WSDOT

U. S. Department of Transportation
Federal Highway Administration

FEBRUARY 2020

ENVIRONMENTAL ASSESSMENT

Appendix L: Draft Wetland and Stream Assessment Report

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

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WETLAND AND STREAM ASSESSMENT REPORT

I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

King and Snohomish Counties, WA

XL 5446
WIN A40561Z

Prepared by
I-405/SR 167 Megaprogram

February 2020

Washington State
Department of Transportation

WETLAND AND STREAM ASSESSMENT REPORT

I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

February 2020

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Executive Summary

The Washington State Department of Transportation (WSDOT) and Federal Highway Administration (FHWA) propose to construct roadway improvements on Interstate 405 (I-405) between the State Route (SR) 522 vicinity and SR 527 to improve mobility and reliability in the I-405 express toll lanes (ETLs) in the cities of Kirkland and Bothell. The SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (Project) will extend the dual ETL system from its current end point, located south of the SR 522 interchange at approximately milepost (MP) 21.79, to the SR 527 interchange, located at approximately MP 26.30. The Project limits extend beyond the SR 527 interchange to MP 27.06.

A total of 52 wetlands covering 17.20 acres were delineated in the study area, including 19 Category IV wetlands, 28 Category III wetlands, and 5 Category II wetlands. The hydrogeomorphic classifications are 29 depressional wetlands, 22 slope wetlands, and one riverine wetland. The Cowardin classes of the wetlands within the study area are primarily palustrine emergent, palustrine scrub-shrub, and palustrine forested. All wetlands in the study area are regulated by the U.S. Army Corps of Engineers and/or the Washington State Department of Ecology.

Many rivers and streams in the study area have been altered to accommodate development. Stream and river buffer sizes vary. Several are limited by their proximity to elements of the built environment and typically consist of immature trees, shrubs, or grasses intermixed with nonnative invasive plant species. A total of 14 streams were verified in the study area.

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Attachments are available upon request.

Acronyms and Abbreviations

BMC	Bothell Municipal Code
Ecology	Washington State Department of Ecology
ETL	express toll lane
FHWA	Federal Highway Administration
HGM	hydrogeomorphic
I-405	Interstate 405
KZC	Kirkland Zoning Code
MP	milepost
NRCS	Natural Resources Conservation Service
OHWM	ordinary high water mark
PAB	palustrine aquatic bed
PEM	palustrine emergent
PFO	palustrine forested
PGIS	pollution-generating impervious surface
PSS	palustrine scrub-shrub
SR	State Route
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WMC	Woodinville Municipal Code
WSDOT	Washington State Department of Transportation
WRIA	Water Resource Inventory Area

Chapter 1. Introduction

The Washington State Department of Transportation (WSDOT) and Federal Highway Administration (FHWA) propose to construct roadway improvements on Interstate 405 (I-405) between the State Route (SR) 522 vicinity (milepost [MP] 21.79) and SR 527 (MP 27.06) to improve mobility and reliability in the I-405 express toll lanes (ETLs) in the cities of Kirkland and Bothell.

The purpose of this Wetland and Stream Assessment Report is to establish a wetland and stream study area for the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (Project) and identify and describe wetlands, streams, and their associated buffers within the study area. This report is intended to document wetland and stream boundary determinations for review by regulatory authorities and provide background information for wetland mitigation reports. Additionally, the information presented in this report describes sensitive habitats within the Project corridor and assists Project engineers and designers in avoiding and/or minimizing impacts on wetlands and streams during the design process. The findings presented in this report can also be used to support future projects that occur partially or entirely within the study area.

This report documents existing conditions within the study area and will provide support for Project permitting including, but not limited to:

- National Environmental Policy Act/State Environmental Policy Act
- Hydraulic Project Approval
- Clean Water Act permits
- Coastal Zone Management Act Certification
- Any applicable permit required by the local jurisdiction

Chapter 2. Proposed Project

This chapter describes the key elements of the Project, including the location, purpose, and overall Project description.

2.1. Location

The Project generally includes a 6-mile segment of I-405 extending from south of the I-405/160th Street interchange to just north of the I-405/SR 527 interchange (Figure 1). The Project is located within the cities of Kirkland and Bothell, Washington (Sections 5, 8, and 9 in Township 26 North and Range 5 East, and Sections 30 and 32 in Township 27 North and Range 5 East). The southern limit of the Project occurs at approximately milepost (MP) 21.79, and the northern limit occurs at approximately MP 27.06. The Project crosses the Sammamish River at river mile 4.6, and it is located within the Cedar-Sammamish Water Resource Inventory Area (WRIA 8) and Hydraulic Unit Code 171100140403.

