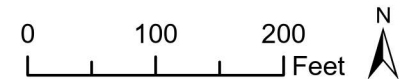
 Construction Footprint

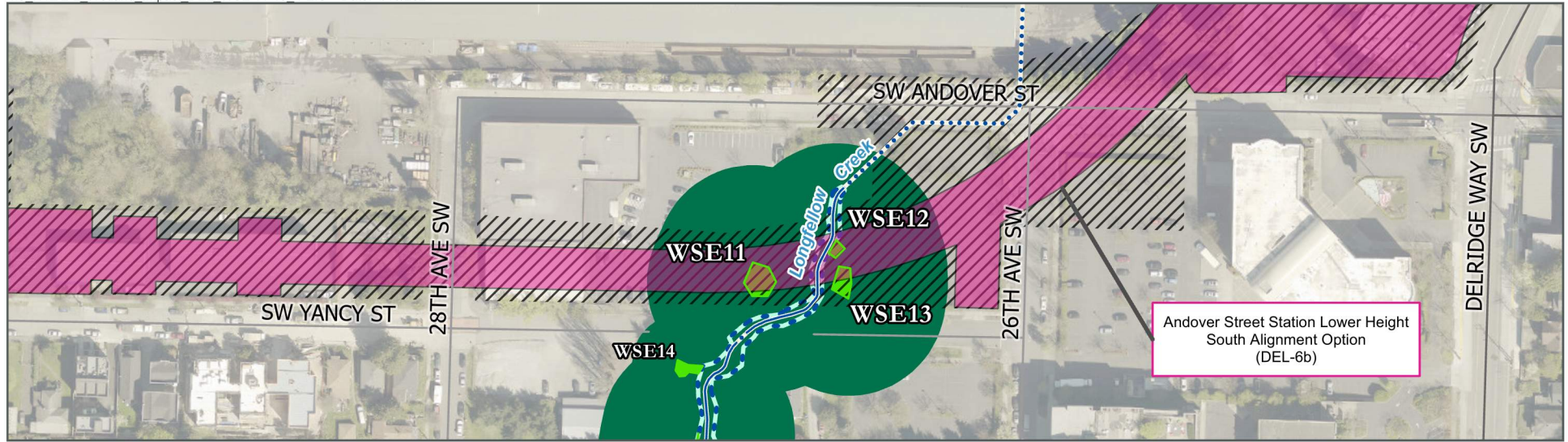
 Wetland

 Wetland Buffer

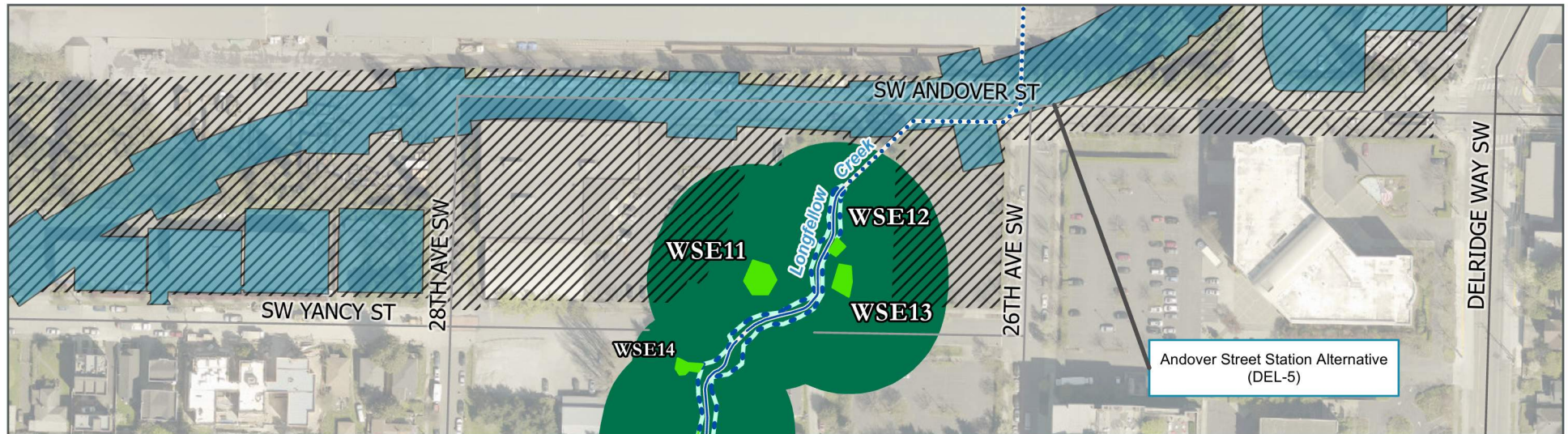
FIGURE 2-1c
Direct Impacts to Wetland WSE4
Duwamish Segment

West Seattle Link Extension





Andover Street Station Lower Height South Alignment Option (DEL-6b)



Andover Street Station Alternative (DEL-5)

Source: EagleView Technologies, Inc. (2021), City of Seattle (2023).






