King County
Department of Natural Resources and Parks
Wastewater Treatment Division

TETRA TECH
and Associated Firms

North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

Critical Area Study for the City of Mercer Island

Final



CONFLUENCE
ENVIRONMENTAL COMPANY

September 2019

Critical Area Study for the City of Mercer Island

September 2019

PREPARED FOR

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Department of Natural Resources and Parks
Wastewater Treatment Division

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ACRONYMS/ABBREVIATIONS

Acronym or Abbreviation	Definition
BMP	best management practice
CAO	Critical Areas Ordinance
CBD	Center for Biological Diversity
CCN	Code Compliance Narrative
Confluence	Confluence Environmental Company
Corps	U.S. Army Corps of Engineers
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
ERMA	Environmental Response Management Application
ESA	Endangered Species Act
ESC	erosion and spill control
FCo	federal species of concern (regarding species listing status)
FMO	foraging, migration, and overwintering
FT	federally threatened (regarding species listing status)
ft/s	feet per second
GIS	geographic information system
HDD	horizontal directional drill
HDPE	high-density polyethylene
I-90	Interstate 90
LF	linear feet
LS-11	Lift Station 11
MICC	Mercer Island City Code
NMFS	National Marine Fisheries Service
NME Project	North Mercer Interceptor and Enatai Interceptor Project
NMPS	North Mercer Pump Station
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
PHS	Priority Habitats and Species
PLAN	Development Plan Set
RLOD	recommended limit of disturbance
ROW	right-of-way
SAP	Sampling and Analysis Plan
SC	state candidate (regarding species listing status)
SEPA	State Environmental Policy Act
SF	square foot (feet)
SMP	Shoreline Master Program
SSDP	Shoreline Substantial Development Permit
TESC	Temporary Erosion and Sediment Control
TPZ	tree protection zone
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code

Acronym or Abbreviation	Definition
WDFW	Washington Department of Fish and Wildlife
WRIA	water resource inventory area
WSDOT	Washington State Department of Transportation
WTD	King County Wastewater Treatment Division

EXECUTIVE SUMMARY

The North Mercer Island Interceptor[1] and Enatai Interceptor Upgrade Project (NME Project) is a regional wastewater improvement project that will require several local permits for work occurring within the City of Mercer Island's (Mercer Island) jurisdiction. Construction for the NME Project, on Mercer Island, is expected to extend from April 2021 to December 2023. This document addresses critical areas associated with NME Project construction within Mercer Island's jurisdiction. Pursuant to City of Mercer Island Code (MICC) 19.07.110, this document meets or exceeds minimum requirements for a *Critical Area Study*.

The purpose of the NME Project is to improve reliability and increase the capacity of the wastewater conveyance system that carries flows from northern Mercer Island to the Eastside Interceptor in Bellevue. The NME Project proposes several upgrades within the service areas on Mercer Island.

The proposed NME Project is in the King County cities of Mercer Island and Bellevue. The NME Project on Mercer Island is defined as the limits of construction associated with facility improvements to the North Mercer Pump Station (NMPS), addition of approximately 11,900 feet of new sewer pipe in upland areas on North Mercer Island, improvements along the Interstate 90 (I-90) Trail, improvements to Lift Station 11 (LS-11) at Fruitland Landing Park, improvements of existing sewer pipe under I-90 at 96th Ave (96th Ave Siphon), and improvements along the shoreline of the Mercer Island Boat Launch. The NME Project also includes construction of the pipeline across the East Channel of Lake Washington, which is within Mercer Island's jurisdictions until mid-way between the Mercer Island Boat Launch and Enatai Beach Park in Bellevue.

Potential impacts to critical areas are assessed in this document based on the revised Critical Area Ordinance (CAO) that took effect on July 29, 2019. Critical areas along the NME Project alignment that are addressed in this document include watercourses (streams), geologically hazardous areas, fish and wildlife conservation areas, and associated buffers. No wetlands or associated buffers are within the proposed NME Project alignment or construction footprint on Mercer Island. Shorelands (i.e., 200 feet landward of ordinary high water mark along the Lake Washington shoreline) are also addressed in this document, per the Shoreline Master Program (SMP)[2]. Note that a revised SMP was adopted by Mercer Island, but is not yet approved by the Washington State Department of Ecology. Therefore, critical areas within the shorelands will follow the pre-2019 CAO, which includes 25-foot buffers for piped streams and no buffers for geologically hazardous areas.

Impacts to critical areas were avoided and minimized to the extent practicable, as required under MICC 19.07.100 *Mitigation Sequencing*. The design for the proposed pipeline alignment prioritized avoidance of sensitive habitats, including constructing a new pipeline in upland habitat and decommissioning a large portion of the degraded existing pipeline currently located in Lake Washington. However, some impacts to critical areas and shorelands will be unavoidable (Table ES-1). The majority of these impacts will be temporary during construction (581,770 SF or 96%). Permanent impacts will occur at NMPS to the stream buffer and along the proposed North

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1 *Interceptor = sewer pipeline*

2 *Note that this document uses the code references for the revised SMP (MICC 19.13), as provided by Mercer Island (2019) because the older SMP references (MICC 19.07.110) overlap with Critical Area Studies within the revised CAO.*

Mercer Island Interceptor pipeline route. Due to the temporary loss (or reduction) of habitat functions and values along the NME Project alignment, and permanent impacts, the NME Project is proposing to provide both site restoration and increased habitat functions and values within specific locations along the pipeline alignment (i.e., ecological enhancement). Proposed ecological enhancements include planting native species, removing invasive species, and adding habitat complexity, connectivity, and other biological features that will increase the ecological functions of the temporarily impacted areas and the surrounding habitat. These ecological enhancements are prioritized to focus on watercourse mitigation requirements identified under MICC 19.07.180(E) and requirements for no-net-loss of ecological functions of shorelands identified under MICC 19.13.020(C) .

Table ES-1. NME Project Impacts by Habitat and Work Area

Critical Area/ Shoreline	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Temporary Impacts						
Watercourse	680	--	--	--	--	--
Watercourse Buffer	10,650	7,050	5,240	930	--	--
Lake Washington	--	--	--	--	--	70,260
Shorelands**	--	--	1,750	--	47,690	--
Outside of Critical Areas***	1,260	374,790	12,910	15,120	33,440	--
Permanent Impacts						
Watercourse	--	--	--	--	--	--
Watercourse Buffer	5,300	--	--	--	--	--
Lake Washington	--	--	--	--	--	--
Shorelands**	--	--	400	--	860	--
Outside of Critical Areas***	--	20,160	--	--	--	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.
**Defined as 200 feet landward of ordinary high water mark (OHWM).
***Defined as areas outside of critical areas, shorelands, and geologically hazardous areas that do not require mitigation.

There are impacts within areas not designated as critical areas and shorelands that will not result in a 1:1 ratio of site restoration to impacts. These include areas along the I-90 Trail where there will be trail widening to conform to the Aubrey Davis Master Plan (Mercer Island 2018) and WSDOT (2015) Roadside Policy Manual. The removal and re-planting of vegetation along the I-90 Trail will be in consultation with Mercer Island and WSDOT. For critical areas and shorelands that have a no-net-loss requirement, the NME Project provides a ratio that is greater than 1:1 for areas of site restoration and ecological enhancement (197,284 SF) compared to areas of impacts to critical areas and shorelands (150,810 SF). Because of the improvements above existing conditions, the NME Project will result in no-net-loss of ecological functions along the pipeline alignment.

1. INTRODUCTION

King County Wastewater Treatment Division (WTD) is applying for environmental and construction permits from the City of Mercer Island (Mercer Island) for a project to improve reliability and increase the capacity of a portion of the existing regional wastewater system. King County's Conveyance System Improvements Program identified a need for capacity upgrades for the North Mercer Island and Enatai interceptors. The North Mercer Island Interceptor and Enatai Interceptor Upgrade Project (NME Project) is intended to improve the existing facility and pipeline components of the regional wastewater system to convey the 20-year peak wastewater flows projected through the year 2060 from service areas in North Mercer Island, the southwest portion of Bellevue, and the Town of Beaux Arts Village (Figure 1).

Confluence Environmental Company (Confluence) has prepared this document, in accordance with the Mercer Island City Code (MICC) 19.07.110, to document the critical areas present along the proposed pipeline alignment, discuss impacts to those critical areas, and describe the site restoration and ecological enhancement plan to avoid, minimize, or mitigate for those impacts. This document complies with the requirements of a *Critical Area Study* under the revised Critical Areas Ordinance (CAO) that took effect on July 29, 2019. In addition, this document addresses shorelands (i.e., 200 feet landward of ordinary high water mark [OHWM] along the Lake Washington shoreline), per the Shoreline Master Program (SMP). The revised SMP was adopted by Mercer Island, but is not yet approved by the Washington State Department of Ecology (Ecology).

As identified in the pre-application letter from Mercer Island Development Services Group on October 23, 2018 (PRE18-047), the NME Project is required to provide information for a Critical Area Review and Shoreline Substantial Development Permit (SSDP). A second pre-application meeting was conducted on September 11, 2019 (PRE19-042) to discuss the critical areas and shorelines within the NME Project and ensure compliance with the revised CAO and existing SMP. This document includes:

- Methods used to identify the presence of critical areas and shorelines that exist along the proposed NME Project pipeline alignment (Section 2)
- Existing conditions associated with identified critical areas, buffers, and shorelands (Section 3)
- Description of the development proposal, including project timeline and sequencing, proposed construction methods, best management practices, and operations and maintenance (Section 4)
- Assessment of the potential direct, indirect, and cumulative effects to critical areas, associated buffers, and shorelines, including impacts caused by the proposed NME Project and associated site alterations, per MICC.07.110 (Section 5)
- A description of mitigation sequencing implementation (per MICC 19.07.100) and the proposed site restoration and ecological enhancement plan, including steps taken to avoid, minimize, and restore impacts to critical areas and shorelands to the greatest extent feasible and a summary of no-net-loss to functions and values (Section 6)
- A description of the monitoring plan that is required for 5 years, per MICC 19.07.080(C)(1) (Section 7)
- A description of the contingency plan that is required to address areas "where monitoring reveals a significant difference from predicted impacts or a failure of protection measures, the applicant shall be responsible for appropriate corrective action," per MICC 19.07.080(C)(4) (Section 8)



Figure 1 – NME Project Alignment Overview

As identified through consultation with Mercer Island's Community Planning & Development Department, the NME Project is subject to three land use approvals/permits through Mercer Island: (1) Public Agency Exception, (2) Critical Area Review 2 – Type III, and (3) SSDP – Type III. This *Critical Area Study* covers the requirements for a Critical Area Review 2 and SSDP. Information is also helpful for the Public Agency Exception, but information that directly speaks to this exception is provided in the *Code Compliance Narrative* (CCN).

The State Environmental Policy Act (SEPA) compliance was completed by King County through a separate process. The final SEPA Checklist is provided in the Mercer Island Land Use Permitting Package.

1.1 PROJECT OVERVIEW

King County WTD assessed the condition of the existing sewer pipeline from Mercer Island to Bellevue and identified a need to expand the regional wastewater system as part of King County's Conveyance System Improvements Program. King County WTD is proposing to construct a new pipeline from the North Mercer Pump Station (NMPS) to Sweyolocken Pump Station to address the identified needs for capacity upgrades. This proposed pipeline alignment will relocate wastewater flows into a new pipe in upland areas and reduce the amount of active sewer pipe in Lake Washington. Relocating flows to upland locations will reduce potential impacts to critical areas and shorelines in the future for maintenance and rehabilitation activities associated with the North Mercer Island Interceptor.

There are six work areas of the NME Project proposed within Mercer Island's jurisdiction (Figure 2). Work within these areas includes constructing new pipe or upgrading pump stations of the regional wastewater system, and can be divided into five NME Project segments. The five segments that make up the proposed NME Project on Mercer Island overlap in terms of the geographical work areas where construction will take place (Table 1). Please note that the segment labeled as street right-of-ways (ROWs) and Interstate 90 (I-90) Trail[3] work area is the proposed North Mercer Island Interceptor alignment that primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, Washington State Department of Transportation (WSDOT) ROWs, and WSDOT Limited Access ROWs.

Table 1. Construction Segments and Work Areas for the NME Project

NME Project Segment*	Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
NMPS	●					
North Mercer Island Interceptor	●	●	●	●	●	
96th Avenue Siphon				●		
LS-11			●			
East Channel Siphon						●

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way

● = at least a portion of the NME Project segment occurs in the identified work area.

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.

3 The I-90 Trail is a multi-use path for biking, walking, and other recreational activities adjacent to the I-90 freeway. The trail begins in Seattle and stretches to the east for 10 miles across Lake Washington, Mercer Island, and into Mercer Slough Nature Park in Bellevue. The I-90 Trail is identified in Figure 1.



Figure 2 – Watercourses and Shorelines that Overlap with the NME Project Work Areas on Mercer Island

Construction of the NME Project on Mercer Island is proposed from April 2021 to December 2023. Most locations along the NME Project pipeline alignment will be impacted for 2 months, with the exception of work at NMPS which will be under construction for 33 months. Although the NME Project covers a large area, it is a linear project that will be done sequentially. A summary of the proposed NME Project activities within each work area on Mercer Island is provided below. Detailed information of the proposed project is provided in Section 4 (Proposed Project). Note that the summary has references to the *Development Plan Set* (PLAN) sheets provided in the Mercer Island Land Use Permitting Package for each work area.

- **Work Area: NMPS and NMPS Stream –** The NME Project proposes to conduct facility improvements for the existing pump station located on Mercer Island. Facility improvements will include constructing a new building and concrete pad to house a standby generator and fuel tank, installing electrical service equipment, constructing a new restroom and odor control fan, and improving the existing access road.

  Adjacent to the NMPS facility, the NME Project proposes to replace the existing pipe by installing new sewer pipe using typical open cut-and-cover construction methods across the stream adjacent to NMPS on King County property. This stream will be identified in this document as the "NMPS stream." Access for the NMPS stream crossing work will be off the public ROW, and then through existing developed areas associated with the NMPS facility. Temporary construction access will be established adjacent to the stream, on both banks. The riparian area adjacent to the NMPS stream will be cleared of existing invasive vegetation and, prior to completion of the NME Project, the riparian areas will be replanted with native vegetation throughout much of the stream length on the King County property.

  Relevant PLAN Sheets:

  - Boundary and Topo Survey: Volume 1: G012; Volume 2: G201
  - Critical Areas: Volume 1: G012, Volume 2: G201
  - Stormwater and Erosion Control Management Plan: Volume 1: C011-C015, C101; Volume 2: C001-C004
  - Restoration & Landscape Plans: Volume 1: L101-L104; Volume 2: C081-C085, C401

- **Work Area: Street ROWs and I-90 Trail –** The NME Project proposes to install new pipe from the NMPS Stream to the Mercer Island Boat Launch, primarily along street ROWs and the I-90 Trail. Construction will include typical open cut-and-cover methods for approximately 10,240 linear feet (LF) of new sewer pipe, widening the I-90 Trail along 5,000 LF of the proposed pipeline alignment, installation of new maintenance holes, odor control vault, gravity sewer, and a rock catcher structure. This work area also includes substantial replanting of vegetation along the I-90 Trail and other areas that are affected along the proposed alignment.