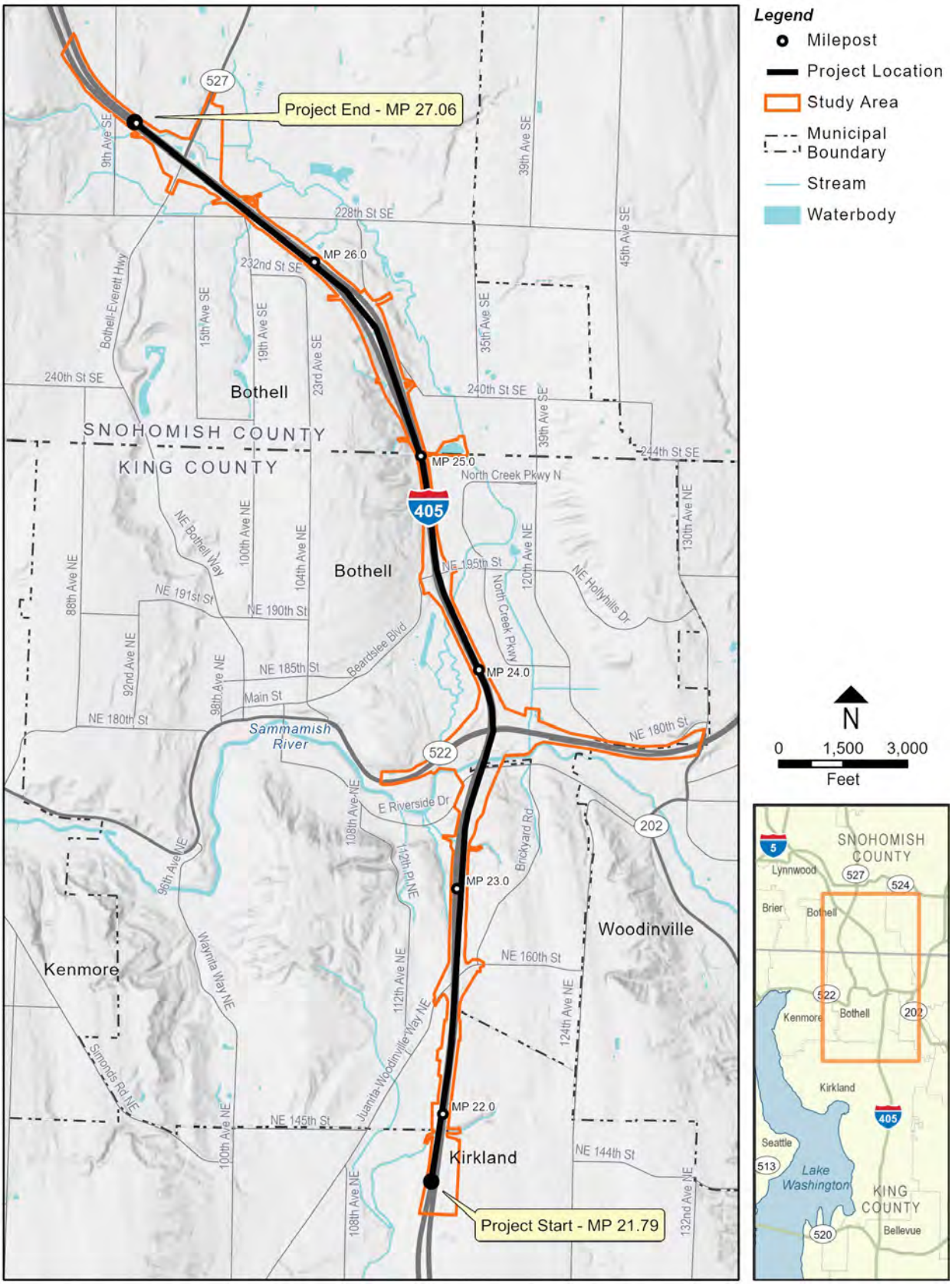

Figure 1. Project Vicinity and Study Area Map

2.2. Purpose and Description

The Project extends along I-405 and is located primarily within the city of Bothell between MP 21.79 and MP 27.06. The Project begins south of the I-405/SR 522 interchange and continues to just north of the I-405/SR 527 interchange. Table 1 summarizes the proposed Project improvements.