FIGURE 2-2a
Direct Impacts to Wetlands WSE11, WSE12, WSE13
and Longfellow Creek
Delridge Segment

Operations Footprint

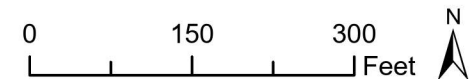
-  Andover Street Station Lower Height South Alignment Option (DEL-6b)
-  Andover Street Station Alternative (DEL-5)

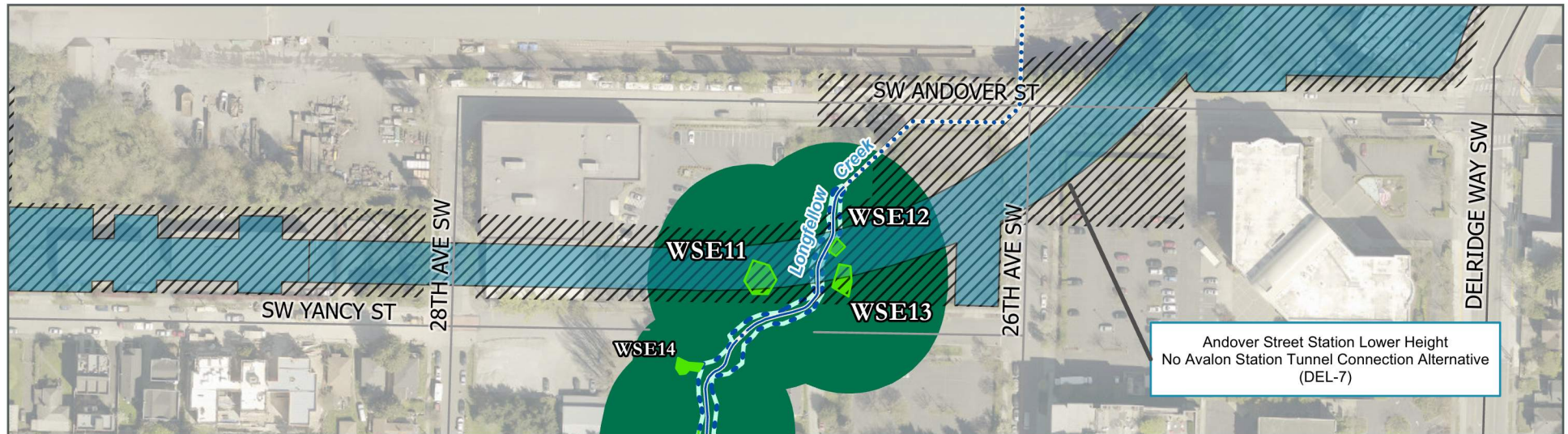
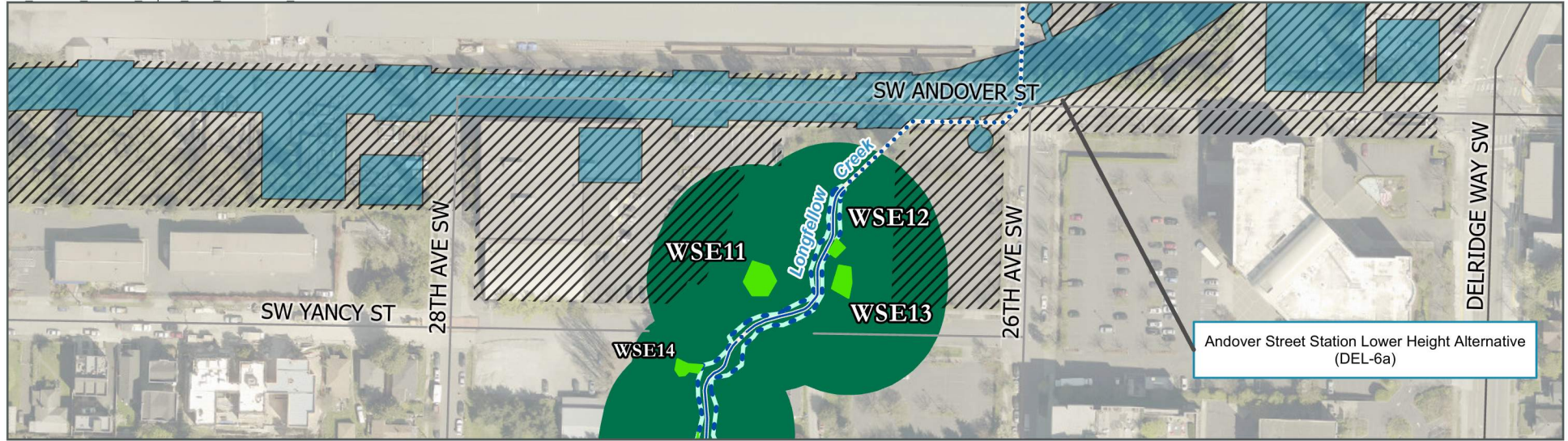
 Construction Footprint