  Relevant PLAN Sheets:

  - Boundary and Topo Survey: Volume 2: G202-G231
  - Critical Areas: Volume 2: G202-G231
  - Stormwater and Erosion Control Management Plan: Volume 2: C001-C004
  - Restoration & Landscape Plans: Volume 2: C061-C067, C081-C085, C401-C432, C451-466

- **Work Area: LS-11 (Fruitland Landing Park) –** Mercer Island operations has requested upgrades to the pump station at Fruitland Landing Park to allow decommissioning of existing pipe in Lake Washington around the northeast end of Mercer Island. The NME Project will also construct new pipe connecting to the pump station. Most of this work will be done below grade in an existing vault, but the area of impervious surface will be expanded during the upgrade work.

Relevant PLAN Sheets:

- Boundary and Topo Survey: Volume 1: G602-603
- Critical Areas: Volume 1: G602-603
- Stormwater and Erosion Control Management Plan: Volume 1: C601-602
- Restoration & Landscape Plans: Volume 1: C601, C602

- **Work Area: 96th Avenue Siphon –** The NME Project proposes to convert an existing pipeline segment to a sewer siphon to convey flows from east Mercer Island into the new North Mercer Island Interceptor, construct a new siphon close to an existing maintenance hole south of I-90 to allow decommissioning of existing pipe in Lake Washington around the northeast end of Mercer Island, and construct new pipe. All work will be done either in an existing maintenance hole or within the street ROW within an improved area (e.g., contains asphalt).

  Relevant PLAN Sheets:

  - Boundary and Topo Survey: Volume 2: G227, G240
  - Critical Areas: Volume 2: G227, G240
  - Stormwater and Erosion Control Management Plan: Volume 2: C001-C004
  - Landscape Plans: Volume 2: C081-C085, C118, C427

- **Work Area: Mercer Island Boat Launch –** The NME Project proposes to install pipe to connect the upland portions of the North Mercer Island Interceptor to the in-water portions of the East Channel Siphon. The upland work will require installation of a shoring system (e.g., slide rail or similar system) to isolate the work area and transition into the work below the ordinary high water mark (OHWM). Upland areas on either side of the channel crossing will be restored with landscaping and habitat improvements (e.g., anchor logs, gravel).

  Relevant PLAN Sheets:

  - Boundary and Topo Survey: Volume 2: G231-232
  - Critical Areas: Volume 2: C131
  - Stormwater and Erosion Control Management Plan: Volume 2: C001-C004
  - Restoration & Landscape Plans: Volume 2: C081-C085, C087, C132-134

- **Work Area: East Channel –** The NME Project proposes to install new pipe using open cut-and-cover trench methods across the East Channel of Lake Washington. From the new siphon inlet structure noted at the Mercer Island Boat Launch, the East Channel Siphon (consisting of 3 parallel pipes approximately 12-inch to 16-inch diameter) will be installed parallel to the north side of the I-90 East Channel Bridge across the East Channel to Enatai Beach Park in Bellevue. Mercer Island jurisdiction is from the Mercer Island Boat Launch to the mid-point of the East Channel.

  Relevant PLAN Sheets:

  - Boundary and Topo Survey: Volume 2: G232-234
  - Critical Areas: Volume 2: G232-234
  - Stormwater and Erosion Control Management Plan: N/A
  - Restoration Plans: Volume 2: C028-029

The NME Project will have impacts to trees within critical areas and shorelands. Impacts will include tree and shrub removal, root cutting, tree clearance pruning, soil compaction, and landscape restoration (replanting). All trees within 20 feet of the proposed construction footprint were evaluated (based on 60% design). Within critical areas, there are 242 living regulated[4] trees that are listed for removal, 195 of which are within WSDOT ROW. The 242 total also includes 9 exceptional trees. Within shorelands, there are 30 living regulated trees that are listed for removal, 29 of which are within WSDOT ROW. Details are provided in the Arborist Report (Tree Solutions 2019), PLAN, and *Tree Management Plan* (Appendix A).

1.2 IDENTIFICATION OF CRITICAL AREAS AND SHORELINES

Critical areas are defined under MICC 19.07 *Environment*, and include geologically hazardous areas, watercourses, fish and wildlife habitat conservation areas, and associated buffers within the Mercer Island portion of the NME Project. Table 2 lists critical areas that will be discussed within this document, as defined by local code. There are no wetland or wetland buffer impacts on Mercer Island associated with this construction. Shorelines also have specific code requirements under the SMP that will also be addressed in this document.

Table 2. Critical Areas and Shorelines in the City of Mercer Island

Critical Areas and Shorelines	Mercer Island Code	Buffer Width (feet)	Setback (feet)
Watercourses			
Stream adjacent to NMPS (Type F)	MICC 19.07.180	120	10
Stream adjacent to Luther Burbank Park parking lot and 96th Avenue Siphon (Type Np) and the I-90 Trial (Type Ns)	MICC 19.07.180	60	10
Piped streams	MICC 19.07.180	No buffer	45 (covered) 15 (daylighted)
Geologically Hazardous Areas*			
Steep Slopes	MICC 19.07.160	75**	N/A
Shallow Landslide Hazard Areas	MICC 19.07.160	25	N/A
Deep-Seated Landslide Hazard Areas	MICC 19.07.160	75	N/A
Seismic Hazard Areas	MICC 19.07.160	50	N/A
Fish and Wildlife Habitat Conservation Areas			
Habitat for state or federally-listed endangered, threatened, sensitive, or candidate species, or species of local importance	MICC 19.07.170	Varied, species-specific	N/A
Priority habitats, as identified by WDFW	MICC 19.07.170	Varied, species-specific	N/A
Areas used by bald eagles for foraging, nesting, and roosting, or within 660 feet of a bald eagle nest	MICC 19.07.170	660 330 (minimum)	N/A
Watercourses and wetlands and their buffers	MICC 19.07.170	see watercourses	see watercourses
Biodiversity areas	MICC 19.07.170	N/A	N/A
Shoreline Master Program (SMP)			
Shorelands	MICC 19.13.050***	200****	25

*A geotechnical data report and geotechnical design memorandum were conducted for the NME Project (Shannon & Wilson 2018a,b).
**Buffer from top and toe of slope only.
***Note that this document uses the code references for the revised SMP (MICC 19.13), as provided by Mercer Island (2019b) because the older SMP references (MICC 19.07.110) overlap with Critical Area Studies within the revised CAO.
****200 feet is the definition of shorelands, which is not technically a "buffer."

4 Regulated trees = based on definitions of tree types provided in MICC 19.16.010, which include an exceptional grove, exceptional tree, and large trees as all being regulated by Mercer Island. Please refer to Appendix A for more details.

New and revised utilities are allowed within critical areas subject to specific criteria. Under the revised CAO, there is a new provision for public agencies called the Public Agency Exception (MICC 19.07.150) that can be used "if the application of this chapter will prohibit a development proposal by a public agency." Table 3 below provides a summary of information on the criteria associated with the public agency exception and NME Project compliance with the local code. Additional details on code consistency compliance is in the CCN provided in the Mercer Island Land Use Permitting Package.

Table 3. Consistency with MICC 19.07.150

Criteria	NME Project Compliance
(A) The public agency shall provide project documents such information as needed for the code official to issue a decision, including but not limited to, permit applications to other agencies, critical area studies, SEPA documents, and other materials.	The requested documents are provided in the Land Use Application Package for review by the Mercer Island Community Planning & Development Department.
(B) The code official may approve alterations to critical areas, buffers and critical area setbacks by an agency or utility when those alterations are not otherwise able to meet all of the standards in this chapter, and when the criteria in (B)(1) through (B)(3) of this section are demonstrated to be met.	See below.
1. The activity or proposed development is described in an adopted city plan or project list, or has otherwise received city council approval;	The NMPS facility design is being reviewed by the Design Review Board, and the land use and construction applications will be reviewed by the Community Planning & Development Department. The proposed development has been discussed with Mercer Island through pre-application meetings and during other design meetings to meet the needs of both the NME Project and the city.
2. There is no other reasonable alternative to the activity or proposed development with less impact on the critical area. In determining what is a reasonable alternative to a proposed development, alteration or activity, the code official may consider the purpose, effectiveness, engineering feasibility, commercial availability of technology, best management practices, safety and cost of the alternative action or proposal. Reasonable alternatives are those that are capable of being carried out, taking into consideration the overall project purposes, needs, and objectives;	Improvements to NMPS, along the proposed North Mercer Island Interceptor pipeline alignment, and within the East Channel of Lake Washington are necessary to accommodate the capacity increases that will be needed for the regional wastewater system. Improvements at NMPS and LS-11 cannot be completed without this exception. The upgrades required result in a need to expand the generator building to accommodate the increased capacity of the wastewater system. There is no reasonable alternative that would result in less impact. Additional discussion of alternatives is provided in the CCN.
3. The activity or development proposal is designed to avoid or minimize and mitigate the impact on critical areas and associated buffers consistent with the avoidance and mitigation sequencing requirements in 19.07.100 - Mitigation Sequencing;	The NME Project will follow guidelines provided in MICC 19.07.100, Mitigation Sequencing. The design process has included consideration of impacts to critical areas and shorelines. Where feasible, changes have been made to decrease the level of impact. For example, the generator building at NMPS is proposed as far west as feasible to limit stream buffer impacts. Similarly, the proposed pipeline alignment prioritizes areas that have limited function due to the presence of impervious surface area. There is no other reasonable alternative to further avoid or minimize impacts to critical areas or shorelines.
4. The proposal does not pose an unreasonable threat to the public health, safety, or welfare on or off the development proposal site; and	The underlying purpose of the entire NME project is to improve the public health, safety, and welfare.
5. The proposal is consistent with other applicable regulations and standards.	The NME Project will comply with all other local, state, and federal regulations.

SEPA = State Environmental Policy Act

Refer to Figure 2 for the watercourses and shorelands within the NME Project pipeline alignment on Mercer Island. While Lake Washington is not considered specifically within the MICC, it is habitat for several species identified under MICC 19.07.170 (Fish and Wildlife Habitat Conservation Areas) and is a shoreline of statewide significance under the Washington Administrative Code (WAC) 173-20-370. Therefore, it will be included within the discussion of critical areas and shorelines.

1.3 NME PROJECT AREA

The NME Project area covers approximately 608490 square feet (SF) on Mercer Island, which includes the proposed construction limits within each work area and additional off-site staging areas (Table 4). The work spans geographically from NMPS to the mid-point of the East Channel of Lake Washington (just north of the I-90 East Channel Bridge). Of this area, approximately 58% (352,920 SF) currently has an improved surface, such as gravel, concrete, or asphalt. In general, the NME Project was prioritized into habitat that is already disturbed or will benefit from enhancements along the proposed pipeline alignment.

Table 4. Summary of the NME Project Area on Mercer Island

Project Element	Work Area (SF)					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
NME Project Construction	17,890	344,080	20,300	16,050	81,990	70,260
Additional Off-Site Staging	--	57,920	--	--	--	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; WSDOT = Washington State Department of Transportation

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, WSDOT ROWs, and WSDOT Limited Access ROWs.

2. METHODS

The NME Project technical team conducted various desktop analyses, historical document reviews, field surveys, to identify and document critical areas and shorelines along the proposed pipeline alignment under Mercer Island's jurisdiction. This section describes the methods used. The review of critical areas is based on the revised CAO that went into effect on July 29, 2019. The current SMP was used in this document and subsequent analysis, which includes the pre-2019 CAO. Note that the methods for tree surveys along the NME Project pipeline alignment are provided by Tree Solutions (2019) in the *Arborist Report*. There are also more detailed methods that were used by Shannon & Wilson (2018a) for the *Geotechnical Data Report for 60 Percent Design* and Shannon & Wilson (2018b) *Geotechnical Design Memorandum for 60 Percent Design*. The methods and results for trees and geologically hazardous areas are summarized below. More detailed information on the methods can be found in the referenced reports.

2.1 DESKTOP ANALYSIS AND HISTORICAL DOCUMENT REVIEW

The NME Project pipeline alignment on Mercer Island was evaluated for the presence of critical areas and shorelines using available online information and geographical information system (GIS) databases. The following databases were reviewed:

- Center for Biological Diversity (CBD) Online Mapping (CBD 2019),
- eBird Online Database (eBird 2019),
- ERMA (Environmental Response Management Application) Online Mapping (ERMA 2019)
- King County iMap (King County 2019a),
- Mercer Island GIS Data Portal (Mercer Island 2019),
- National Marine Fisheries Service (NMFS) Office of Protected Species (NMFS 2019),
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (USFWS 2019a),
- Washington Department of Fish and Wildlife (WDFW) SalmonScape (WDFW 2019a),
- WDFW Priority Habitat and Species (PHS) Online Mapping (WDFW 2019b),
- WDFW Species in Washington (WDFW 2019c),
- Wildlife Distribution Maps (NatureMapping 2019),
- Washington State Department of Natural Resources (DNR) Forest Practices Application Mapping Tool (DNR 2019a),
- DNR Natural Heritage Features List (DNR 2019b), and
- USFWS iPac species list (USFWS 2019b)

Results of the online information and GIS database searches are provided in Appendix B.

2.2 FIELD SURVEYS

Existing conditions along the proposed NME Project pipeline alignment on Mercer Island were documented through field surveys and best available science. The following list includes the field surveys conducted by the technical team to collect data used to define specific NME Project conditions. The goals of the surveys are summarized in Table 5.

Table 5. Field Survey Summary

Survey Date	Area(s) Surveyed	Goals
June 30, 2016	Mercer Island Conveyance, NMPS, LS 11, Mercer Island Boat Launch	Survey of Mercer Island critical areas, including stream surveys, shoreland surveys at LS-11 and Mercer Island Boat Launch, OHWM flagging of the stream at NMPS, and wetland evaluation at NMPS (determined not to be a wetland)
December 2016	Mercer Island Conveyance, NMPS	Initial topographic survey elements completed for the Mercer Island Conveyance; Survey of NMPS stream culvert and outlet, downstream of SE 22nd Street
March 2017	East Channel of Lake Washington	Underwater video and dive surveys of the East Channel
November 2017	Entire Alignment	Secondary survey of critical areas
June 2017	Gallagher Open Space Wetlands	Wetland delineations conducted around Shorewood Siphon staging areas (removed from NME Project scope); all wetlands on Mercer Island avoided
July 2017	Mercer Conveyance	Tree classification within the WSDOT ROW
January 2018	NMPS	Stream OHWM plan view survey
January 2019	Entire Alignment	Initial tree survey completed
April 2019	Mercer Island Conveyance	Tree survey completed
July 2019	Entire Alignment	Ongoing topographic and utility updates have been performed throughout design

LS-11 = Lift Station 11; NMPS = North Mercer Pump Station; OHWM = ordinary high water mark; ROW = right-of-way; WSDOT = Washington State Department of Transportation

2.3 WATERCOURSES AND BUFFERS

Mercer Island (2019) GIS data, King County (2019) GIS data, and site-specific data collected during site visits and provided in the PLAN (Volume 1: G012, G602; Volume 2: G201-G234) were used during the desktop analysis to evaluate the presence of watercourses and types of watercourses that overlap with the NME Project pipeline alignment. Identifying the type of watercourses defined the associated buffers within the NME Project (discussed further in Section 2.3.2).

MICC 19.16.010 defines a watercourse as "a course or route, formed by nature and generally consisting of a channel with a bed, banks, or sides throughout substantially all its length, along which surface waters, with some regularity (annually in the rainy season), naturally and normally flow in draining from higher to lower lands." Mercer Island classifies watercourses by type, including fish-bearing stream (Type F), perennial non-fish-bearing stream (Type Np), intermittent non-fish-bearing stream (Type Ns), and piped stream (MICC 19.07.180(A)). Piped streams are culverted streams covered by improved surfaces or soils. Streams that fall into each of these categories will be discussed in this document.