Table 1. Project Description

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

Project Element	I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project
SR 527 interchange area	• Construct new direct access ramps to the north, south and east, and two inline transit stations (one in each direction) in the I-405 median just south of SR 527 at 17th Avenue SE. Transit stations would include station platforms, signage, artwork, lighting, fare machines, and site furnishing such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. • Reconstruct the pedestrian bridge over I-405.
17th Avenue SE, 220th Street SE, SR 527	Reconfigure 17th Avenue SE and portions of 220th Street SE and SR 527 to include a roundabout at the Canyon Park Park and Ride, bicycle and pedestrian improvements, and improvements at the SR 527 and 17th Avenue SE intersections with 220th Street SE.
Fish barrier corrections	Replace five fish barriers with restored stream connections at the following streams: • Par Creek (WDFW ID 993083) • Stream 25.0L (WDFW ID 993104) • North Fork of Perry Creek (WDFW ID 08.0070 A 0.25) • Two fish barriers at Queensborough Creek (WDFW ID 993084 and 993109)
Sammamish River bridges	• Remove the existing northbound I-405 to eastbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. • Remove the existing northbound I-405 to westbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. • Build a new bridge for northbound I-405 traffic over the Sammamish River. • Build a new bridge over the Sammamish River for the new direct access ramp at SR 522. • Build a new bridge over the Sammamish River for the northbound I-405 to SR 522 ramp.
Noise and retaining walls	• Construct 3 new noise walls near NE 160th Street and SR 527. • Construct several new retaining walls.
Stormwater management	• Provide enhanced treatment for an area equivalent to 100 percent of new PGIS (approximately 24 acres). • Retrofit about 20 acres of existing untreated PGIS and continue to treat stormwater from the approximately 44 acres of PGIS that currently receives treatment. • Construct three new stormwater outfalls, one on the Sammamish River and two on the North Fork of Perry Creek.
Construction duration	Construction is expected to last 3 to 4 years, beginning in 2021.

ETL = express toll lane; I-405 = Interstate 405; MP = milepost; OHWM = ordinary high water mark; PGIS = pollution-generating impervious surfaces; SR = State Route

Chapter 3. Methods

This chapter summarizes the methods used to comply with WSDOT, federal, state, and local guidance. Additional details regarding the methods used to prepare this report are provided in Attachment A, Methods and Tools.

3.1. Study Area

WSDOT defined the study area by reviewing the maximum extent of the proposed Project footprint, including roadway and roadside improvements. The study area includes areas along I-405 and near the SR 522 and SR 527 interchanges. In addition to the Project footprint, the study area includes areas where additional project improvements could occur to ensure that WSDOT assessed wetlands, streams, and other natural habitats that could be affected by the Project (Figure 1). The study area for streams also includes 300 feet upstream and 300 feet downstream of the location of each stream-related Project element (e.g., culvert replacements and bridge construction).

3.2. Wetlands

WSDOT made wetland determinations using field-documented characteristics and data from the previously delineated wetlands and the National Wetlands Inventory maps developed by the U.S. Fish and Wildlife Service (USFWS 2018). Wetland fieldwork was conducted from March 13, 2019, to May 13, 2019. The fieldwork included delineating wetlands, assigning wetland ratings, and recording observations of soils, hydrology, and vegetation, as well as landscape position and general site conditions.

WSDOT identified wetlands within the study area in accordance with the *Regional Supplement to the U.S. Army Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010). The boundaries of jurisdictional wetlands occurring within the study area were delineated by placing sequentially numbered flags to define wetland boundaries, which were subsequently surveyed. Wetland locations and identifying features are described in Chapter 4 and are shown on wetland plan sheets in Attachment C.

The Regional Delineation Supplement (USACE 2010) recommends using methods described in Chapter 19 of the *Engineering Field Handbook* (NRCS 2015) to determine if precipitation occurring in the three full months prior to the site visit was normal, drier than normal, or wetter than normal. Actual rainfall is compared to the normal range of the 30-year average. When considering the three prior months as a whole, normal precipitation conditions were present prior to field work. (Attachment B).

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

- “L” if the wetland is located adjacent to the southbound lanes of I-405 and the westbound lanes of SR 522.