-  Wetland
-  Wetland Buffer

-  Stream
-  Piped Stream
-  OHWM
-  Riparian Management Zone
-  Limited Development Zone

West Seattle Link Extension















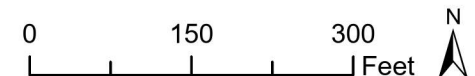
Source: EagleView Technologies, Inc. (2021), City of Seattle (2023).

FIGURE 2-2b
Direct Impacts to Wetlands WSE11, WSE12, WSE13
and Longfellow Creek
 Delridge Segment

Operations Footprint

- | | | | | | | | |
|---|---|--|--------------------------|--|--------------------------|--|--------|
|  | Andover Street Station Lower Height Alternative (DEL-6a) |  | Construction Footprint |  | Wetland |  | Stream |
|  | Andover Street Station Lower Height No Avalon Station Tunnel Connection Alternative (DEL-7) |  | Wetland Buffer |  | Piped Stream |  | OHWL |
| | |  | Riparian Management Zone |  | Limited Development Zone | | |



West Seattle Link Extension





Source: King County (2021), City of Seattle, EagleView Technologies, Inc. (2023).

Operations Footprint

-  Dakota Street Station Lower Height Alternative (DEL-2a)
-  Delridge Way Station Lower Height Alternative (DEL-4)

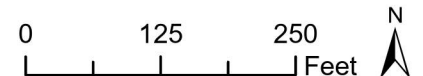
 Construction Footprint

 Wetland

 Wetland Buffer

FIGURE 2-3a
Direct Impacts to Wetland WSE1
Delridge Segment

West Seattle Link Extension





Source: King County (2021), City of Seattle, EagleView Technologies, Inc. (2023).

Operations Footprint

- Tunnel 41st Avenue Station Alternative (WSJ-3a)
- Tunnel 42nd Avenue Station Option (WSJ-3b)