2.3.1 Stream OHWM

RCW 90.58.030 defines the OHWM as "on all lakes, streams, and tidal water is that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department."

Ecology published a guide (Olson and Stockdale 2010) to interpret the code and provide guidance for field OHWM determinations. This guidance was used to determine the OHWM of the unnamed stream adjacent to NMPS (identified as the "NMPS stream"). Specifically, discrete locations were identified on the east bank of the

stream, the bank closest to the NMPS, to delineate the OHWM. Locations were chosen based on presence of field indicators of OHWM identified in Olson and Stockdale (2010) and shape of the channel. The plan view locations of the OHWM were marked with pin flags within the construction area, and all OHWM locations within the study area were later surveyed and included in the PLAN.

2.3.2 Stream Buffers

Stream buffers are defined under MICC 19.07.180(C)(1) based on the stream type (discussed above). By these definitions, the streams that have buffers that overlap with the limits on construction include the Type F stream located at NMPS (120-foot buffer), Type Np streams adjacent to the Luther Burbank Park parking lot and 96th Avenue Siphon (60-foot buffer), and the Ns stream adjacent to the I-90 Trial (60-foot buffer). Piped streams do not have a buffer, per the revised CAO. Note that, under the existing SMP, piped streams have a 25-foot buffer. Within shorelands, the pre-2019 CAO stream buffers will be used and the revised CAO stream buffers will be used for critical areas outside of shorelands.

The project is requesting to modify the NMPS stream buffer based on the existing conditions and criteria established under MICC 19.07.180(C-E). It is notable that there are existing impervious surface areas within the stream buffer associated with the Type F stream, as discussed in Section 3.2. The goals for site restoration and ecological enhancement within buffers (see Section 6) of the NME Project follow the criteria established under MICC 19.07.180(E), where mitigation measures shall achieve equivalent or greater ecological function including, but not limited to:

- Habitat complexity, connectivity, and other biological functions;
- Seasonal hydrological dynamics, water storage capacity, and water quality; and
- Geomorphic and habitat processes and functions.

2.4 WETLANDS AND BUFFERS

Based on results from online database searches and site visits, no wetlands or wetland buffers fall within the NME Project area as regulated by MICC 19.07.190. During early design phases, the Gallagher Open Space wetlands were proposed to be included in the NME Project, but this area was avoided during later design phases. More information on NME Project mitigation sequencing is provided in Section 6. Wetlands will not be discussed further in this document.

2.5 GEOLOGICALLY HAZARDOUS AREAS

Geologically hazardous areas (e.g., erosion hazards, steep slopes, and landslide hazards) were evaluated by Shannon & Wilson (2018a) for the *Geotechnical Data Report for 60 Percent Design* and Shannon & Wilson (2018b) *Geotechnical Design Memorandum for 60 Percent Design*, reviewed by Confluence through online data from Mercer Island (2019) GIS, and identified using site-specific data collected during site visits and provided in the PLAN (Volume 1: G012, G602; Volume 2: G201-G234).

The methods used by Shannon & Wilson (2018a,b) included the use of existing (1962 through 2013) and current (2017 to 2018) subsurface explorations to evaluate the soil and groundwater conditions along the NME Project pipeline alignment. A series of geologic tests were performed on the current subsurface soil samples for the geotechnical analysis. The geologic soil units along the NME Project pipeline alignment were categorized using the boring logs. The boring logs also identified the natural water content, penetration resistance, percent fines, and the Atterberg Limits of soil samples at various depths within the boring subsurface profile and where test borings were located within the study area.

The geotechnical analysis also included hydrogeologic testing, including observation wells and/or vibrating wire piezometers to detect groundwater elevations and subsurface stability. Following field testing, a series of laboratory tests were performed on selected soil and groundwater samples to determine the natural water content, grain size distribution, Atterberg Limits, one-dimensional consolidation properties, corrosion testing, and microbiological testing to generate boring log data.

2.6 SHORELINES

Mercer Island (2019) and King County iMap (2019a) GIS datasets were used during the desktop analysis to evaluate the presence of "Waters of the State" and their associated shorelines. Lake Washington is designated as Waters of the State. Due to its size (>1,000 acres), it is also designated as a shoreline of statewide significance (WAC 173-20-370). Therefore, the shorelines are regulated. The shoreline is defined as beginning at OHWM (RCW 90.58.030). The OHWM for Lake Washington was established by the Corps (1981), and is at an elevation of 21.8 feet in the 1929 National Geodetic Vertical Datum.

The revised Mercer Island SMP is codified under MICC 19.13. It provides for a 25-foot development setback for all structures from OHWM (MICC 19.13.050). Within 200 feet of OHWM is considered a shoreland and development must conform to RCW 90.58, the Shoreline Management Act, with no-net-loss requirement for ecological functions of development projects.

2.7 FISH AND WILDLIFE HABITAT CONSERVATION AREAS

Various databases were used during the desktop analysis to evaluate presence of fish and wildlife habitat conservation areas (refer to Section 2.1). As defined under MICC 19.07.170(A), fish and wildlife habitat conservation areas include the following:

- Areas where state or federally-listed endangered, threatened, sensitive, or candidate species, or species of local importance, have primary association;
- PHS areas identified by WDFW (2019b);
- Areas used by bald eagles for foraging, nesting, and roosting, or within 660 feet of a bald eagle nest;
- Watercourses and wetlands and their buffers; and
- Biodiversity areas.

Potential overlap with fish and wildlife habitat conservation areas was analyzed, including potential use of the habitat, as discussed in Section 3.6 below. These include both terrestrial habitat and aquatic habitat, focusing on Lake Washington. Species use of Lake Washington will be addressed in this document.

3. EXISTING CONDITIONS

Critical areas and shorelines overlap with the proposed NME Project pipeline alignment. The existing conditions of these areas are described below. The information is organized into the following categories: (1) general site conditions and surrounding land use, (2) watercourses and buffers, (3) geologically hazardous areas, (4) shorelands, (5) Lake Washington, (6) species use, and (7) summary of existing conditions.

3.1 GENERAL SITE CONDITIONS AND SURROUNDING LAND USE

Mercer Island is a suburban island community just over 5 miles long and 2 miles wide. The City of Mercer Island consists of residential areas, a downtown business core, and preserved parks and open space, with a population of just over 24,000 people. The island is surrounded by Lake Washington, and the shoreline is nearly completely developed with residential properties.

The NME Project on Mercer Island includes the proposed pipeline alignment from NMPS, traveling generally southeast along ROWs for surface streets and the I-90 Trail, and ending at the eastern boundary of Mercer Island's jurisdiction within the East Channel of Lake Washington. The I-90 Trail is a multi-use path that parallels the northern edge of I-90 on Mercer Island (refer to Figure 1). The I-90 Trail will be used for both staging and access along the pipeline alignment. There are additional staging areas on Mercer Island that are not directly associated with proposed pipeline alignment. Mercer Island's jurisdiction for the NME Project ends at the mid-point of the East Channel between the Mercer Island Boat Launch and Enatai Beach Park in Bellevue.

Parcels within the NME Project on Mercer Island include King County utility parcels (e.g., NMPS), residential parcels, Mercer Island ROWs, WSDOT ROWs (e.g., I-90 Trail), and Mercer Island parks (e.g., Luther Burbank Park, Fruitland Landing Park, and Mercer Island Boat Launch). The proposed NME Project pipeline alignment primarily follows surface streets, I-90 Trail e.g., WSDOT ROW), and WSDOT Limited Access ROW. The NME Project overlaps with several zoning districts and environmental designations (Figure 3). Based on data from Mercer Island (2019), the zoning districts include residential (R-8.4, R-9.6, R-12, and R-15), multi-family (MF-3), and public institution (PI). Environmental designations along the proposed NME Project alignment include urban residential environment and urban park environment. Use regulations for the NME Project is under "Utility," which is a permitted use within both the environmental designations (MICC 19.13.040).

NMPS is located near the east–west center of North Mercer Island, and north of I-90, within a residential area (refer to Figure 1). NMPS itself is on King County property. The NMPS stream receives surface water and stormwater flows from residential properties and the Mercer Island downtown core. From the NMPS stream crossing, the proposed North Mercer Island Interceptor will be constructed along the I-90 ROW staying primarily within the I-90 Trail and residential areas.

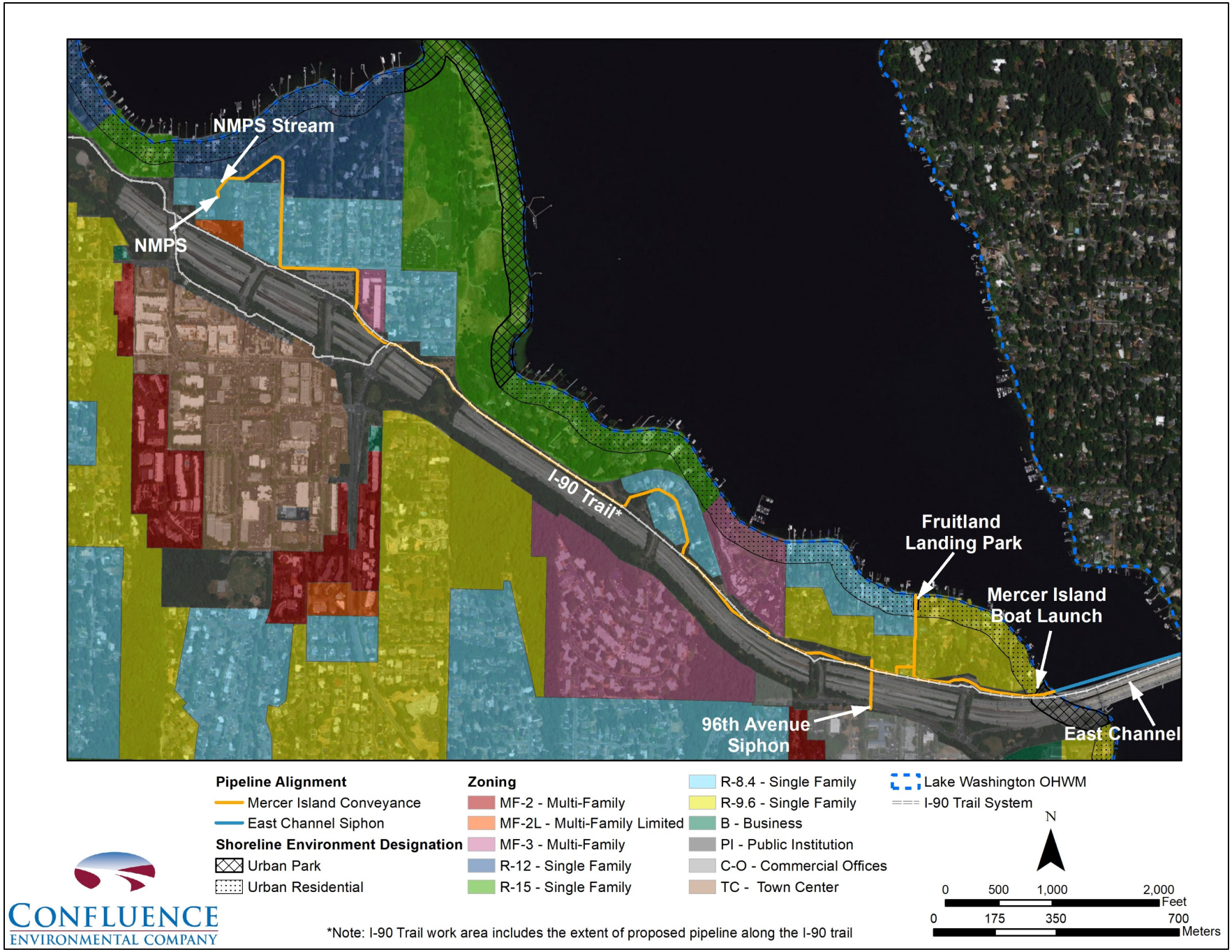


Figure 3 – Zoning Districts and Environmental Designations on Mercer Island

There are two junctions from the main North Mercer Island Interceptor pipeline: (1) 96th Avenue Siphon, and (2) LS-11 at Fruitland Landing Park. The proposed 96th Avenue Siphon will be in a residential area that will receive limited upgrades as part of the proposed NME Project. The siphon will be located 320 feet south of the proposed pipeline alignment just south of I-90 (refer to Figure 1). LS-11 is located 0.15 mile north of the proposed pipeline alignment adjacent to Lake Washington (refer to Figure 1). LS-11 is within a public shoreline access park named Fruitland Landing. The park has a small picnic area, access to Lake Washington (below riprap armoring), and several wastewater structures operated by Mercer Island, most of which lie below grade. Improvements to LS-11 are requested by the Mercer Island operations to address future capacity concerns on Mercer Island. Proposed improvements for LS-11 will occur above the OHWM of Lake Washington, although much of this is within the first 50 feet of the OHWM, and most of the work will be below grade.

From the LS-11 junction, the proposed North Mercer Interceptor alignment will run generally south toward I-90, following the I-90 Trail to the Mercer Island Boat Launch, where it will intersect the existing pipeline (refer to Figure 1). The pipeline will enter the East Channel at the shoreline of the Mercer Island Boat Launch to the north of the I-90 East Channel Bridge. The Mercer Island Boat Launch is a waterfront park featuring lawn, parking area, and a boat launch ramp to Lake Washington. These amenities are located just under, north, and south of the I-90 East Channel Bridge.

Lake Washington is the second largest natural lake in Washington, with 80 miles of shoreline. Lake Washington lies within water resource inventory area (WRIA) 8. The lake is approximately 20 miles long, with a mean width of approximately 1.5 miles and a circumference of 50 miles. The lake covers 22,138 surface acres, and has a mean depth of approximately 100 feet and a maximum depth of approximately 200 feet. The waters within the NME Project are shallow, with a maximum depth of approximately 60 feet. Lake Washington is the most populated watershed in the state (King County 2003).

The following is a description of existing conditions associated with the critical areas and shorelines along the proposed NME Project pipeline alignment.

3.2 WATERCOURSES AND BUFFERS

Several small streams drain the vicinity of the proposed upland segments on Mercer Island (Figure 4). Based on available GIS data (Mercer Island 2019), the NMPS stream is the only potential fish-bearing stream (Type F) within the NME Project area. The NMPS stream and buffer is expected to be impacted by construction from the open cut-and-cover trench used to install the proposed wastewater pipe, and the stream buffer is expected to be impacted from upgrades to the NMPS facility and modified stormwater outfall. Although the stream is mapped as a potential fish-bearing stream, it is not used by any salmonid species (WDFW 2019a,b). The lack of suitable habitat for salmonids and challenges to anadromy were confirmed during field visits. For example, downstream of the NMPS parcel, the stream runs through a box culvert under SE 22nd Street, and continues underground for over 700 LF to an outlet under a dock in Lake Washington. The culvert slope is very gradual (approximately 1.2%). Impacts and mitigation for the NMPS stream and buffer are discussed in Section 5 below.

Between the NMPS stream and I-90 East Channel Bridge, there are piped streams, perennial streams (Type Np), and a seasonal stream (Ns) within the NME Project area. The piped streams within the construction limits have portions that are also classified as perennial (Type Np) or seasonal (Type Ns) outside of the construction limits. There is a perennial stream adjacent to the Luther Burbank Park parking lot that will be avoided. This area will be used for staging, and will only use existing improved surfaces (e.g., concrete, asphalt). There is a piped stream just north of I-90 along the I-90 Trail that has a small section of seasonal stream that will overlap with the construction limits. The seasonal stream along the I-90 Trail will be avoided, but the buffer will be temporarily impacted. The final stream, the perennial stream adjacent to the 96th Avenue Siphon work area, will be avoided but the buffer that occurs within the street ROW will be temporarily impacted during construction.