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

The study area for the wetland assessment comprises the entire area within the city limits of Kirkland and Bothell and a small area within Woodinville. City of Bothell Municipal Code (BMC) 14.04.500, City of Kirkland Zoning Code (KZC) 90.55, and City of Woodinville Municipal Code (WMC) 21.51.300 indicate that wetlands within their jurisdictions should be rated using the *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014), referred to as the Washington State Department of Ecology (Ecology) rating system. The Ecology rating system includes a functional assessment for water quality, hydrologic, and habitat functions of the wetlands. KZC 90.55, Table 90.55.1; BMC 14.04.530(F)1; and WMC 21.51.310, Table 21.51.310(1) provide wetland and associated buffer standards for rating, delineation, buffer width determination, and other elements. Several wetlands in Bothell are within shoreline jurisdiction. Buffer widths for those wetlands were determined using BMC 13.13, Table 13.13.020-1. For all three jurisdictions, wetland buffer widths are determined by the wetland rating and habitat score. According to WSDOT guidance, existing elevated road prisms are not treated as wetland, streams, or their buffers, except where the local jurisdiction requires WSDOT to do so (WSDOT 2008). Therefore, all wetland buffers were cut at the toe of the road prism.

Using the Ecology rating system, WSDOT qualitatively assessed the condition of wetland and wetland buffers in the study area using:

- Dominant land use (e.g., agriculture, residential, commercial, industrial).
- Dominant buffer vegetation type (tree, shrub, herb, vine, unvegetated).
- Estimated percent cover of invasive plants by species.

Wetland functions for wetlands in the study area were evaluated using the Ecology wetland rating form and were rated as Category I, II, III, or IV (Hruby 2014). Category I is considered the highest functioning wetland, and Category IV is considered the lowest functioning wetland. To determine an accurate assessment of a wetland's functional values, function scores were calculated based on the entire wetland system, when applicable, not just the delineated portion of wetland within the study area.

The WSDOT Wetland Functions Characterization Tool for Linear Projects (Best Professional Judgment tool) manual (Null et al. 2000) was also used to characterize the functions provided by each potentially affected wetland. The Best Professional Judgment tool is a qualitative tool allowing for rapid characterization of wetland functions, evaluating water quality functions, hydrologic functions, habitat functions, and special characteristics. A table summarizing the functions and values for each potentially affected wetland is provided in Attachment H.

3.3. Streams

Streams in the study area were assessed to delineate their ordinary high water marks (OHWMs). Stream fieldwork was conducted from December 12, 2018, to March 15, 2019. WSDOT walked the entire study area and compared field observations to City of Bothell, City of Kirkland, and King County stream data to verify existing stream alignments and stream conditions.

For each stream identified within the study area, WSDOT determined the OHWM using the definition in the Washington Administrative Code (WAC) Section 222-16-010 and the methods described in Ecology's publication *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson et al. 2016). The City of Kirkland and City of Bothell have adopted the WAC definition for the OHWM, as indicated in KZC 5.10.611 and BMC 13.03.010. No streams were identified within City of Woodinville jurisdiction.

The streams within the study area were assessed to establish which have the potential to support fish, and which do not. WSDOT coordinated with Washington Department of Fish and Wildlife (WDFW) to review existing data and conduct field visits to determine potential fish use. Fish use potential is based on criteria defined in the WDFW Fish Passage and Diversion Screening Inventory (WDFW 2019b). Fish use potential does not indicate that there are fish documented in the stream, only that the existing habitat could potentially support fish use. WSDOT uses WDFW fish use potential determinations to plan fish barrier corrections in accordance with the federal injunction in *United States et al. vs. Washington et al.* No. C70-9213, Subproceeding No. 01-1, dated March 29, 2013 (WDFW 2019a).

The Cities of Bothell and Kirkland both classify streams in accordance with WAC 222-16-030, which defines stream classifications as:

- Type S – all waters inventoried as "shorelines of the state," including periodically inundated areas of their associated wetlands.
- Type F – segments of natural waters that in any case contain fish habitat.
- Type Np – all segments of natural waters that are perennial, non-fish habitat streams.
- Type Ns – all segments of natural waters that are seasonal, non-fish habitat streams in which surface flow is not present for at least some portion of a year of normal rainfall.