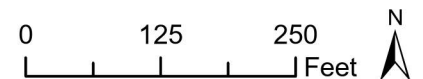
Construction Footprint

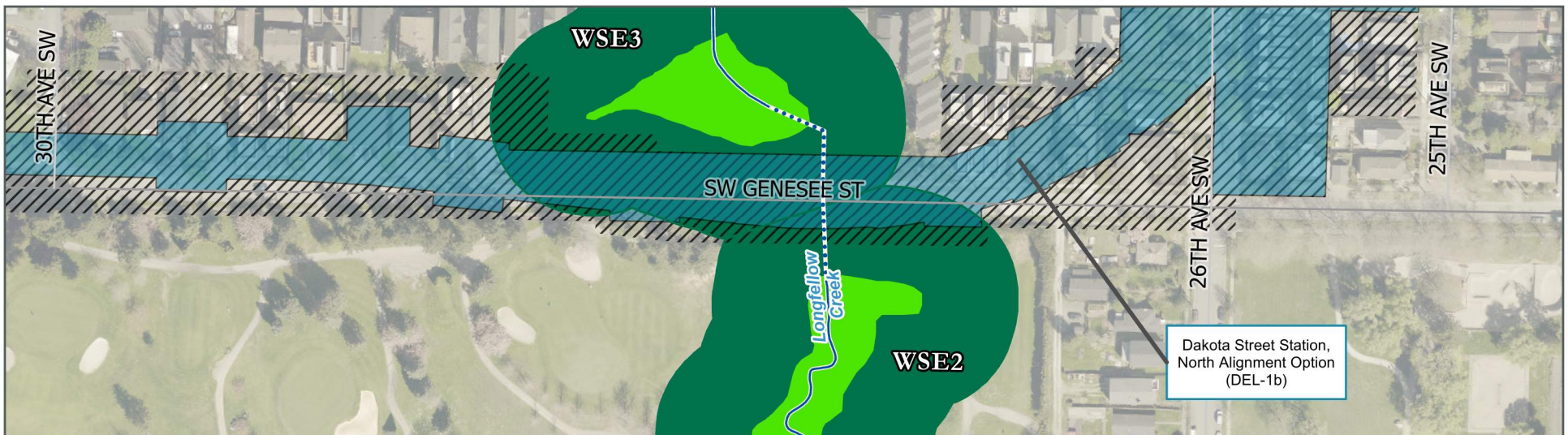
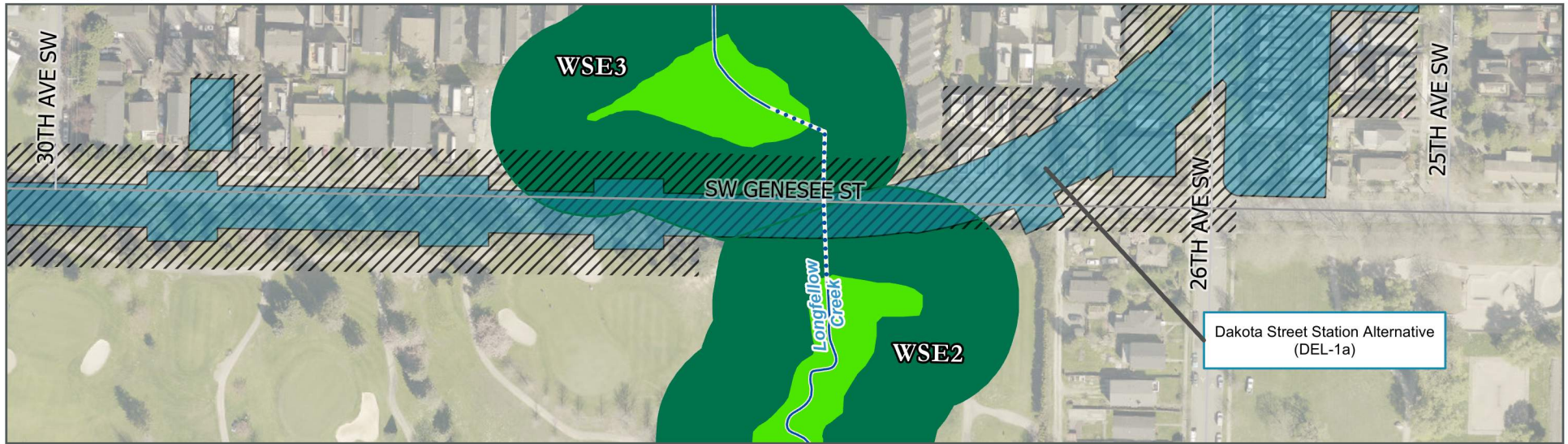
Wetland

Wetland Buffer

FIGURE 2-3b
Direct Impacts to Wetland WSE1
West Seattle Junction Segment

West Seattle Link Extension





Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).

Operations Footprint

-  Dakota Street Station Alternative (DEL-1a)
-  Dakota Street Station North Alignment Option (DEL-1b)