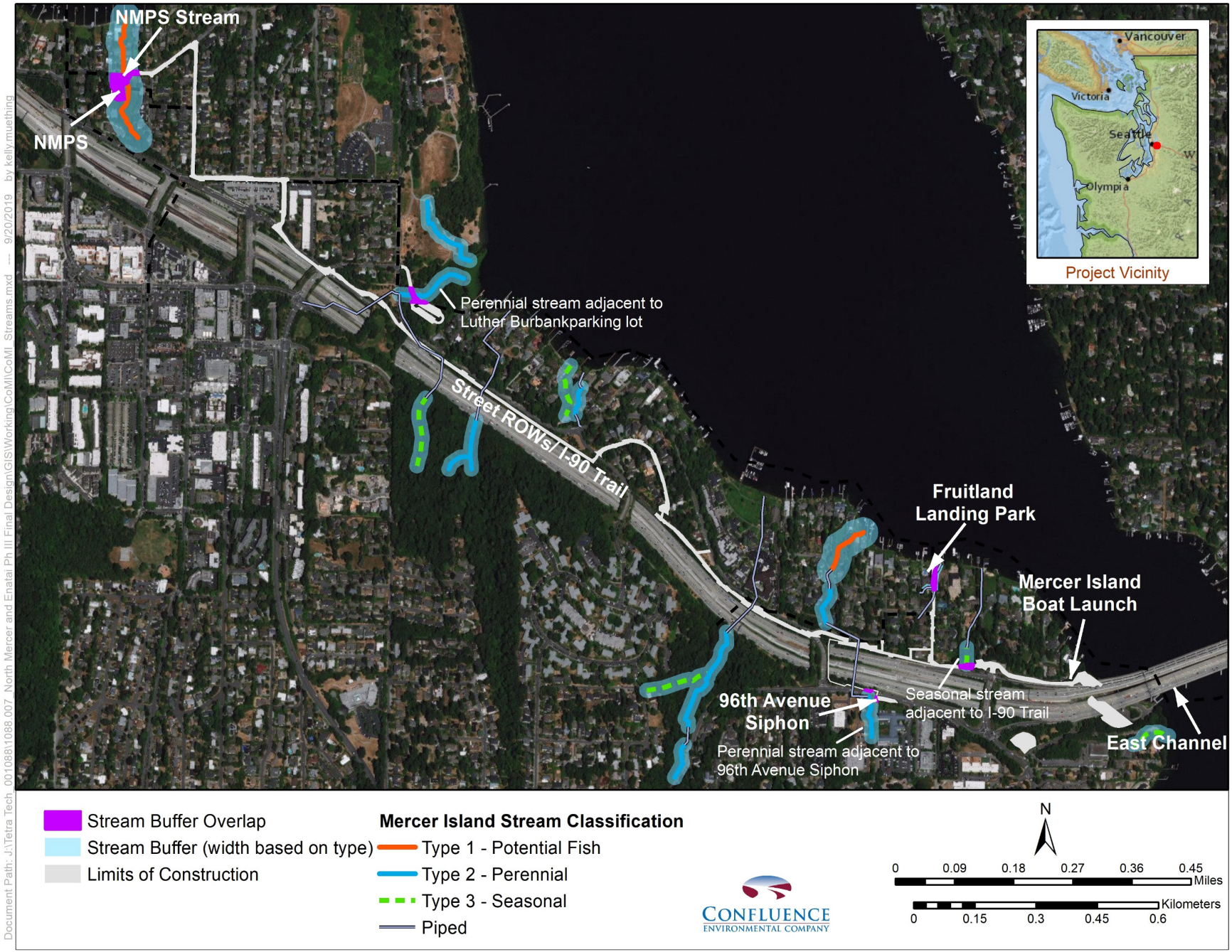


Figure 4 – Watercourses and Buffers along the NME Project Pipeline Alignment

The existing conditions for the NMPS stream consist of riprap along the stream banks and substrate that ranges in size from silt (<0.002 inches) to large cobbles (7 inches), although the majority is composed of gravels and cobbles. There is an existing stormwater outfall located near the SE 22nd Street box culvert. The existing pipe is an 8-inch ductile iron pipe and is surrounded by rip-rap along the stream banks. Appendix C (Photos 1-5) provides the existing watercourse conditions of the NMPS stream and stormwater outfall location.

Based on Mercer Island code, the NMPS stream has a 120-foot buffer, of which approximately 5,800 SF is already developed with impervious surface (e.g., pavement, buildings, concrete). The NMPS stream buffer encumbers the entire property. Vegetation within the NMPS stream buffer consists of native and invasive species. Several large coniferous and deciduous trees are present in the riparian corridor, including red alder (*Alnus rubra*), western red cedar (*Thuja plicata*), and Douglas-fir (*Pseudotsuga menziesii*). However, the understory is dominated by invasive plant species present throughout the buffer, causing degraded buffer functions. Invasive species observed during a December 2016 site visit, and subsequent site visits by the arborists, include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Polygonum cuspidatum*), and hedge bindweed (*Calystegia sepium*). Appendix C (Photos 1-5) provides the existing watercourse buffer conditions of the NMPS stream.

Figure 4 provides the locations of all piped, seasonal, and perennial streams (or stream sections) along the proposed North Mercer Island Interceptor alignment. The location of piped streams in the NME Project area was surveyed and field verified. The pipes containing these streams are located under the I-90 Trail. All of the piped streams, except the stream at Fruitland Landing Park, will be avoided by at least 2 vertical feet during construction. The Fruitland Landing Park stream is a 12-inch concrete storm drain that exits near the OHWM for Lake Washington. This piped stream will be moved by Mercer Island prior to NME Project activity at Fruitland Landing Park (PLAN Volume 1: C605). There is a 25-foot buffer associated with the piped stream at Fruitland Landing Park because the SMP currently uses the pre-2019 CAO. This buffer is likely to be impacted during the requested upgrades to LS-11.

The perennial stream and buffer adjacent to the Luther Burbank Park parking lot is well developed and protected by a curb along the edge of the parking lot. Existing conditions associated with the two sections of perennial and seasonal stream buffer (adjacent to the 96th Avenue Siphon and just north of I-90 along the I-90 Trail, respectively) include conditions associated with a roadside swale. There is a narrow strip of vegetation and some trees surrounding these locations. Each stream collects stormwater from the surrounding area and conveys it to a piped section of stream before letting out into Lake Washington.

According to the revised CAO (MICC 19.07.180(C)), piped streams no longer have an associated buffer. There is a 60-foot buffer for the perennial stream adjacent to the Luther Burbank Park parking lot and the 96th Avenue Siphon work area, and a 60-foot buffer for the seasonal stream adjacent to the I-90 Trail. These locations include work in areas that are primarily covered by asphalt or concrete, although some of the vegetated area surrounding the seasonal stream adjacent to the I-90 Trail will be temporarily impacted. Appendix C (Photos 7, 9, 12, 14, and 15 provides existing conditions for the piped streams, perennial streams, seasonal stream, and associated buffers along the proposed North Mercer Island Interceptor pipeline alignment.

3.3 GEOLOGICALLY HAZARDOUS AREAS

The majority of the elements of the NME Project on Mercer Island overlap with geologically hazardous areas. These areas include “lands that are susceptible to erosion, landslides, seismic events, or other factors as identified by WAC 365-190-120” and are reported within the following categories: (1) landslide hazard areas (including steep slopes, deep seated landslide hazard areas, and shallow seated landslide hazard areas), (2) seismic hazard areas, and (3) erosion hazard areas (MICC 19.07.160(A)).

Based on Mercer Island (2019) GIS, site-specific surveys (PLAN Volume 1: G012, G602; Volume 2: G201-G234), geotechnical data report and geotechnical design memorandum (Shannon & Wilson 2018a,b), and qualified geotechnical expert consultation (Mike Kucker, pers. comm., 2019), landslide hazard areas and seismic hazard areas were mapped along the proposed North Mercer Island Interceptor pipeline alignment (Figure 5). Over 60% of the NME Project alignment in Mercer Island is within identified geologically hazardous areas or buffers. To differentiate overlap within geological hazard areas and prevent double-counting, the following hierarchy for reporting between geological hazard areas was followed throughout this report: (1) landslide hazard areas (including steep slopes, deep seated landslide hazard areas, and shallow seated landslide hazard areas), and then (2) seismic hazard areas. It is notable that erosion hazard areas overlap with these two categories and are dealt with using NME Project best management practices (BMPs) to control erosion during construction activities (see Section 4.3 below).

In landslide hazard areas, the NME Project is located in either glacially overridden very dense or hard deposits that are not susceptible to landslide activity, or will be constructed near the top of the landslide hazard area, which during construction, unloads the slope and reduces the risk of landslide activity. In seismic hazard areas, the NME Project is either located in glacially overridden very dense or hard deposits that are not susceptible to liquefaction, or seismic-induced settlements are within magnitudes that can be mitigated by the pipe design.

The proposed North Mercer Island Interceptor pipeline alignment overlaps with four areas of steep slopes and/or steep slope buffers on Mercer Island. The first (northernmost) area of steep slope buffer is a small (170 SF) vegetated area with conifers, which is adjacent to the I-90 Trail and south of North Mercer Way (see PLAN Volume 2: C213). This area is within the WSDOT ROW. The second area with a steep slope is at the intersection of 90th Place SE and the I-90 Trail, in an area densely vegetated with both conifers and deciduous trees. This area is located between two impacted and stabilized impervious surfaces, within the WSDOT ROW, but with a small portion of the buffer extending into Mercer Island ROW (see PLAN Volume 2: C229). The next steep slope along the alignment is near to LS-11 in a narrow strip with a maximum length of 200 feet parallel to the proposed pipeline alignment and with width of less than 60 feet. The steep slope is situated along the I-90 Trail, adjacent to an I-90 onramp (both previously stabilized impacted areas), and within the WSDOT ROW. Existing stabilization includes adjacent retaining walls and a concrete wall (see PLAN Volume 2: C221). The final area with a steep slope is located at the Mercer Island Boat Launch, within both WSDOT and Mercer Island ROWs. The slope extends upland of the OHWM from a failing retaining wall through a section of mixed lawn and roadway (see PLAN Volume 2: C232). Appendix C (Photo 11) provides existing conditions for the steep slope areas along the proposed North Mercer Island Interceptor pipeline alignment.

The NME Project also overlaps with deep-seated and shallow landslide hazard areas and their associated buffers over the majority of the pipeline alignment (Figure 5). As the alignment is primarily adjacent to developed areas, such as the WSDOT ROW, Mercer Island ROW, and the I-90 Trail, most of these areas have been compacted, stabilized, or otherwise mitigated for landslide risks. Appendix C provides existing conditions for the landslide hazard areas along the proposed North Mercer Island Interceptor pipeline alignment.

The NME Project on Mercer Island overlaps with seismic hazard areas over most of the proposed alignment (Figure 5). According to DNR Washington Interactive Geologic Maps, the NME Project is situated within the Seattle Fault Zone, which consists of a series of 4 or more east- to west-trending, south-dipping fault splays beneath Seattle. The fault zone extends from Bremerton to south Bellevue, along an alignment that is roughly coincident with I-90. It should be noted that the location of this east- to west-trending fault splay is interpreted and is deep and not representative of the location near the surface (Shannon & Wilson 2018b).

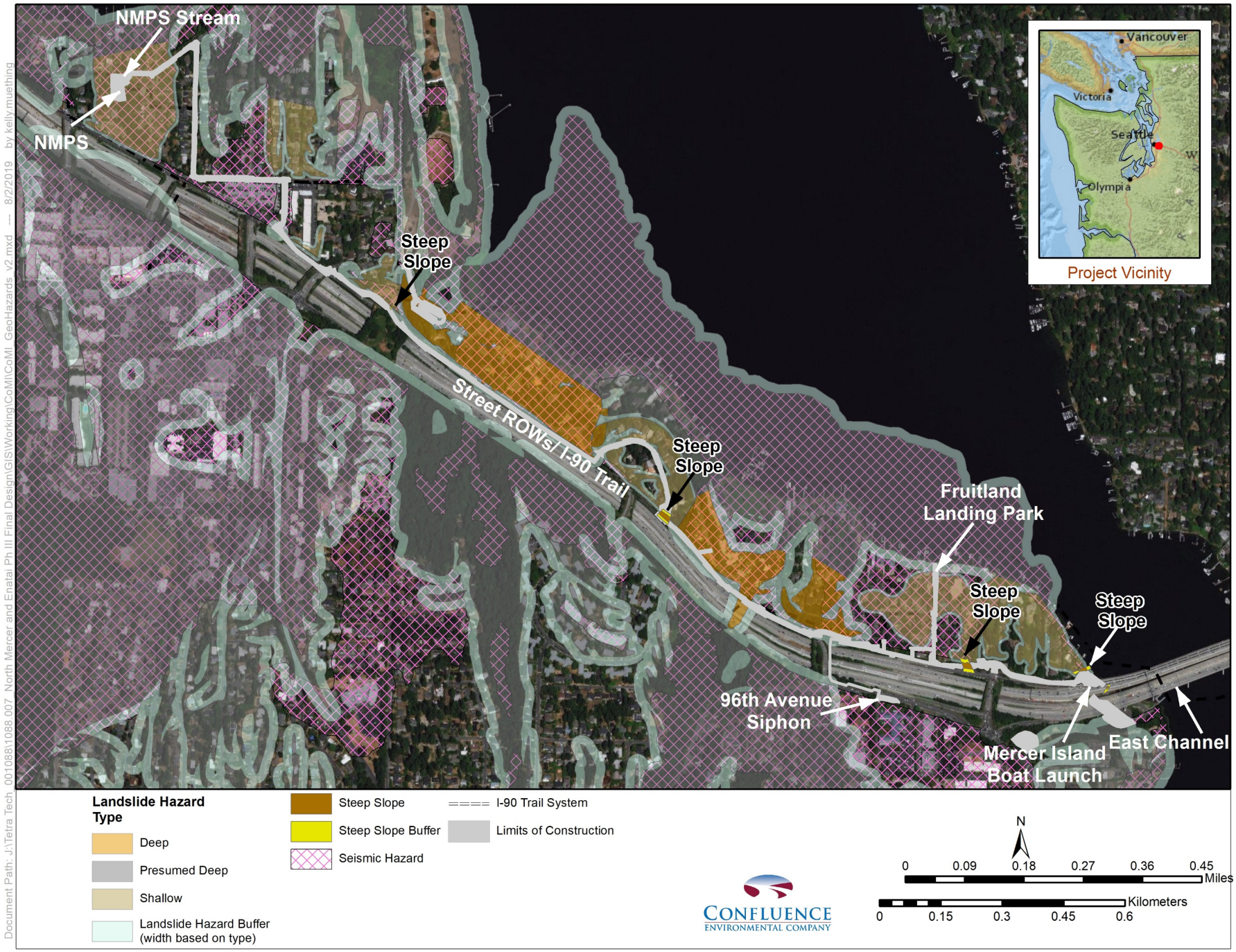


Figure 5 – Geologically Hazardous Areas and Buffers along the NME Project Pipeline Alignment

3.4 SHORELANDS

The shorelands associated with the NME Project on Mercer Island are at LS-11 (Fruitland Landing Park) and the Mercer Island Boat Launch. Work at Fruitland Landing Park is requested by Mercer Island Public Works, and is primarily below grade but above OHWM. As described above, Fruitland Landing Park is a public shoreline access park. The riparian habitat at the park includes native trees and trees associated with landscaping. These include Douglas-fir, bitter cherry (*Prunus emarginata*), and Japanese maples (*Acer palmatum*) (Tree Solutions 2019). A piped stream at the park exits near the OHWM of Lake Washington. Appendix C (Photos 17-19) provides photographs of Fruitland Landing Park.