In some cases, a local jurisdiction's stream typing may vary from WDFW fish use potential classifications due to the use of different methods. For the purposes of this report and describing current stream conditions, WSDOT has included stream types determined by local jurisdictions and potential fish use determined by WDFW for each stream within the study area (see Section 4.3). Additional information about streams is provided in Attachment G.

Chapter 4. Existing Conditions

This chapter describes the existing conditions in the study area specific to the overall landscape setting, wetlands, and streams.

4.1. Landscape Setting

The study area is in the Lake Washington/Cedar/Sammamish watershed, water resource inventory area (WRIA) 8, which is located in western Washington. The watershed drains approximately 692 square miles and includes two major river systems (Cedar and Sammamish) and three large lakes (Union, Washington, and Sammamish). The study area contains three basins in WRIA 8: Juanita Creek, the Sammamish River, and North Creek. Juanita Creek and the Sammamish River drain into Lake Washington, and North Creek drains into the Sammamish River. The Muckleshoot Indian Tribe has usual and accustomed fishing places in WRIA 8.

The study area is located within an urbanized, highly developed area where land uses include commercial and residential structures. According to the 2017 WRIA 8 Salmon Conservation Plan (Rheaume and Stokes 2017), the Lake Washington/Cedar/Sammamish watershed is the most populous watershed in Washington State. As of 2017, the human population of the watershed was approximately 1.4 million. The municipal drinking water supply for the City of Seattle is supplied by a large portion of the upper Cedar River watershed and is managed under a Habitat Conservation Plan. Between 2010 and 2017, the population in the central Puget Sound region, including King, Kitsap, Pierce, and Snohomish Counties, and their 82 cities and towns, increased by 10 percent to 4.1 million people. Forecasts project this number to increase to nearly 5.8 million people by 2050 (PSRC 2019).

4.2. Wetlands

4.2.1. Overview

A total of 52 wetlands covering 17.20 acres were delineated in the study area, including 19 Category IV wetlands, 28 Category III wetlands, and 5 Category II wetlands. Of the 52 wetlands, the hydrogeomorphic (HGM) classifications include 29 depressional wetlands, 22 slope wetlands, and one riverine wetland. The Cowardin classes of the wetlands within the study area are primarily palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO). All wetlands in the study area are regulated by the U.S. Army Corps of Engineers (USACE) and/or Washington State Department of Ecology (Ecology). Table 2 summarizes wetlands by classification.

There is a wide variety of wetland types of various quality found within the study area. Many are small roadside ditches with little species diversity beyond grasses and invasive plants. Most wetlands in the study area receive runoff from developed areas through ditches and drainage pipes, as well as natural sources including groundwater, precipitation, seeps, and springs.

Table 2. Wetland Summary by Classification

Classification System	Class	Area (acres)	Percent of Total Area
U.S. Fish and Wildlife Service (Cowardin et al. 1979)	PEM	15.38	26
	PSS	12.27	21
	PFO	22.84	38
	PAB	8.87	15
	Total	**59.36**	**100**
Washington State Department of Ecology (Hruby 2014)	I	0	0
	II	42.07	71
	III	14.67	25
	IV	2.62	4
	Total	**59.36**	**100**
Local Jurisdiction	I	0	0
	II	42.07	71
	III	14.67	25
	IV	2.62	4
	Total	**59.36**	**100**
Hydrogeomorphic Class	Depressional	56.68	95
	Riverine	0.05	<1
	Slope	2.63	4
	Total	**59.36**	**100**

PAB = palustrine aquatic bed; PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub
Note: Percentage discrepancies are due to rounding.

The most diverse and highest quality wetlands are Wetlands 24.35L, 25.03R, 26.13R, 26.35R, and 26.70R, which are classified as Category II because they discharge immediately to an impaired water and are mapped by WDFW as a priority habitat. Wetland 24.35L is located just north of the I-405/SR 522 interchange on the southbound side of I-405 near the University of Washington-Bothell campus. Wetland 25.03R is located east of I-405 along the right bank of North Creek. Wetland 26.13R is located east of I-405 at MP 26.13, south of 228th Street SE and west of Fitzgerald Road. Wetland 26.35R is located just south of the I-405/SR 527 interchange on the northbound side of I-405 near the confluence of South Fork Perry Creek and North Fork Perry Creek. Wetland 26.70R is located east of the northbound I-405 off-ramp to SR 527 along Queensborough Creek.

Table 3 summarizes the 52 wetlands found within the study area, including their size, buffer width, Cowardin class, HGM class, Ecology rating, and local jurisdictional rating.