-  Construction Footprint

-  Wetland
-  Wetland Buffer






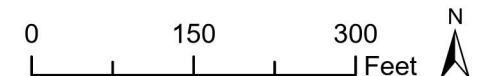
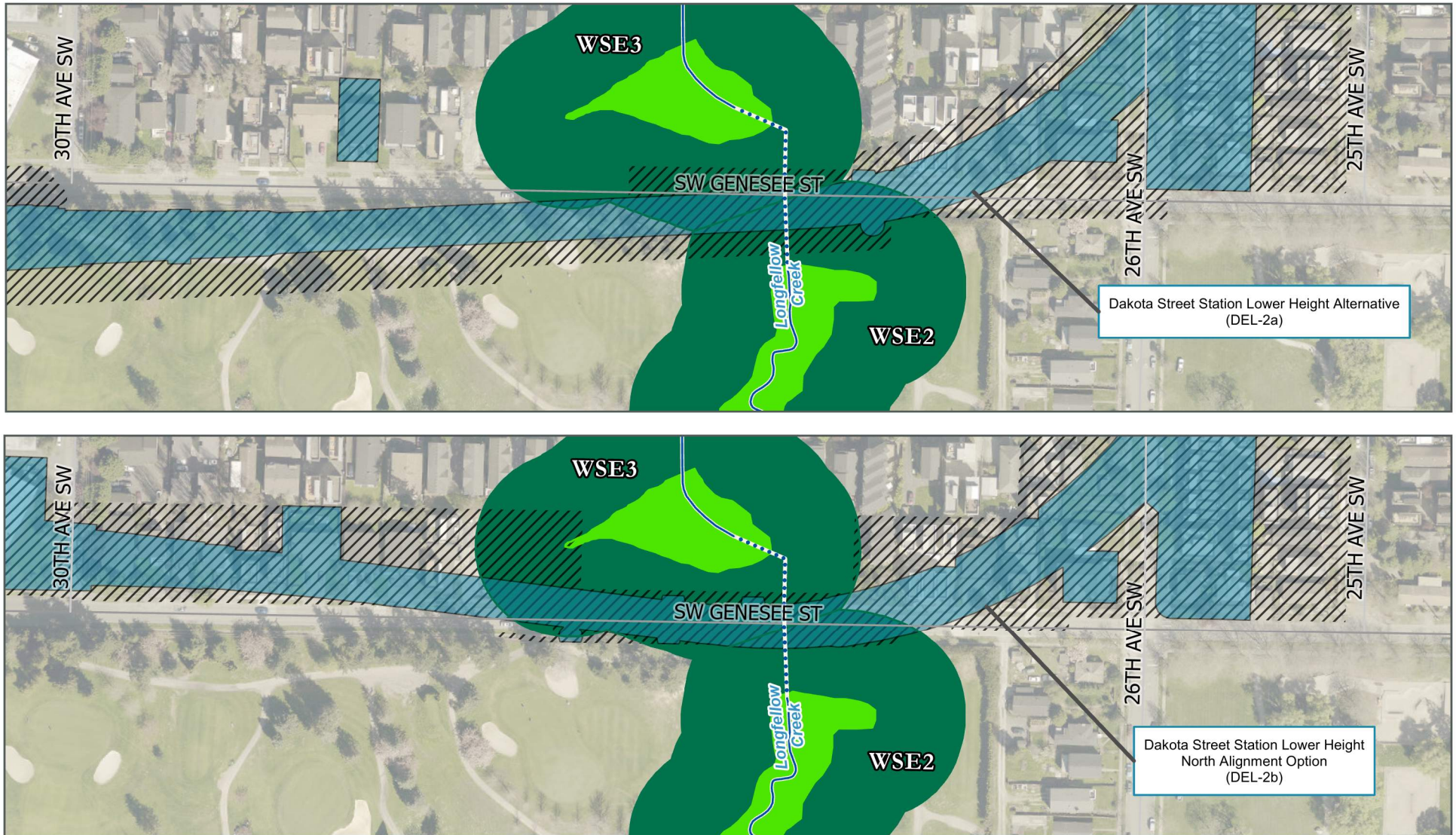
-  Stream
-  Piped Stream
-  OHWM
-  Riparian Management Zone
-  Limited Development Zone

FIGURE 2-4a
Direct Impacts to Wetlands WSE2, WSE3
and Longfellow Creek
Delridge Segment

West Seattle Link Extension





Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).






FIGURE 2-4b
Direct Impacts to Wetlands WSE2, WSE3
and Longfellow Creek
Delridge Segment

Operations Footprint

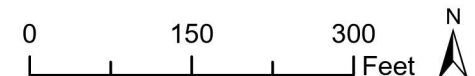
-  Dakota Street Station Lower Height Alternative (DEL-2a)
-  Dakota Street Station Lower Height North Alignment Option (DEL-2b)