The riparian habitat where the North Mercer Island Interceptor will traverse through the Mercer Island Boat Launch is a steep (~30% slope), grass lawn area to the north of I-90. The lawn area is separated from the Lake Washington shoreline by a low (approximately 4-foot) riprap-armored bulkhead that is failing in at least one location. The riprap armored bulkhead will be partially removed and replaced with a more ecologically-friendly alternative during construction. Terrestrial vegetation consists of lawn, red alder, and Himalayan blackberry. There is also a patch of Japanese knotweed located near the construction footprint. The beach substrate along the park is dominated by cobble and gravel. Appendix C (Photos 20-23) provides photographs of the Mercer Island Boat Launch site.

3.5 LAKE WASHINGTON

Lake Washington is not called out with an aquatic designation within MICC 19.13 (SMP), but is considered part of the shoreline as per Chapter 90.58 RCW (Washington Shoreline Management Act), and a shoreline of the state under WAC 173-20-370. It is also used by species that are defined in MICC 19.07.170 under fish and wildlife conservation habitat. Therefore, Lake Washington will be included within the discussion of critical areas and shorelines. The NME Project will cross the Lake Washington near its narrowest point (1,400 LF), which is the location of the I-90 East Channel Bridge. Substrate under the bridge is a mix of gravel, sand, mud, and cobble, with occasional boulders. At depths below 10 feet, sand and mud dominate the substrate. Based on an underwater video surveys completed by Confluence on March 22 and May 22, 2017, invasive aquatic vegetation, primarily Eurasian watermilfoil (*Myriophyllum spicatum*) and Brazilian elodea (*Egeria densa*), was found within the shallow areas adjacent to the Mercer Island Boat Launch. Between depths of approximately 15 feet and 20 feet, patches of green filamentous algae were observed growing on hard substrate such as cobble. Appendix C (Photos 24-25) provides photographs of underwater conditions under the I-90 East Channel Bridge.

3.6 SPECIES USE

There are 12 species or habitats associated with areas along the NME Project pipeline alignment identified as "fish and wildlife habitat conservation areas" (Table 6). Some of these species are also listed by the state or federal government as threatened or endangered. Critical habitat for Endangered Species Act (ESA)-listed species and PHS designated are identified below within the NME Project area. Based on a review of online databases, existing literature, and on-site observations, some of these species have been observed or modeled as present along (or near) the proposed NME Project pipeline alignment. No threatened or endangered plant species are known to be in or near the NME Project construction limits.

Table 6. Species Associated with Fish and Wildlife Habitat Conservation Areas Along the NME Project Pipeline Alignment

Species (Common Name)	Species (Scientific Name)	Federal and State Status	Critical Habitat	PHS
Birds				
Bald eagle	*Haliaeetus leucocephalus*	FCo	--	●
Great blue heron	*Ardea herodias fannini*	--	--	●
Rufous hummingbird	*Selasphorus rufus*	--	--	○
Fish				
Bull trout/dolly varden	*Salvelinus confluentus*	FT, SC	●	●
Chinook salmon	*Oncorhynchus tshawytscha*	FT, SC	●	●
Steelhead	*O. mykiss*	FT	--	●
Coho salmon	*O. kisutch*	FCo	--	●
Coastal cutthroat trout	*O. clarki*	--	--	●
Sockeye salmon/kokanee	*O. nerka*	--	--	●
Habitat				
Biodiversity areas and corridors	Mercer Island Open PHS Region	Terrestrial Habitat	--	●
Freshwater forested/shrub	NWI Wetlands	Aquatic Habitat	--	●
Lake	NWI Wetlands	Aquatic Habitat	--	●

ESA = Endangered Species Act, FT = federally threatened; FCo = federal species of concern; PHS = priority habitats and species based on WDFW (2019a,b) due to vulnerable aggregations, commercial, recreational, or tribal importance; SC = state candidate; NWI = National Wetlands Inventory

● = documented in reports or online literature; ○ = identified as a migratory bird and documented in the area

Sources: CBD 2019, eBird 2019, ERMA 2019, USFWS 2019b, WDFW 2019a,b,c

Several ESA-listed species were listed to potentially be in the NME Project area by USFWS (2019b), but are not likely to be present due to lack of suitable habitat. These species include marbled murrelet (*Brachyramphus marmoratus*), streaked horned lark (*Eremophila alpestris strigata*), yellow-billed cuckoo (*Coccyzus americanus*), North American wolverine (*Gulo gulo luscus*), and gray wolf (*Canis lupus*). There is no designated critical habitat in the NME Project area or documented presence of the listed species. There were also migratory birds that were listed by USFWS (2019b), but unless they were documented by another database (e.g., eBird 2019, CBD 2019), they were not included as potential species with associated habitat on Mercer Island.

3.6.1 Use of Terrestrial Habitat

According to USFWS (2019b) and NatureMapping (2019), the NME Project pipeline alignment is within the predicted breeding areas for the bald eagle (*Haliaeetus leucocephalus*), great blue heron (*Ardea herodias fannini*), and the rufous hummingbird (*Selasphorus rufus*). This does not mean, however, that habitat is appropriate for breeding and rearing along the pipeline alignment. For example, documented breeding areas for great blue heron are located more than 5,000 feet away from the NME Project on Mercer Island (WDFW 2019b). The identified rookery is located within the Mercer Slough Nature Park close to the Bellevue portion of the NME Project. However, there have been great blue heron sightings as close as N Mercer Way (adjacent to the I-90 Trail) and in Luther Burbank Park within 1,000 feet of proposed off-site staging will occur in the winter (eBird 2019). Similarly, the closest bald eagle nest is located more than 1,500 feet away, but there have been sightings of these birds within Luther Burbank Park and residential areas along the proposed North Mercer Island Interceptor pipeline alignment (eBird 2019). Identified nesting locations are not readily available for the Rufous Hummingbird, but they have been sighted within Luther Burbank Park (eBird 2019).

The prevalence of residential neighborhoods, proximity to I-90, and limited vegetation surrounding the NME Project likely prevents nesting or breeding of birds within the area directly associated with the NME Project. Terrestrial species likely use some of these areas for foraging and/or resting, but breeding is unlikely.

3.6.2 Use of Aquatic Habitat

The majority of habitat adjacent to the NME Project pipeline alignment includes Lake Washington, and the NME Project crosses the East Channel of Lake Washington. There are six fish that have habitat associated with fish and wildlife conservation areas by Mercer Island, including three ESA-listed species. Below is a brief review of fish use of Lake Washington, focusing on the ESA-listed species.

Bull Trout

The Coastal Recovery Unit Implementation Plan for bull trout (*Salvelinus confluentus*) has designated Lake Washington as important shared foraging, migration, and overwintering (FMO) habitat (USFWS 2015). Shared FMO areas are particularly important to the anadromous and fluvial life history forms due to their complex migratory patterns associated with foraging and overwintering. Shared FMO areas are also critical to maintaining or reestablishing the expression of the anadromous life history behavior within the recovery unit.

Bull trout forage in Lake Washington as they migrate to and from the marine environment (USFWS 2015). Availability of food in Lake Washington is generally good and considered properly functioning. The benthic habitat of Lake Washington likely provides adequate aquatic macroinvertebrates that support an abundant food base. As piscivorous fish, bull trout are expected to forage on juvenile salmonids. Despite the introduction of artificially propagated salmonids, such as Chinook salmon, into Lake Washington, the abundance and availability of juvenile salmonids are likely reduced relative to historical conditions.

Although substantial portions of the Lake Washington and Ship Canal shorelines are modified, these areas still provide habitat complexity and processes that establish and maintain aquatic environments, which provide a variety of depths and structures that support bull trout foraging and rearing phases. Despite the high summer water temperatures in the surface waters, Lake Washington and the Ship Canal continue to provide sufficient water quality and quantity to support normal growth and survival of bull trout. The only barrier to migration is the Ship Canal, which was identified by USFWS (2015) as a temperature barrier to bull trout. Based on a review of fish counts at the Ship Canal, bull trout are considered rare but possible in Lake Washington (USFWS 2004).

Chinook Salmon

Chinook salmon (*Oncorhynchus tshawytscha*) spawning populations within WRIA 8 (i.e., the north Lake Washington population and the Cedar River population) use Lake Washington for rearing and migration. A third population, the Issaquah stock, is a nonnative stock from the Issaquah Hatchery, which has been in operation since the 1930s (WDFW 2004, Ruckelshaus et al. 2006).

Small numbers of Chinook salmon fry begin migrating into Lake Washington from the Cedar River in January, and most Chinook salmon fry enter the lake in mid-May. Initially, the Cedar River Chinook salmon fry tend to concentrate in the littoral zone at the south end of Lake Washington between February and mid-May, until they grow large enough to move offshore (Fresh 2000, Tabor et al. 2004, 2006). Therefore, the lakeshore area near the Cedar River mouth appears to be an important nursery area for juvenile Chinook salmon. Tabor et al. (2004) found that the mean abundance of juvenile Chinook salmon from February through May is positively related to proximity to the Cedar River mouth, but there is no difference by June between the Lake Washington and Cedar River populations. Juveniles migrate away from the Cedar River mouth and along the Lake Washington shorelines as they grow. The mouth of the Cedar River is located approximately 5.5 miles from the NME Project pipeline alignment, and the Chinook salmon juveniles that use the NME Project area will likely be the larger sizes that use deeper habitat, as described below.

After entering the lake, the juvenile Chinook salmon rear in the shallow littoral zone as they gradually migrate to Union Bay and the Ship Canal. Juvenile Chinook salmon tend to prefer gradually sloping sand-silt substrate habitat less than 1.6 feet deep (Tabor et al. 2006). They also congregate at the mouths of small tributary streams, possibly attracted by flow, shallow-water depths, benthic invertebrate or terrestrial insect food sources, fine-particle substrate accumulated at the stream delta fans, or some combination of these factors (Shared Strategy for Puget Sound 2007). Juvenile Chinook salmon tend to increase their use of deeper-water habitat areas as they get larger, likely as a response to prey availability, reduced predation risks, and possibly more favorable water temperature conditions (Warner and Fresh 1998, Celedonia et al. 2008).

Chinook salmon fry typically rear in Lake Washington from 1 month to 4 months before migrating through the Ship Canal to Puget Sound (Seiler et al. 2004, Tabor et al. 2006). The larger fingerlings enter the lake between mid-May and June after spending up to 6 months rearing in the rivers and streams.

Adult Chinook salmon typically return to Lake Washington in August and September, sometimes within days of returning to their natal rivers (City of Seattle and Corps 2008). The average time spent by adult Chinook in Lake Washington in 1998 was 2.9 days (Fresh et al. 1999). Therefore, the existing modified habitat conditions in Lake Washington and the Ship Canal may have a limited effect on returning adults, although the relatively brief time spent in the lake may be related to the long-term trend of increasing water temperatures in late summer.

Critical habitat for Chinook salmon is designated in Lake Washington (70 FR 52630). The critical habitat within Lake Washington along the NME Project pipeline alignment has been substantially modified by long-term anthropogenic activities such as single-family residences and private docks. In addition, the nearshore is dominated by the invasive species Eurasian watermilfoil. There is very little native and nonnative riparian vegetation growing along the shoreline, reducing the overhanging vegetation habitat that is preferred by juvenile Chinook salmon. In general, the physical and biological features in Lake Washington are not ideal for Chinook salmon rearing.

Steelhead

There are 2 steelhead (*O. mykiss*) populations in the Cedar River-Lake Washington watershed (WRIA 8): the natural-origin Cedar River population and the introduced north Lake Washington population. Allozyme analysis of steelhead sampled in the Cedar River in 1994 clusters them with winter steelhead in the Green, White, and Puyallup rivers, including some Snohomish basin steelhead stocks (WDFW 2004).

Juvenile steelhead migrating out of WRIA 8 will pass through the NME Project pipeline alignment using the general area as a migratory corridor. Juvenile steelhead rear in fresh water, including Lake Washington, for several years before migrating to Puget Sound. Smoltification and seaward migration of steelhead is expected to be concentrated between April and May (WDF et al. 1973, ERMA 2019). There is no critical habitat for steelhead along the NME Project alignment (81 FR 9251).

Returning adult steelhead pass through the Ballard Locks to Lake Washington between December and early May (WDF et al. 1973). Spawning occurs throughout WRIA 8, including the lower Cedar River, the Sammamish River and its tributaries, and several smaller Lake Washington tributaries (WDFW 2006). Steelhead spawn primarily in the main stem of the Cedar River from March through early June (Burton and Little 1997).

Non ESA-Listed Fish

All fish identified in Table 6 use Lake Washington for migration (Kerwin 2001, WDFW 2019a,b). Populations of coho salmon (*O. kisutch*) are depressed within Lake Washington (Fresh 1994, Fevold et al. 2001, WRIA 8 Steering Committee 2005). Coho salmon will typically migrate through Lake Washington from July to January to get to spawning grounds in Kelsey Creek, Coal Creek, May Creek, and the Cedar River (ERMA 2019, WDFW 2019a). Compared to coho salmon, populations of cutthroat trout (*O. clarki*) appear to be increasing in Lake

Washington (Fresh 1994, Fevold et al. 2001, WRIA 8 Steering Committee 2005). Cutthroat trout are an identified predator of Chinook salmon fry in Lake Washington (Celedonia et al. 2008). Sockeye salmon (*O. nerka*) will migrate through Lake Washington from May to September to get to spawning grounds in the same drainages as coho salmon (ERMA 2019, WDFW 2019a). There are also historical areas of beach spawners along the Lake Washington shoreline, although there are no documented spawning grounds associated with the NME Project along the Mercer Island shoreline (WDFW U.D.). The resident form of sockeye salmon, kokanee trout, are also documented as occurring in Lake Washington by WDFW (2019b).

3.7 SUMMARY OF EXISTING CONDITIONS

There are several critical areas and shorelines that overlap within the NME Project area on Mercer Island (Table 7). The NME Project overlaps with residential, multi-family, and public institution zoning districts. Environmental designations along the proposed NME Project alignment include urban residential environment and urban park environment. The NME Project is a permitted use within both the environmental designations (MICC 19.13.040).

Table 7. Critical Areas and Shorelines that Overlap with the NME Project

Habitat	Type of Critical Area or Shoreline Present by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Watercourses and Buffers						
NMPS Stream (Type F)	●					
NMPS Stream Buffer	●					
Perennial Stream Buffer		●		●		
Seasonal Stream Buffer		●				
Piped Stream		●	●			
Geologically Hazardous Areas and Buffers						
Landslide Hazard Areas	●	●	●		●	
Landslide Haz. Buffers		●	●	●	●	
Seismic Hazard Areas	●	●	●	●	●	
Fish and Wildlife Habitat Conservation Area						
Special-status species	●	●	●	●	●	●
Priority habitats	●					●
Bald Eagle Habitat						
Watercourses and buffers	●	●	●	●		
Biodiversity areas	●					●
Shorelines						
Shorelands			●		●	
Lake Washington						●
Other Areas						
Outside of Critical Areas or Shorelands		●		●	●	

● = identified within the work area.

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, WSDOT ROWs, and WSDOT Limited Access ROWs.