Table 3. Wetlands in the Study Area

Wetland[a]	Wetland Classification/Rating				Total Wetland Size (acres)	Wetland Size in the Study Area (acres)	Buffer Width (feet)[e]
	Cowardin[b]	HGM	Ecology[c]	Local Jurisdiction[d]			
21.94R	PFO	Depressional	III	III	0.13	0.12	60
22.11R	PSS	Depressional	III	III	0.07	0.01	60
22.21L	PSS	Slope	IV	IV	0.01	0.01	50
22.68R	PEM	Slope	IV	IV	0.06	0.06	50
22.85L	PSS	Slope	IV	IV	0.10	0.08	50
23.32R	PEM	Slope	IV	IV	0.03	0.03	50
23.35R	PEM	Depressional	IV	IV	0.01	0.01	50
23.37R	PSS	Depressional	IV	IV	0.04	0.04	50
23.42R	PSS/PEM	Slope	IV	IV	0.09	0.09	50
23.45R	PSS/PEM	Depressional	IV	IV	0.22	0.12	50
23.46R	PSS/PFO	Slope	IV	IV	0.09	0.09	50
23.47R	PSS	Depressional	IV	IV	0.09	<0.01	50
23.50R	PSS	Slope	IV	IV	0.20	0.20	50
10.69R[f]	PEM	Depressional	III	III	0.02	0.02	60
10.78R[f]	PFO	Depressional	III	III	0.26	0.26	60
10.80R[f]	PEM	Depressional	III	III	0.41	0.41	60
10.90R	PEM	Slope	IV	IV	0.15	0.15	50
11.15R	PFO/PEM	Depressional	IV	IV	0.47	0.47	50
11.35L	PEM/PSS	Slope	IV	IV	0.18	0.18	50
11.65L	PEM	Depressional	IV	IV	0.17	0.17	40
23.65L	PFO	Depressional	III	III	0.64	0.64	75
23.80L	PEM/PSS	Depressional	III	III	2.21	2.21	75

Wetland[a]	Wetland Classification/Rating				Total Wetland Size (acres)	Wetland Size in the Study Area (acres)	Buffer Width (feet)[e]
	Cowardin[b]	HGM	Ecology[c]	Local Jurisdiction[d]			
23.80R	PEM/PSS	Depressional	III	III	1.33	1.33	75
23.81R[f]	PEM/PSS/PFO	Depressional	III	III	6.01	0.19	105
24.00L[f]	PEM	Depressional	III	III	1.26	1.14	105
24.20R[f]	PEM	Slope	IV	IV	0.39	0.39	40
24.30R[f]	PEM	Depressional	III	III	0.19	0.10	60
24.35L[f]	PFO/PSS/PEM/PAB	Depressional	II	II	21.44	0.17	225
24.35R[f]	PEM	Depressional	III	III	0.50	0.06	60
25.03R[f]	PAB/PEM/PSS	Depressional	II	II	5.28	4.32	165
25.08L	PEM/PSS	Slope	III	III	0.14	0.14	75
25.22L	PEM/PSS/PFO	Depressional	III	III	0.13	0.13	100
25.28R	PSS/PEM	Slope	III	III	0.04	0.04	75
25.33R	PFO/PSS	Slope	III	III	0.18	0.18	75
25.34L	PSS	Slope	III	III	0.02	0.02	75
25.66L	PEM/PSS	Slope	IV	IV	0.04	0.04	50
26.10L	PEM/PSS	Slope	IV	IV	0.12	0.12	50
26.13R[f]	PFO/PSS	Depressional	II	II	11.49	0.43	165
26.15L	PFO/PSS	Depressional	III	III	0.11	0.11	75
26.32L	PSS	Depressional	III	III	0.02	0.02	75
26.35R	PSS/PFO	Depressional	II	II	3.12	1.23	125
26.50R	PFO	Depressional	III	III	0.10	0.04	75
26.55L	PFO/PEM	Depressional	III	III	0.20	0.19	75
26.62R	PSS	Slope	III	III	0.01	0.01	75
26.65R	PFO	Riverine	III	III	0.05	0.05	75

Wetland[a]	Wetland Classification/Rating				Total Wetland Size (acres)	Wetland Size in the Study Area (acres)	Buffer Width (feet)[e]
	Cowardin[b]	HGM	Ecology[c]	Local Jurisdiction[d]			
26.70R	PFO	Depressional	II	II	0.74	0.74	125
26.77R	PSS	Slope	III	III	0.03	0.02	75
26.78R	PSS	Slope	III	III	0.04	0.04	75
26.79R	PSS	Slope	III	III	0.02	0.02	75
26.80R	PFO	Depressional	III	III	0.01	0.01	75
27.30M	PEM	Slope	III	III	0.54	0.54	75
27.45L	PEM	Slope	IV	IV	0.15	0.02	50
				Total	**59.36**	**17.20**	

[a] Wetland IDs from south to north.