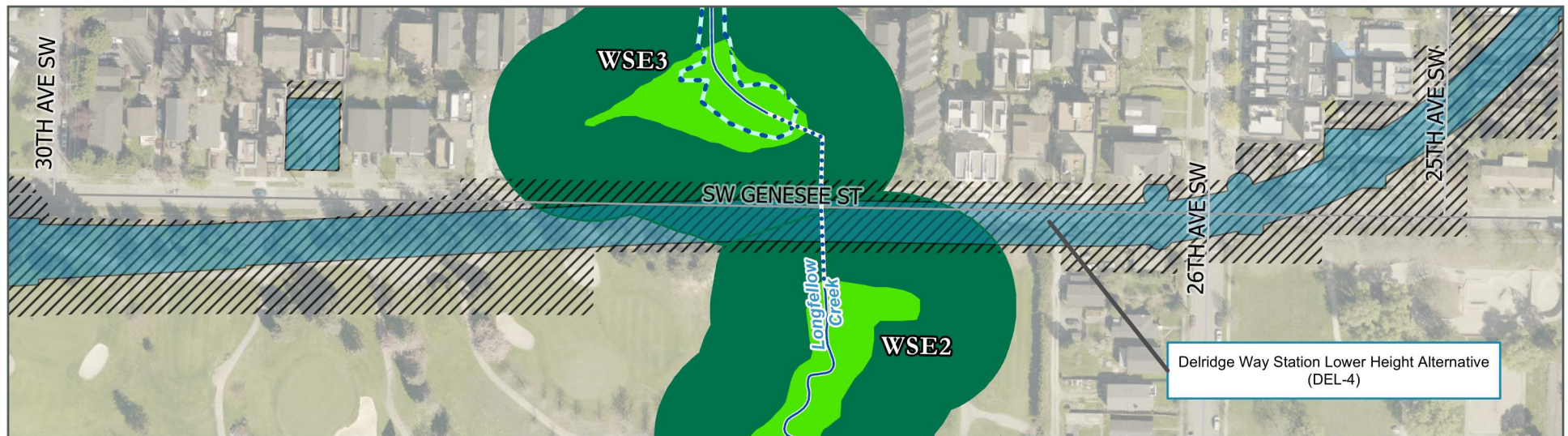
-  Construction Footprint

-  Wetland
-  Wetland Buffer

-  Stream
-  Piped Stream
-  OHWM
-  Riparian Management Zone
-  Limited Development Zone

West Seattle Link Extension





Source: EagleView Technologies, Inc. (2021), City of Seattle (2023).

Operations Footprint

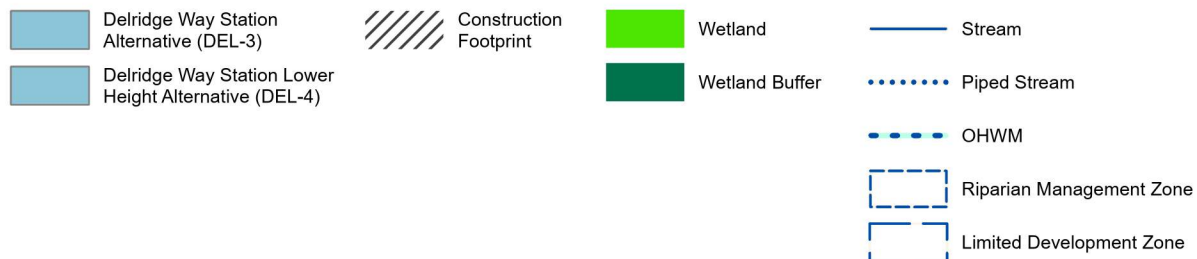
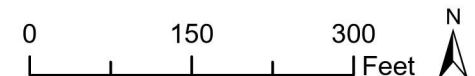


FIGURE 2-4c
Direct Impacts to Wetlands WSE2, WSE3
and Longfellow Creek
 Delridge Segment

West Seattle Link Extension



2.2 Impacts to Streams/Waterbodies

Direct impacts to waterbodies along the West Seattle Link Extension would occur in the Duwamish and Delridge segments. Direct impacts to the Duwamish Waterway and Longfellow Creek are presented in Tables 2-3, 2-4, and 2-5. Impacts to Longfellow Creek for each alternative are shown on Figures 2-4a through 2-4c. Impacts to Duwamish Waterway are shown on Figures 2-5a and 2-5b.

Table 2-3. Summary of Impacts to Streams/Waterbodies – Duwamish Segment

Alternative Name	Alternative Identification	Number of Permanent In-Water Piers	Approximate Area of Construction Impacts in Waterbody (acres)	Over-water Structures (acre) ^a	Permanent Benthic Surface Impacts (acre)
Preferred South Crossing Alternative	DUW-1a	0	0 to <0.1 ^b	0.8 to 0.9	0
South Crossing South Edge Crossing Alignment Option	DUW-1b	4 to 5	0.2 to 1.0 ^c	0.7 to 0.9	<0.1 to 0.4 ^d
North Crossing Alternative	DUW-2	0 to 3	0 to 0.9 ^c	0.7 to 0.9	0 to 0.5

Note: The ranges of impacts shown represent impacts from different bridge types; support guideway column locations would vary by bridge type; Preferred Alternative DUW-1a and some bridge types for Alternative DUW-2 could avoid in-water work.

^a This area represents the total area of elevated bridge features over the Duwamish Waterway; this does not include bridge guideway columns or pile caps in the water; these are shown in the Permanent Benthic Surface Impacts column.

^b Less than 0.1 acre of impact is associated with riprap removal/replacement along shoreline.