The proposed North Mercer Island Interceptor pipeline alignment was designed to avoid impacts to sensitive habitat, which is why the proposed alignment is primarily located within street ROWs and the I-90 Trail. These locations have been compacted, stabilized, or otherwise mitigated for things like landslide risks or erosion hazards. As described in Section 1.3 above, the majority of the pipeline alignment is proposed within already improved areas (approximately 58%). In areas with functional buffers, there are examples within the NME Project area of degraded conditions. For example, the NMPS stream buffer has an understory dominated by invasive species. The NME Project will use the opportunities within critical areas and shorelines that have degraded conditions to enhance ecological functions. In other areas there are functional buffers that offer important support to the critical area that is present. For example, areas with vegetated habitat along the I-90 Trail that controls erosion along steep slopes. These areas were reviewed during the design to avoid or support to continue to provide the functions and values of that critical area. The goal of the NME Project is to result in a no-net-loss of existing conditions within both critical areas and shorelines along the proposed pipeline alignment.

4. PROPOSED PROJECT

The NME Project on Mercer Island is defined as the limits of construction associated with facility improvements to the NMPS, construction of approximately 16,700 LF of new sewer pipe in upland areas on North Mercer Island, improvements along the I-90 Trail, improvements to LS-11 at Fruitland Landing Park, and improvements along the shoreline of the Mercer Island Boat Launch. The NME Project also includes construction of approximately 1,400 LF new sewer pipe in the East Channel of Lake Washington. The work areas defined in Section 1.1 above for the NME Project include: (1) NMPS and NMPS stream; (2) Street ROWs and I-90 Trail, (3) LS-11 (Fruitland Landing Park), (4) 96th Avenue Siphon, (5) Mercer Island Boat Launch, and (6) East Channel.

4.1 PROJECT TIMELINE AND SEQUENCING

NME Project construction on Mercer Island is expected to extend from April 2021 to December 2023 (Table 8). Activities within sensitive habitats were prioritized to occur for as short a period as possible; however, there are site-specific restrictions that will affect the timing and duration of construction activities. The expected sequence of work is as follows: updates to the NMPS will start as early as possible because this segment has the longest total duration (33 months); then work will progress in a linear fashion along the proposed pipeline alignment. At the same time, work will also start at the Mercer Island Boat Launch and proceed uphill toward the force main discharge to meet the work starting from NMPS. The exception to the linear workflow is the in-water work, which will occur during in-water work windows approved by the Corps and WDFW. It is anticipated that, for most of the work along the North Mercer Island Interceptor, construction activities will be in one area at a time (i.e., one street or continuous I-90 Trail segment) that is approximately 1,500 LF to 2,500 LF in length. The duration of the work within these segments will be for approximately 2 months to 6 months between mobilization and site restoration. Table 8 provides the overall durations, but the work itself will occur rapidly within individual neighborhoods and sections of the proposed NME Project pipeline alignment.

Table 8. Construction Sequencing for the NME Project on Mercer Island

Work Area (NME Project Segment)	Proposed Actions	Construction Sequencing	Duration (months)
NMPS and NMPS Stream (NMPS and North Mercer Island Interceptor)	• Begins with initial mobilization • Ends with the NMPS facility upgrades completed • NMPS stream work is a portion of this	• Apr 2021 • Dec 2023 • Jul 2022-Aug 2022	33
Street ROWs and I-90 Trail (North Mercer Island Interceptor)	• Begins after initial mobilization • Ends when the open cut-and-cover work is complete down to the Mercer Island Boat Launch	• Jul 2021 • Nov 2022	17
Fruitland Landing Park (LS-11 and North Mercer Island Interceptor)	• Begins with mobilization of LS-11 work • Ends after upgrades are complete	• Mar 2021 • May 2022	14
96th Avenue Siphon (96th Avenue Siphon and North Mercer Island Interceptor)	• Begins with mobilization of 96th Avenue Siphon work • Ends after upgrades are complete	• May 2022 • Oct 2022	6

Table 8. Construction Sequencing for the NME Project on Mercer Island

Work Area (NME Project Segment)	Proposed Actions	Construction Sequencing	Duration (months)
Mercer Island Boat Launch (North Mercer Island Interceptor)	• Begins after the installation of the shoring system (upland) • In-water work begins as soon as the in-water fish work window opens • Ends after site restoration of the bulkhead and planting the riparian area behind the bulkhead	• Jun 2021 • Jul 2022 • Nov 2022	18
East Channel of Lake Washington (East Channel Siphon)	• Begins as soon as the in-water fish work window opens • Ends when the open cut-and-cover work is complete in the East Channel to install the new siphon	• Jul 2022 • Nov 2022	5

NMPS = North Mercer Pump Station; LS-11 = Lift Station 11; ROW = right of way

The durations discussed in Table 8 are based on a conservative set of assumptions. They are shown as the earliest likely dates to begin work. The contractor may elect to conduct portions of the work in subsequent years, but will have to get any changes from the proposed schedule approved by King County. In-water work must be conducted during the seasonal windows proposed due to restrictions with other permitting agencies. It is also possible that unplanned events delay activities, and the resulting durations will exceed those presented in Table 8. Should such conditions affect permit conditions, King County will notify the relevant agencies.

4.2 PROPOSED PROJECT COMPONENTS

The purpose of the NME Project is to improve reliability and increase the capacity of the wastewater conveyance system that carries flows from northern Mercer Island to the Eastside Interceptor in Bellevue. To address the identified needs for capacity upgrades, King County WTD is proposing to upgrade existing facilities, construct a new pipeline from Mercer Island to the East Channel of Lake Washington via Fruitland Landing Park and the Mercer Island Boat Launch. The following proposed project components provide a detailed description of the construction methods.

4.2.1 NMPS and NMPS Stream

The NME Project proposes to upgrade and expand the NMPS facility. The pump station will be upgraded to accommodate the increased flow and pumping head that it will experience with the proposed pipeline improvements. Preventing nuisance odor impacts is also a major goal for the operation of the NME Project. The existing odor control system at the NMPS will be replaced with a more reliable carbon scrubber system. The carbon scrubber system, combined with the existing injection of inorganic salt solution into the wastewater at the NMPS, will control and treat odors at the pump station site.

Other improvements to the NMPS will be implemented at the same time, addressing the electrical service, heating, ventilation, air conditioning, water system, odor control, stormwater management, and site access. A new building and concrete pad will be constructed to the west of the existing structure house a standby generator, electrical service equipment, and a restroom. A temporary pump station will be built to manage flows during construction. Exterior modification will relocate the electrical transformer and an odor control chemical storage tank and add a fuel tank and more odor control equipment. The access roadway will be modified to improve vehicle access and turning.

The NME Project also proposes to replace the existing pipe by installing new sewer pipe using typical open cut-and-cover construction methods across the stream adjacent to NMPS. The NMPS stream is an unnamed stream that is a tributary to the Lake Washington watershed. The NMPS stream is expected to have an extremely low

likelihood of salmonid presence due to poor water quality (headwaters are primarily stormwater runoff), channelized and armored banks and bed, and challenges to anadromy (including a 700-foot culvert from Lake Washington to the NMPS parcel).

There will also be a redesign of the existing stormwater outfall that discharges into the NMPS stream. Existing outfalls that service the pump station yard drains and roof drains will be combined with the existing outfall near the SE 22nd Street box culvert. This outfall will be moved back approximately 5 feet from the edge of the stream and a new apron in upland habitat will be constructed to dissipate energy before entering the stream.

Construction Staging and Access

There is existing infrastructure (i.e., a paved pump station access road and parking area) that will be used for temporary access and staging for NMPS facility upgrades and the open cut-and-cover work across the NMPS stream (Figure 6). This existing infrastructure will limit the need for site preparation that will disturb the surrounding area, but additional locations will be disturbed. Temporary staging and access will be used at the NMPS work area for the entire duration of the NME Project (April 2021 to December 2023). Clearing and grubbing activities will be minimal, as staging will be primarily limited to already improved areas.

Long-term access improvements will also be included in the construction activities associated with NMPS, including changes to the access road within the NMPS parcel and the frontage road before the NMPS parcel. The overall changes to the roads will result in new impervious surface area, as discussed in Section 5.2, and removal of trees (Tree Solutions 2019).

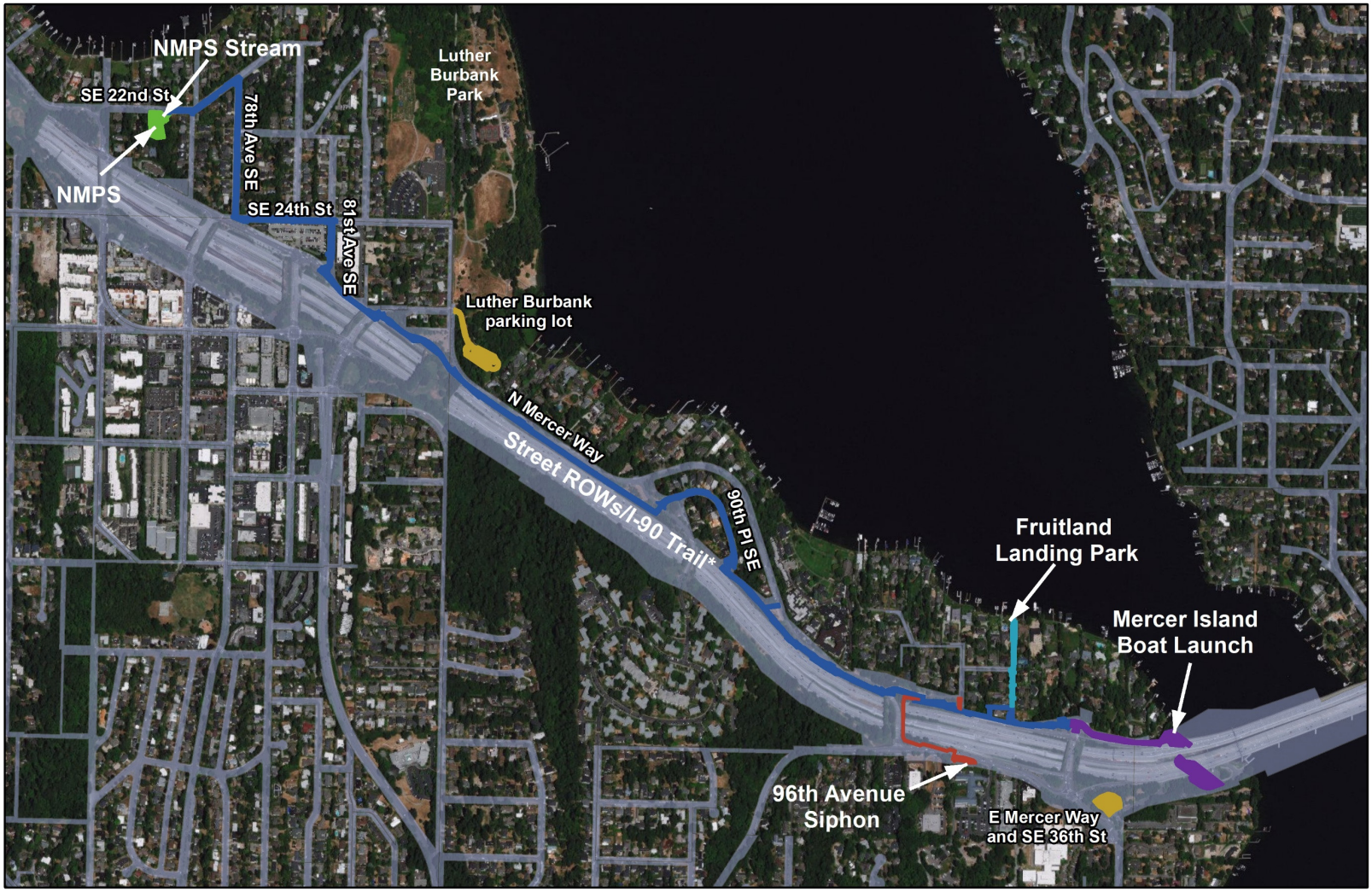
There will also be temporary construction access areas adjacent to the NMPS stream, on both banks, during construction (July 2022 to August 2022). This onsite access will include two areas that are largely dominated by Himalayan blackberry.

Site Preparation

Settlement monitoring points will be installed by hand prior to upland construction activities. Monitoring points will be used to identify changes in surface, slope, and structure settlement due to NME Project construction. Groundwater monitoring wells or vibrating wire piezometers will be installed in geotechnical exploratory boring locations. Groundwater readings will be taken and recorded every 3 months for a total of 33 months, which is the full range of activities for the NME Project at NMPS (refer to Table 8). Groundwater slug tests will be performed in wells to estimate the hydraulic conductivity of the soil.

Existing utilities (e.g., utility pipe or other buried structure) will be located and marked with paint or flags. This activity is relevant for upland work only. The utility will then be exposed using air excavation with a vactor truck to create a pothole.

Some existing utilities will require relocation during, and in advance of, construction. These utilities will be exposed by hand, vactor truck, or using an excavator, and relocated out of the new infrastructure footprint. New utility service will be installed and connected prior to decommissioning or removing the old utility. Following utility relocation, the trenches will be filled and compacted with a trench compactor. Excavated material may be removed from the site with a dump truck and trailer, as necessary.



*Note: Street ROWs/I-90 Trail work area includes the extent of proposed pipeline along the I-90 trail and city street ROWs

Figure 6 – Staging and Access along the Proposed NME Project Pipeline Alignment

Construct New and Temporary Facilities

The location of the new generator building, yard area, and temporary pump station will be cleared and grubbed using standard BMPs for erosion control (see Section 4.3 below). Facility improvements for the existing pump station include (Figure 7):

- New dual force main pipe to convey wastewater;
- New generator building to house standby generator and restroom facility;
- New retaining walls and courtyard area to house mechanical equipment;
- Expanded driveway and parking area to allow for safe turnaround on-site; and
- Modified storm drainage outfall location and pipe size.

The equipment used for constructing new and temporary NMPS facilities may include excavators, dump trucks and trailers, compactors, concrete saws, compressors, concrete mixer and pumper trucks, lifts (for workers and materials), grinders, rollers, and pavers. The activities associated with NMPS facility improvements will result in an increase of approximately 5,300 SF of impervious surface area, for a total impervious surface area of 11,096 SF (30% out of a 37,253 SF total area) post-NME Project.

The facility upgrades to NMPS will also include improvements to the existing stormwater pipe. The replacement pipe will be a 12-inch high-density polyethylene (HDPE) pipe. Construction methods will include removing the existing outfall pipe and rip-rap surrounding the pipe. Although some existing rip-rap surrounding the pipe may need to get replaced, the work below OHWM will be minimized to the extent possible. A new outfall apron will be constructed above the OHWM, and new pipe installed using open cut-and-cover methods. The revised stormwater outfall will follow the 2019 Stormwater Management Manual for Western Washington (Ecology 2019) and other standard practices. Note that additional stormwater control measures were not possible. According to Mercer Island (2019), the NMPS site is in a location where infiltrating low impact development facilities are not permitted. King County WTD will continue consultation with Mercer Island to formalize the plan for a fee-in-lieu for the increased stormwater quantity based on a ¼ mile downstream analysis.

Excavation and Fill Material Handling

Clean excavated materials during facility upgrades may be used as backfill in excavated areas. However, there is a preference to use clean backfill material from off-site sources. The clean excavated materials from upland habitat that are not reused as backfill will be transferred to a King County-approved upland disposal location.

Install Pipe Across the NMPS Stream

The pipe will be installed using typical open cut-and-cover construction methods perpendicular to the stream banks. Because the NMPS stream extends well beyond the limits of the property (both upstream and downstream), there was no way to connect to the rest of the proposed pipeline without crossing the stream. Surface water withdrawals of the NMPS stream work area are necessary to establish a dry work zone and avoid releasing excessive turbidity during construction through the stream channel. The trench will be excavated in a linear fashion. The excavated trenches for the pipe will be shored using a trench box style method, where applicable. The pipe will then be installed in the trench, and the trench backfilled and compacted. The equipment used for the stream crossing will primarily include a dump truck and trailer, excavator (midi or large), and a hand-held soil compactor.