[b] Cowardin et al. (1979) or National Wetlands Inventory class based on vegetation: PAB = palustrine aquatic bed; PEM = palustrine emergent; PSS = palustrine scrub-shrub; PFO = palustrine forested.

[c] Ecology rating according to Hruby (2014).

[d] Wetlands rated according to City of Kirkland Wetlands Ordinance described in Kirkland Zoning Code (KZC) 90.55, City of Bothell Wetlands Ordinance described in Bothell Municipal Code (BMC) 14.04.500, and City of Woodinville Wetlands Ordinance described in Woodinville Municipal Code (WMC) 21.51. 300.

[e] Wetland buffer width according to City of Kirkland Wetlands Ordinance described in KZC 90.55, and City of Bothell Wetlands Ordinance described in BMC 14.04.530(F)1, and City of Woodinville Wetlands Ordinance described in WMC 21.51. 300.

[f] Wetland buffer width according to City of Bothell Critical Areas in Shoreline Jurisdiction described in BMC Chapter 13.13 and Table 13.13.020-1.

Additional information about the wetlands identified in the study area can be found in the attachments to this report, including:

- Attachment B: Wetland inventory maps (National Wetlands Inventory and local jurisdiction), U.S. Geological Survey topographic maps, a soil survey map, climate conditions, and a list of plant species existing within the study area.
- Attachment C: Existing conditions plan sheets showing wetlands and streams within the study area.
- Attachment D: Wetland summary tables providing details of each wetland, including location, rating, buffer width, wetland size, Cowardin and HGM classification, dominant vegetation, soils, hydrology, and wetland functions summary.
- Attachment E: Wetland delineation data sheets.
- Attachment F: Wetland rating forms.
- Attachment H: Wetland functions and values forms

Soils

Soil textures identified by scientists in the wetland sample plots include sandy loam, silty clay loam, silt loam, loamy sand, clay loam, sand, loam, silty clay, sandy clay loam, and organic soil. The three most common soil textures were sandy loam (identified in 36 wetland sample pits), silt loam (21 sample pits), and loamy sand (10 sample pits). Five sample pits had organic soil. Additional information about soils can be found on the soil survey maps in Attachment B.

The most common hydric soil indicators for wetlands in the study area are Depleted Matrix (F3), Redox Dark Surface (F6), Loamy Gleyed Matrix (F2), and Hydrogen Sulfide (A4), as defined in the *Field Indicators of Hydric Soils in the United States, Version 8.2* (NRCS 2018).

Vegetation

The Cowardin classes of the wetlands within the study area are primarily palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO), with 13 wetlands classified as PEM, 7 classified as PFO, and 12 classified as PSS. The remaining 20 wetlands have mixed Cowardin classifications, with one of the Category II wetlands classified as PFO, PSS, PMM, and palustrine aquatic bed (PAB).

Most wetlands in the study area are located next to I-405 or developed areas, are dominated by invasive plant species, and lack structural complexity to support habitat for species under the Endangered Species Act. Common species observed in the wetlands in the study area include red alder (*Alnus rubra*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), reed canarygrass (*Phalaris arundinacea*), and Himalayan blackberry (*Rubus armeniacus*). Attachment B provides a list of plant species observed within the study area. Attachment D provides wetland summary tables that identify dominant plant species present within or near each wetland in the study area.

Hydrology

Most wetlands in the study area receive runoff from developed areas through ditches and drainage pipes, as well as water from natural sources including groundwater, seeps, and springs. The HGM classifications of the 52 wetlands consist of: 29 depressional wetlands, 22 slope wetlands, and one riverine wetland. Wetland 26.65R is the only riverine wetland in the study area. The primary source of hydrology for Wetland 26.65R is overbank flooding from Queensborough Creek.