^c Construction impact for Option DUW-1b and Alternative DUW-2 represent the total area of the cofferdam footprints and work trestle guideway column support footprints that would be placed on the benthic surface, minus the area of guideway columns that would remain permanently in the waters. All this in-water work would occur in salmonid critical habitat and essential fish habitat.

^d Less than 0.1 acre of impact is associated with storm drain outfalls.

Table 2-4. Summary of Impacts to Shorelines – Duwamish Segment

Alternative Name	Alternative Identification	Shoreline: Long-term Impacts (linear feet) ^a	Shoreline: Construction Impacts (linear feet) ^{b, c}	Shoreline Buffer: Long-term Impacts (acres) ^{a, c}	Shoreline Buffer: Construction Impacts (acres) ^{b, c}
Preferred South Crossing Alternative	DUW-1a	400	100	2	5
South Crossing South Edge Crossing Alignment Option	DUW-1b	500	1,000	2	3
North Crossing Alternative	DUW-2	500	800	2	8

^a To estimate permanent shoreline impacts, the impact analyses for all alternatives assumed a complete loss of habitat within the permanent footprint. Actual impacts may be less where the guideway is elevated or where shoreline is already developed.

^b These construction impacts represent areas that would be temporarily impacted by the project, outside of the long-term project footprint.

^c Shoreline buffer includes both paved and unpaved surfaces; paved areas may be eliminated when permitting is complete.

Table 2-5. Summary of Impacts to Streams/Waterbodies – Delridge Segment

Alternative Name	Alternative Identification	Longfellow Creek: Long-term Impact (acres) ^a	Longfellow Creek: Construction Impact (acres)	Longfellow Creek Riparian Management Area within 75 feet ^a : Long-term Impact (acres) ^b	Longfellow Creek Riparian Management Area within 75 feet ^a : Construction Impact (acres) ^b	Longfellow Creek Limited Riparian Development Area ^a : Long-term Impact (acres) ^b	Longfellow Creek Limited Riparian Development Area ^a : Construction Impact (acres) ^b
Preferred Andover Street Station Lower Height South Alignment Option	DEL-6b	<0.1	<0.1	0.2	0.2 ^c	<0.1	0.1 ^{c, e}
Dakota Street Station Alternative	DEL-1a	0	0	<0.1	0.1 ^{c, d}	<0.1	0.1 ^{c, d}
Dakota Street Station North Alignment Option	DEL-1b	0	0	0.1 ^{c, d}	<0.1	0.1 ^{c, d}	0.1
Dakota Street Station Lower Height Alternative	DEL-2a	0	0	No Impact	<0.1	<0.1	<0.1 ^{c, d}
Dakota Street Station Lower Height North Alignment Option	DEL-2b	0	0	<0.1	<0.1	0.1	<0.1 ^{c, d}
Delridge Way Station Alternative	DEL-3	0	0	<0.1	<0.1	<0.1	<0.1 ^{c, d}
Delridge Way Station Lower Height Alternative	DEL-4	0	0	<0.1	<0.1	<0.1	<0.1 ^{c, d}
Andover Street Station Alternative	DEL-5	0	0	0	<0.1	<0.1	0.1 ^c
Andover Street Station Lower Height Alternative	DEL-6a	0	0	0	<0.1	<0.1	0.1 ^{c, e}
Andover Street Station Lower Height No Avalon Station Tunnel Connection Alternative	DEL-7	<0.1	<0.1	0.2	0.2 ^c	<0.1	0.1 ^{c, e}

Note: To estimate stream impacts, the impact analyses for all alternatives includes all stream or buffer areas under the guideways, regardless of whether the guideways are elevated or at-grade/retained-cut. All long-term impacts shown in this table would be areas shaded by guideway.