Figure 7 – NMPS Site Plan

Prior to excavation, the stream will be isolated using block nets, and fish will be removed from the construction area using a seine. Barriers will be installed upstream and downstream of the excavation area to isolate the construction area from the surrounding environment. A gravity bypass system will be installed in the construction area (refer to Figure 7), and flow will be returned downstream of the construction area. A standby pump will be installed temporarily to handle high flow events during construction activities.

The NMPS stream crossing will include installation of stabilization in the area where the pipe will cross the stream, which is similar to the existing condition of riprapped streambed conditions. Although the majority of the existing streambed material is composed of gravels and cobbles, the substrate ranges in size from silt (<0.002 inches) to large cobbles (7 inches). The proposed replacement of streambed material will be a 1.5-feet thick layer of WSDOT 10-inch cobbles (note that 10 inches is the maximum size of the existing material, and this material includes smaller sediment – about 50% is smaller than 4 inches) on top of standard WSDOT streambed sediment (grain size up to 2.5 inches). The substrate material mix matches the smaller 80% of the existing grain size present in the streambed. The larger materials will be used to stabilize the channel and protect against scour. The site-specific hydraulic assessment identified a need for larger cobble at the top layer for scour protection from larger infrequent flood events, up to the 100-year event. Materials up to 2.5 inches are stable up to a velocity of 3 feet per second (ft/s) to 4 ft/s and materials up to 8 inches are stable up to a velocity of 5 ft/s to 8 ft/s.

The bypass outfall will include temporary erosion-protection measures to prevent scour at the point of discharge, if necessary. The contractor-proposed dewatering system will be reviewed and approved by Mercer Island and WDFW and will comply with NMFS fish screen criteria (NMFS 1997). Even though ESA-listed species are not documented in the NMPS stream, the NME Project will still adhere to the recommended in-water work window for tributaries to Lake Washington.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable once construction activities are completed within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. Pavement and hardscapes (e.g., roadways, curbs, gutters) removed during construction will be replaced or moved. There will also be site restoration activities surrounding the NMPS facility that will replace trees removed during construction (PLAN Volume 1: L101). Riprap that currently serves as substrate for the streambed within the area that is crossed by the pipe will be replaced by a more appropriate streambed material. General site restoration includes a total of 19,672 SF within King County property.

In addition to general site restoration, the NMPS stream buffer will be enhanced. The buffer will be cleared of invasive vegetation and replanted with native vegetation throughout much of the stream length on the property (PLAN Volume 1: L101). Overall, there is a total of 26,592 SF of on-site enhancement available that will provide benefits to the NMPS stream. These enhancement measures will provide improved riparian functions, including shading, pollutant filtration, and organic material recruitment to the stream. The native species proposed for planting will also benefit wildlife that may use the riparian areas surrounding the NMPS facility. Given the predominance of invasive species in the existing understory, as described above, the proposed enhancement actions will improve the habitat functions along the NMPS stream area over existing conditions. The ecological enhancement within the NMPS stream buffer will specifically address the criteria under MICC 19.07.180(E)(1), to improve habitat complexity, connectivity, and other biological functions.

Additional details on the site restoration and enhancement plan are provided in Section 6.

4.2.2 Street ROWs and I-90 Trail

The existing North Mercer Island Interceptor will be replaced using typical open cut-and-cover construction methods in the upland areas from the NMPS to the Mercer Island shoreline near the I-90 East Channel Bridge.

Pipeline will be installed within shallow trenches 15 feet deep or less and backfilled to match the existing grade and surface conditions The alignment where pipe will be installed mainly follows N Mercer Way, the multi-use path adjoining I-90 (i.e., the I-90 Trail), or some combination of the two (refer to Figure 1). The proposed pipeline alignment in the street ROWs and I-90 Trail work area will cross seven piped stream sections (refer to Figure 4). There are perennial and seasonal portions of the piped streams that occur outside of the construction limits. There is one perennial stream buffer that occurs adjacent to the Luther Burbank Park parking lot (discussed in the following section), and a seasonal stream that occurs adjacent to the I-90 Trail, that overlaps with the construction limits. Work within the street ROWs and I-90 Trail work area will prioritize locations that have existing impervious surface area, but will have both temporary and permanent impacts to vegetated areas (see Section 5 below). Finally, there are geologically hazardous areas along the proposed North Mercer Island Interceptor alignment. Work in these areas will not affect the stability of geologically hazardous areas, as described in Section 5.1.2.

Construction activities within this work area will avoid critical areas to the extent practicable. For example, piped streams will be avoided by at least 2 vertical feet and more often over 5 vertical feet. Piped streams will not be removed, relocated, or altered, to preserve the existing conditions of the stream. Buffer habitat for the seasonal stream adjacent to the I-90 Trail will be temporarily affected, but impacts will only include the grasses along the edge of the trail and will not affect trees within the buffer habitat. Other critical areas and shorelands are also affected at Fruitland Landing Park, the 96th Avenue Siphon, and Mercer Island Boat Launch, but those areas are separate from the street ROWs and I-90 Trail work area even though they are part of the North Mercer Island Interceptor construction segment.

Construction Staging and Access

The majority of construction on Mercer Island is associated with transitioning the active North Mercer Island Interceptor from Lake Washington to a new pipe in upland habitat, primarily along the I-90 Trail. This part of the NME Project is a linear segment (10,240 LF) that will occur sequentially along the proposed pipeline alignment. Staging and access will be provided through a series of locations (Table 9, refer to Figure 6). Ultimately, access points along the work area will be determined by the contractor. Clearing and grubbing will occur as necessary for access followed by substantial clearing of vegetation, including trees, during the expansion of the I-90 Trail.

Table 9. Staging and Access along the North Mercer Island Conveyance Pipeline Alignment

Staging and Access	Location	Duration (months)
Luther Burbank Park	Staging will be provided at the Luther Burbank Park parking lot during winter months. No construction activities, other than staging, will occur at this location.	17 months (only during winter months)
Street ROWs	Site to be accessed off existing Mercer Island ROWs: • SE 22nd Street • 78th Avenue SE • SE 24th Street • 81st Avenue SE • N Mercer Way • 90th Place SE • SE 35th Street	17 months
I-90 Trail	Work within the I-90 Trail will be accessed from N Mercer Way via construction access points, as determined by the contractor.	13 months
E Mercer Way and SE 36th Street	Staging will be provided adjacent to the Mercer Island Boat Launch during the duration of construction along the street ROWs and I-90 Trail. No construction activities, other than staging, will occur at this location.	17 months

The area that will be used for the longest duration is the offsite staging located south of I-90 and at the intersection of E Mercer Way and SE 36th Street, also located adjacent to the frontage road leading to the Mercer Island Boat Launch (refer to Figure 6). This area will be used for staging for the entire 17 months, and no other construction activities will occur. This location currently is a grassy field that is not currently used by the public. The Luther Burbank Park parking lot (refer to Figure 6), which is an improved surface, will be needed for a total of 17 months. However, staging will not be provided consecutively because this area will only be used during winter months. There will likely be pruning and removing limbs of trees along the boundary of the parking lot, but no tree removal. In addition, the perennial stream adjacent to the parking lot will be avoided, and only the portion of the buffer that occurs in areas with improved surfaces will be used (refer to Figure 4). Street ROWs and I-90 Trail will be used as the NME Project progressively moves along the alignment. Even though this entire work area will be accessed over the 17-month construction period, individual areas will not be used for that entire length of time. The contractor will require staging areas for laydown, with selection based on open and accessible space for construction equipment to safely load and unload. These short-term staging and access areas will be used for several months at a time.

Site Preparation

Settlement monitoring points, as described above for the NMPS and NMPS Stream work area, will be installed by hand prior to upland construction activities. Groundwater readings will be taken and recorded every 3 months for a total of 17 months, which is the full range of activities for the street ROWs and I-90 Trail work area (refer to Table 8). Groundwater slug tests will be performed in wells to estimate the hydraulic conductivity of the soil.

Groundwater withdrawals will also be necessary at several points along the proposed upland portions of the North Mercer Island Interceptor alignment during the open cut-and-cover construction. Sump pumps and wells may be used at the discretion of the contractor to temporarily dewater these work areas where the excavation depths are within approximately 3 feet below the groundwater table. In limited areas where the depth below the water table exceeds 3 feet, dewatering will most likely be done with well points.

Turbid water will be held in Baker tanks before discharge in accordance with applicable permit requirements. Dewatering discharges will be made to storm drains or the sanitary sewer according to local area permit conditions. No discharges will be made into the groundwater.

Existing utilities (e.g., utility pipe or other buried structure) will be located and marked with paint or flags. This activity is relevant for upland work only. The utility will then be exposed using air excavation with a vactor truck to create a pothole.

Some existing utilities will require relocation during, and in advance of, construction. These utilities will be exposed by hand, vactor truck, or using an excavator, and relocated out of the new infrastructure footprint. New utility service will be installed and connected prior to decommissioning or removing the old utility. Following utility relocation, the trenches will be filled and compacted with a trench compactor. Excavated material may be removed from the site with a dump truck and trailer, as necessary.

Install Maintenance Holes and Gravity Sewer

A total of 32 new maintenance holes will be installed during construction along the proposed North Mercer Island Interceptor alignment (Figure 8). All maintenance holes will be installed in upland areas, most within existing impervious surfaces. Each maintenance hole is less than 4 SF of impervious area, and installation of the maintenance holes will not affect critical areas or shorelands.

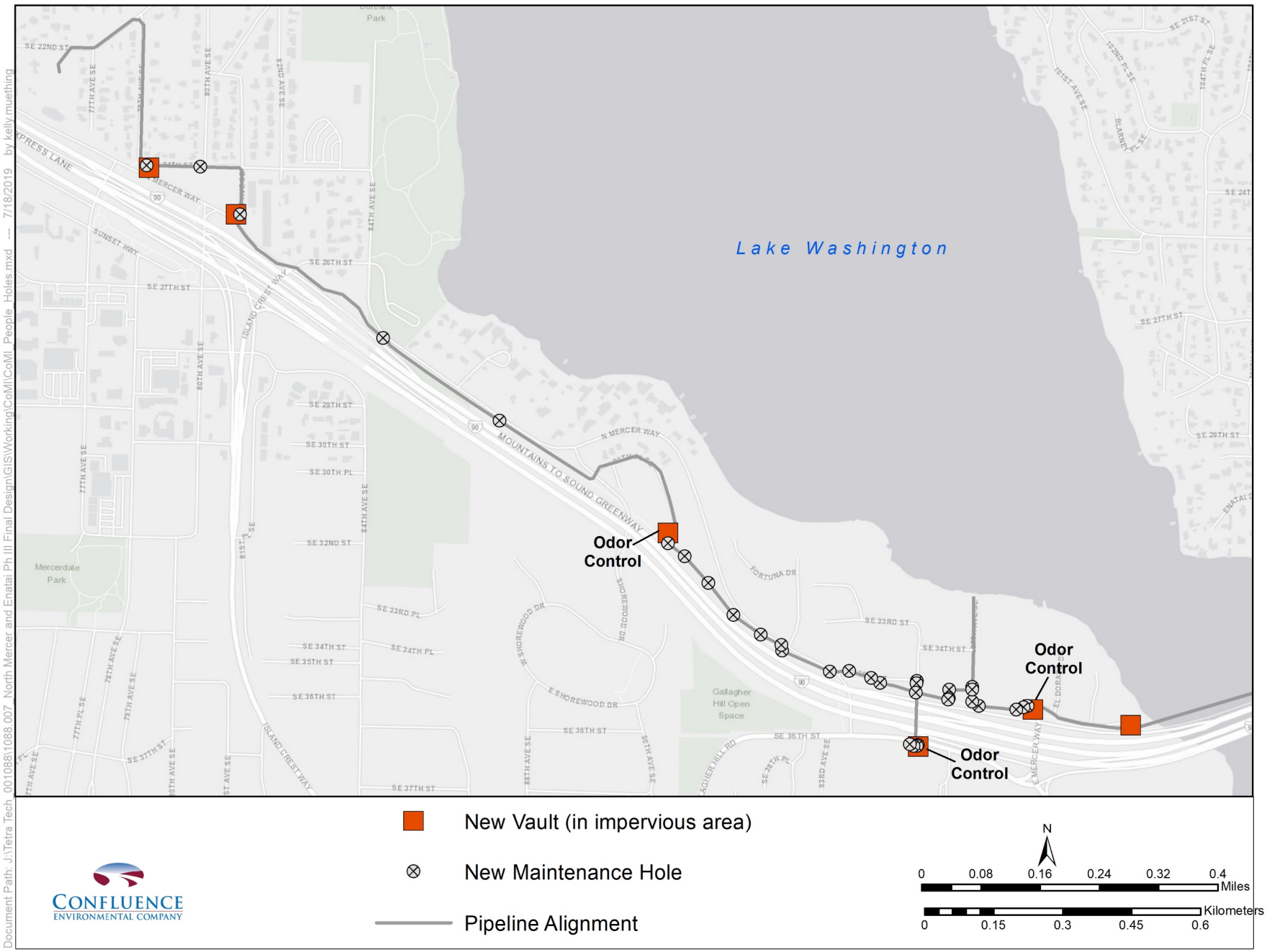


Figure 8 – Location of New Maintenance Holes and Vaults along the North Mercer Island Interceptor Alignment

Four steep slopes occur along the proposed North Mercer Island Interceptor alignment. The first is within a small (170 SF) vegetated area with conifers, adjacent to the I-90 Trail and south of North Mercer Way (see PLAN Volume 2: C213). This area is within the WSDOT ROW. The second steep slope is at the end of the 90th Place SE cul-de-sac (see PLAN Volume 2: C229). The slope at this location is approximately 43%. The gravity sewer pipe will drop down the side of the bank for approximately 35 LF to merge into the I-90 Trail. The third steep slope is between 97th Avenue SE and SE 35th Street where the pipeline will be aligned along a steep embankment in a well-established vegetated area (see PLAN Volume 2: C221). The slope is approximately 50% and a total length of 120 LF. The fourth steep slope is located at the Mercer Island Boat Launch, within both WSDOT and Mercer Island ROWs. The slope extends upland of the OHWM from a failing retaining wall through a section of mixed lawn and roadway (54% slope; see PLAN Volume 2: C232). As noted above, work in these areas will not affect the stability of geologically hazardous areas.

Install Odor Control Vault

A new odor control vault with an above-grade exhaust fan, access hatch, and lift slab will be installed at the force main discharge structure at the 90th Place SE cul-de-sac (Figure 8). A second odor control structure will be installed near the intersection of E Mercer Way and SE 35th Place (Figure 8). Vaults will be constructed below grade. The area used for the vaults will be cleared, excavated, and shored; the unit installed; the air duct connected to the sewer; and the area backfilled and compacted. The odor control vaults will include a carbon scrubber odor control system that will be designed to ensure high level odor prevention and reduce emission levels to maintain existing conditions. The odor control system will withdraw and treat potential odors from the hydraulic structures, including the flow diversion vault and siphon inlet and outlet vaults.