The wetland hydrology indicators for wetlands in the study area include surface water (A1), high water table (A2), and saturation (A3), as defined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (USACE 2010). A high water table is defined as direct, visual observation of water table 12 inches or less below the surface in a soil pit. Saturation is defined as the visual observation of saturated soil conditions 12 inches or less from the soil surface as indicated by water glistening on the surface and broken interior faces of soil sample removed from the soil pit. Surface water is defined as direct, visual observation of surface water (flooding or ponding) during a site visit.

The hydrology indicators for 35 wetlands were saturation and a high water table. The hydrology indicator for 13 wetlands was saturation only. The other 4 wetlands had saturation, a high water table, and surface water present.

4.2.2. Wetland Buffers

All of the wetlands in the study area have been affected by human influence to some extent. Wetland buffer sizes are limited by their proximity to elements of the built environment and typically consist of immature trees, shrubs, or grasses intermixed with nonnative invasive plant species, such as Himalayan blackberry and reed canarygrass. Buffer conditions for each wetland are summarized in the wetland summary tables (Attachment D).

Wetland 11.65L is located in Woodinville, and the City of Woodinville requires a standard 40-foot wide buffer. Two wetlands in the study area (Wetland 21.94R and Wetland 22.11R) are in Kirkland, and the City of Kirkland requires a 60-foot-wide buffer for both. Forty-nine wetlands in the study area are in Bothell, and the City of Bothell's standard buffer widths vary from 40 feet to 225 feet wide. Based on field observations, many vegetated buffers within the study area are narrower than the standard buffer widths required by the local jurisdictions. The observed extents of the vegetated buffers are shown in Attachment C. Refer to Chapter 3, Methods, for a detailed description of how wetland buffer widths were determined.

4.2.3. Wetland Functions

Habitat, hydrologic, and water quality functions for each wetland were rated using the Ecology wetland rating form. The total of the three function scores was used to rate each wetland as Category I, II, III, or IV (Hruby 2014).

In general, most wetlands in the study area provide low to moderate levels of water quality and hydrologic functions and low levels of habitat functions because of their proximity to I-405. Ecology wetland rating forms for each delineated wetland are provided in Attachment F.

4.3. Streams

Many rivers and streams in the study area have been somewhat altered to accommodate development in a highly urbanized area. Stream and river buffer sizes vary. Several buffers are limited by their proximity to elements of the built environment and typically consist of immature trees, shrubs, or grasses intermixed with nonnative, invasive plant species. Streams in the study area are all part of the Lake Washington hydrologic system and are typically characterized as low-gradient systems that originate in gently sloping upper basins and flow through narrow valleys. Stream flows are mostly fed by local rainfall, stormwater runoff, and groundwater.

As described in Chapter 3, stream types in the study area were classified based on City of Bothell and City of Kirkland municipal codes, and fish use potential was determined by WDFW. WDFW's determination of fish use potential is based on habitat criteria but does not indicate fish presence (WDFW 2019b). In some cases, local jurisdictions' stream typing may vary from WDFW fish use potential classifications due to the use of different methods. Table 4 provides the local stream type and WDFW's determination of fish use potential for all 14 streams verified in the study area. The stream types listed in Table 4 indicate stream typing for reaches within the study area; reaches outside of the study area may have different stream types. Attachment G provides stream summary tables that describe the location of the stream within the watershed and study area, stream flow path, local stream type, buffer width, riparian area characterization with dominant plant species, and documented fish use according to SalmonScape (WDFW 2019c).

Table 4. Local Stream Type and Fish Use Potential Summary Table

Stream	Local Stream Type	WDFW Fish Use Potential[a]
Juanita Creek	Type F	Yes
Stream 22.25L	No Designation	No
Stream KL14	Type Np	No
Stream 42	Type Np	No
Sammamish River	Type S	Yes
North Creek	Type S	Yes
unnamed tributary to Par Creek	No Designation	No Designation
Par Creek	No Designation	Yes
Stream 25.0L	Type Ns	Yes
Stream 66	Type Ns	Yes
North Fork Perry Creek	No Designation	Yes
South Fork Perry Creek	No Designation	Yes
Crystal Creek	No Designation	Yes
Queensborough Creek	Type F	Yes

[a] Fish use potential as determined by Washington Department of Fish and Wildlife does not indicate fish presence; it is documented based on habitat criteria (WDFW 2019b).

Chapter 5. References

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