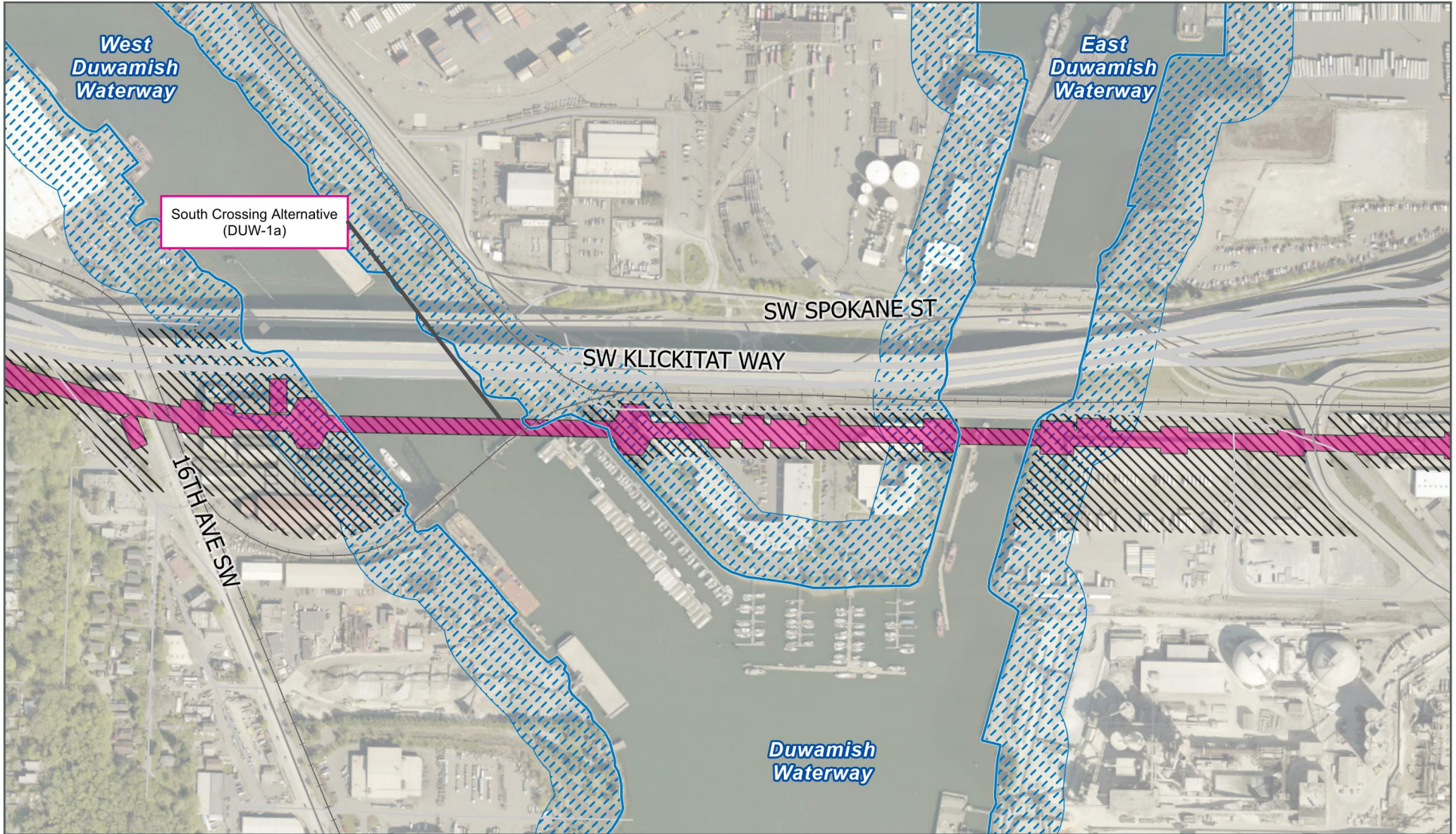
^a The riparian management area is 0 to 100 feet from the stream. The City of Seattle allows some development activities in a subset of the management area (the limited riparian development area) 75 to 100 feet from the stream (Seattle Municipal Code Section 25.09.200).

^b Riparian management area was calculated for areas perpendicular from daylighted sections of Longfellow Creek; piped stream is excluded from City of Seattle riparian management regulations.

^c These metrics may include paved areas within 75 feet of the stream; these may be removed from impact metrics following coordination with the City of Seattle.

^d These impact areas are overlapped by the 110-foot wetland buffers around wetlands WSE2 and WSE3.

^e These impact areas are overlapped by the 110-foot wetland buffers around wetlands WSE11, WSE12, and WSE13.



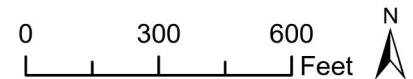
Source: EagleView Technologies, Inc. (2021), City of Seattle (2023).

Operations Footprint



FIGURE 2-5a
Direct Impacts to Duwamish Waterway
Duwamish Segment

West Seattle Link Extension





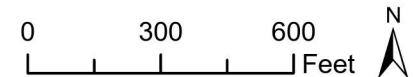
Source: EagleView Technologies, Inc.(2021), City of Seattle (2023).

FIGURE 2-5b
Direct Impacts to Duwamish Waterway
Duwamish Segment

Operations Footprint

- South Crossing, South Edge Crossing Alignment Option (DUW-1b)
- North Crossing Alternative (DUW-2)
- Construction Footprint
- Shoreline
- Shoreline Buffer (200 feet)

West Seattle Link Extension



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