Equipment for the odor control vault that is located above grade includes a fresh air intake, vent stack (more than 6 feet in height), access hatch, lift slab, and electrical service cabinet. The larger odor control components, including foul air ducts, fan, and carbon scrubber are located below grade. The primary equipment used for this work will include a dump truck and trailer, excavator, and trench compactor. Other necessary equipment will be determined by the contractor. The activities associated with the odor control vault will result in new impervious surface area.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable once construction activities are completed within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. Pavement and hardscapes (e.g., roadways, curbs, gutters) removed during construction will be replaced or moved. There will also be site restoration activities along the street ROWs and I-90 Trail to replace vegetation removed during construction, although not all trees removed will be able to be replaced in-kind and onsite (refer to the Tree Management Plan – Appendix A). All work for the North Mercer Island Interceptor, after the NMPS stream crossing, will be located outside of sensitive aquatic habitats. There will be some impacts to watercourse buffers (e.g., adjacent to the I-90 Trail), but this impact will be restored with native species (Planting Mix D) that will provide improvements to the existing conditions. Overall, there is a total of 7,050 SF of improvements within the existing watercourse buffer.

Additional details on the site restoration and enhancement plan are provided in Section 6.

4.2.3 LS-11 (Fruitland Landing Park)

Mercer Island operations has requested upgrades to the existing LS-11. The existing LS-11 is a duplex pump station located in Fruitland Landing Park at the end of 97th Avenue SE. LS-11 will be modified to allow it to meet a greater discharge head (Figure 9).

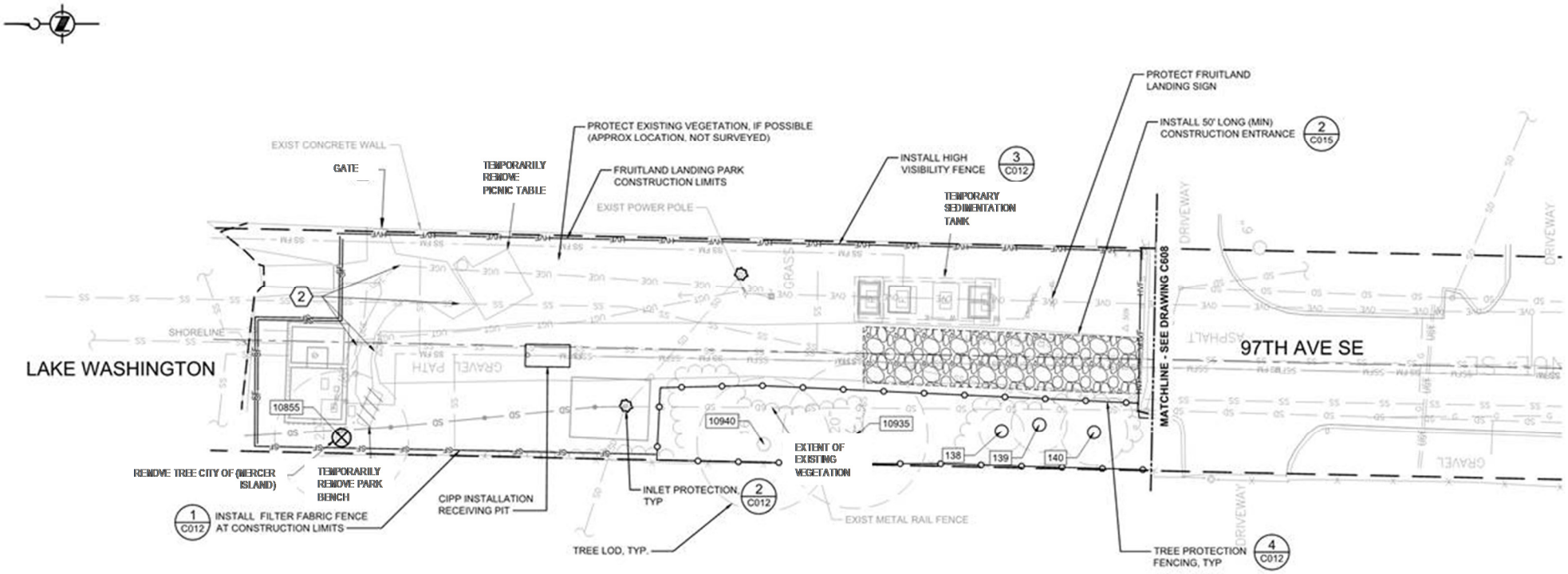


Figure 9 – Proposed Modifications to Lift Station-11

Construction Staging and Access

The staging area for LS-11 will be at the existing Fruitland Landing Park (refer to Figure 6). Staging will be needed for a total of 14 months (March 2021 to May 2022). Clearing or grubbing for these staging areas will be minimal, although some vegetation will be removed, including one tree (common hawthorn; *Crataegus monogyna*). Access to the Fruitland Landing Park work area will be from an existing street ROW at the end of 97th Avenue SE.

Site Preparation

Settlement monitoring points, as described above, will be installed by hand prior to construction activities. Groundwater readings will be taken and recorded every 3 months for a total of 14 months, which is the full range of activities for LS-11 (refer to Table 8). Groundwater slug tests will be performed in wells to estimate the hydraulic conductivity of the soil. If groundwater withdrawals are necessary, they will be done in the same manner as described for the street ROWs and I-90 Trail work area. Similarly, existing utilities will be located, marked, exposed, and relocated (as necessary).

Upgrade LS-11

Upgrades at LS-11 are requested by Mercer Island operations to allow for greater discharge head that will accompany growth on Mercer Island. LS-11 upgrades will consist of motor upsizing, piping replacement within the dry well, electrical improvements, and the force main extension. The NME Project is working with Mercer Island because many of the requests made by Mercer Island operations will increase the impervious surface area of LS-11. The existing LS-11 is a nonconforming structure because the conditions exceed the maximum impervious area identified in the SMP for lot coverage, even though the park is not a full lot (Table 10). Fruitland Landing Park is a street-end park that is narrow and has limited space to reduce the amount of impervious area due to the overall size. The proposed improvements requested by Mercer Island to LS-11 will result in an increase of 10% between 0 and 25 feet of OHWM and 32% between 25 and 50 feet of OHWM.

Table 10. Impervious Surface Area within Fruitland Landing Park

	Within 25' of OHWM	Within 25-50' of OHWM	Total
Existing Impervious Area (SF)	261	450	711
Proposed Impervious Area (SF)	337	771	1108
Added Impervious Area (SF)	76	321	397
Total Area (included vegetated area) (SF)	730	1000	1730
% Total Impervious Area	**46%**	**77%**	**64%**
% Change Total Impervious Area	**+10%**	**+32%**	**+23%**

The power conduit and cable from the local service pole to the dry well will need to be replaced, which will require minor trenching above the OHWM of Lake Washington (a distance of <25 LF). The contractor will temporarily place gravel to stabilize the staging areas during construction, which will be removed after construction.

The existing force main will be extended by approximately 280 LF as a 10-inch-diameter pipe southward from the intersection of 97th Avenue SE and SE 34th Street to the new interceptor down 97th Avenue SE toward the I-90 Trail. All work for the force main extension will occur within the street ROW. There is an existing piped stream

in the Fruitland Landing Park work area (refer to Figure 4), which will be moved by Mercer Island prior to the NME Project construction activities. This piped stream will be moved out of the construction limits. The final location of this piped stream will affect the location of the associated 25-foot buffer, per the pre-2019 CAO.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. Restoration also includes replacing the curb, gutter, and sidewalk removed during connection of the new siphon to the interceptor. There is a small section (620 SF) that will include adding native vegetation to screen the additions within the park from neighboring residents. Other changes in this area will include moving overhead power lines below ground, which will enhance park scenery and habitat function.

Additional details on the site restoration and enhancement plan are provided in Section 6.

4.2.4 96th Avenue Siphon

The NME Project proposes to construct a new sewer siphon to accept flows from eastern Mercer Island, identified as the 96th Avenue Siphon. The location of the 96th Avenue Siphon is in a residential area that will receive limited upgrades as part of the proposed NME Project. The proposed siphon will be located 320 feet south of the proposed North Mercer Island Interceptor alignment, which is just south of I-90 (refer to Figure 6).

Construction Staging and Access

The staging area for the 96th Avenue Siphon will be in the areas surrounding the existing maintenance hole to the south of I-90 (refer to Figure 6). Staging will be needed for a total of 6 months (May 2022 to October 2022). Clearing or grubbing for the staging area will be minimal, as the locations are within improved areas. Minor amounts of clearing alongside the access road, and at existing maintenance holes and vaults, may be necessary. No trees will be removed for staging or access (Tree Solutions 2019). Access for the 96th Avenue Siphon will likely occur via SE 36th Street.

Site Preparation

Settlement monitoring points, as described above, will be installed by hand prior to construction activities. Groundwater readings will be taken and recorded every 3 months for a total of 6 months, which is the full range of activities for the 96th Avenue Siphon (refer to Table 8). Groundwater slug tests will be performed in wells to estimate the hydraulic conductivity of the soil. If groundwater withdrawals are necessary, they will be done in the same manner as described for the street ROWs and I-90 Trail work area. Similarly, existing utilities will be located, marked, exposed, and relocated (as necessary).

Install Bypass Pipe and Remove Existing Siphon

Upgrades at the 96th Avenue Siphon are required for the new pipeline to run through the North Mercer Island upland. These upgrades will reroute flows from eastern Mercer Island to flow directly into the proposed North Mercer Island Interceptor rather than flowing through King County's existing East Trunk in Lake Washington, which will be decommissioned. This accomplishes 2 tasks: (1) flows are rerouted through the upland, rather than through Lake Washington; and (2) substantial upgrades to LS-11 which will otherwise be needed are avoided on the shoreline of Lake Washington. Both tasks avoid potential impacts within sensitive habitat.

A temporary bypass will be installed during construction activities for the 96th Avenue Siphon. This bypass will run west along SE 36th Street and cross under SE 36th Street, adjacent to the I-90 retaining wall along N Mercer Way over I-90, and connect to a discharge maintenance hole on SE 35th Street.

The existing 16-inch pipe, bends, supports, and sand will be removed from the existing steel casing by pushing from one end of the pipe to the other in sections small enough to fit through the maintenance hole. This work will be accomplished with a boring sled, a dump truck, and trailer. The steel casing will then be inspected and cleaned.

Install New Siphon

The 96th Avenue Siphon will be installed in the existing casing that was cleaned during removal of the existing pipe. All installation work will occur in the maintenance holes in small sections. Carrier pipes and isolation spacers will be installed using a boring sled (skids). The annular space will be filled with backfill material. Concrete plugs will be installed at the casing entrance into the maintenance hole wall at the upstream and downstream ends. Drop pipes will be connected at the inlet and outlet structure, and clamps and supports applied, as necessary.

To connect the new siphon to the proposed North Mercer Island Inceptor, a trench will be excavated and shored for installation and sewer connection. A containment structure will be installed, and then the area will be backfilled and compacted. The primary equipment for the siphon installation will include a dump truck and trailer, excavator, and trench compactor.

Install Odor Control Vault

A new passive odor control system will be installed adjacent to the siphon inlet. This system will include a vault housing a carbon canister and smaller vault housing a below-grade vent pipe. The activities associated with the odor control vault will not result in new impervious surface area.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable once construction activities are completed within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. Restoration also includes replacing the curb, gutter, and sidewalk removed during connection of the new siphon to the interceptor. No additional ecological enhancements are proposed in this work area beyond general site restoration.

4.2.5 Mercer Island Boat Launch

The NME Project proposes to install pipe to connect the upland portions of the North Mercer Island Interceptor to the in-water portions of the East Channel Siphon. Installation of this pipe will occur at the northern end of the Mercer Island Boat Launch, which is a waterfront park featuring lawn, parking area, and a boat launch ramp to Lake Washington. The lawn area is separated from the beach by a low (approximately 4-foot) riprap-armored bulkhead that is failing in several locations. The lake substrate along this shoreline area is dominated by cobble and gravel, with areas of fine sediment being deposited into the nearshore from the failing bulkhead. The boat launch is located beneath the I-90 East Channel Bridge. There is a small dock associated with the boat launch, which includes moorage space for the Mercer Island Police Department and the Muckleshoot Indian Tribe.

Construction Staging and Access

Construction staging will encompass the entire upper parking lot and an uphill portion of the lower parking lot located under the I-90 East Channel Bridge (refer to Figure 6). Staging will be needed for a total of 24 months (June 2021 to May 2023). Access will utilize the existing frontage road, which will temporarily block a portion of road coming into the Mercer Island Boat Launch area during construction activities. Some clearing or grubbing activities will be necessary for construction staging and access at the boat launch, but the area is mostly improved and will not require substantial amount of clearing.

Site Preparation

Settlement monitoring points, as described above, will be installed by hand prior to upland construction activities. Groundwater readings will be taken and recorded every 3 months for a total of 18 months, which is the full range of activities at the Mercer Island Boat Launch (refer to Table 8). Groundwater slug tests will be performed in wells to estimate the hydraulic conductivity of the soil. If groundwater withdrawals are necessary, they will be done in the same manner as described for the street ROWs and I-90 Trail work area. Similarly, existing utilities will be located, marked, exposed, and relocated (as necessary).

Install Operations and Maintenance Access Vault

An access vault for operations and maintenance will be installed on the grassy hillside approximately 150 feet upland of the East Channel of Lake Washington and adjacent to the existing frontage road (labeled "New O&M Structure" on Figure 10). The access vault will be cast-in-place and approximately 10 feet by 16 feet (160 SF). The vault area will be excavated and shored, a clay dam (a bentonite water barrier that swells upon contact with water from a pumper truck) will be installed on the lake side of the excavation, and the excavation will be dewatered using WSDOT-approved methods (WSDOT 2014). The vault structure will then be installed and utility connections made, prior to backfilling and compaction. Equipment will include a dump truck and trailer, excavator, and soil compactor.

Install Rock Catcher

A rock catcher will be installed in the pipeline to prohibit large solids from entering the East Channel Siphon. The area used for the rock catcher will be cleared, excavated, and shored; the unit will be installed; the air duct will be connected to the sewer; and the area will be backfilled and compacted. The equipment used for this work will primarily include a dump truck and trailer, excavator, and trench compactor.

Install Pipe Above the OHWM

The upland work will require installation of a shoring system to isolate the work area from the surrounding environment that will transition into the work below the OHWM. This system will be assembled in the upland (above OHWM) and will serve as a transition. Excavations to OHWM will occur in the upland layback area. A turbidity curtain (below OHWM) and silt fences (above OHWM) will be used for secondary containment of turbidity or erosion from upland, thereby minimizing turbidity effects in Lake Washington. The isolated area will be dewatered using a contractor-proposed system that will be reviewed and approved by Mercer Island. A trench will be created, the pipe will be installed in the trench, and the trench will be backfilled and compacted. Installation of the pipe will require taking out a portion of the existing bulkhead (65 LF out of 128 LF). Replacement of this portion of the bulkhead will include soft shore stabilization design elements (described below under site restoration and cleanup). The turbidity curtain will remain in place while work is occurring in the isolated nearshore area to prevent a turbidity plume in Lake Washington. After pipe installation, and after turbidity has subsided below regulatory levels, the turbidity curtain will be removed.

Install Pipe Below the OHWM

New pipe will be installed below the OHWM using typical open cut-and-cover construction methods with special considerations for in-water work. The isolation system used for the upland habitat (e.g., slide rail) will transition into the water in order to install the new pipe. In addition, there is an existing bulkhead that is protecting the steep slope (54% slope) associated with the Mercer Island Boat Launch shoreline, which will be removed during construction.

Work that must occur in-water will be completed during one approved in-water work window, in an area isolated from the rest of Lake Washington. This will be accomplished by installing the shoring system and turbidity curtain (described above). Fish removal from the isolated area may be required.

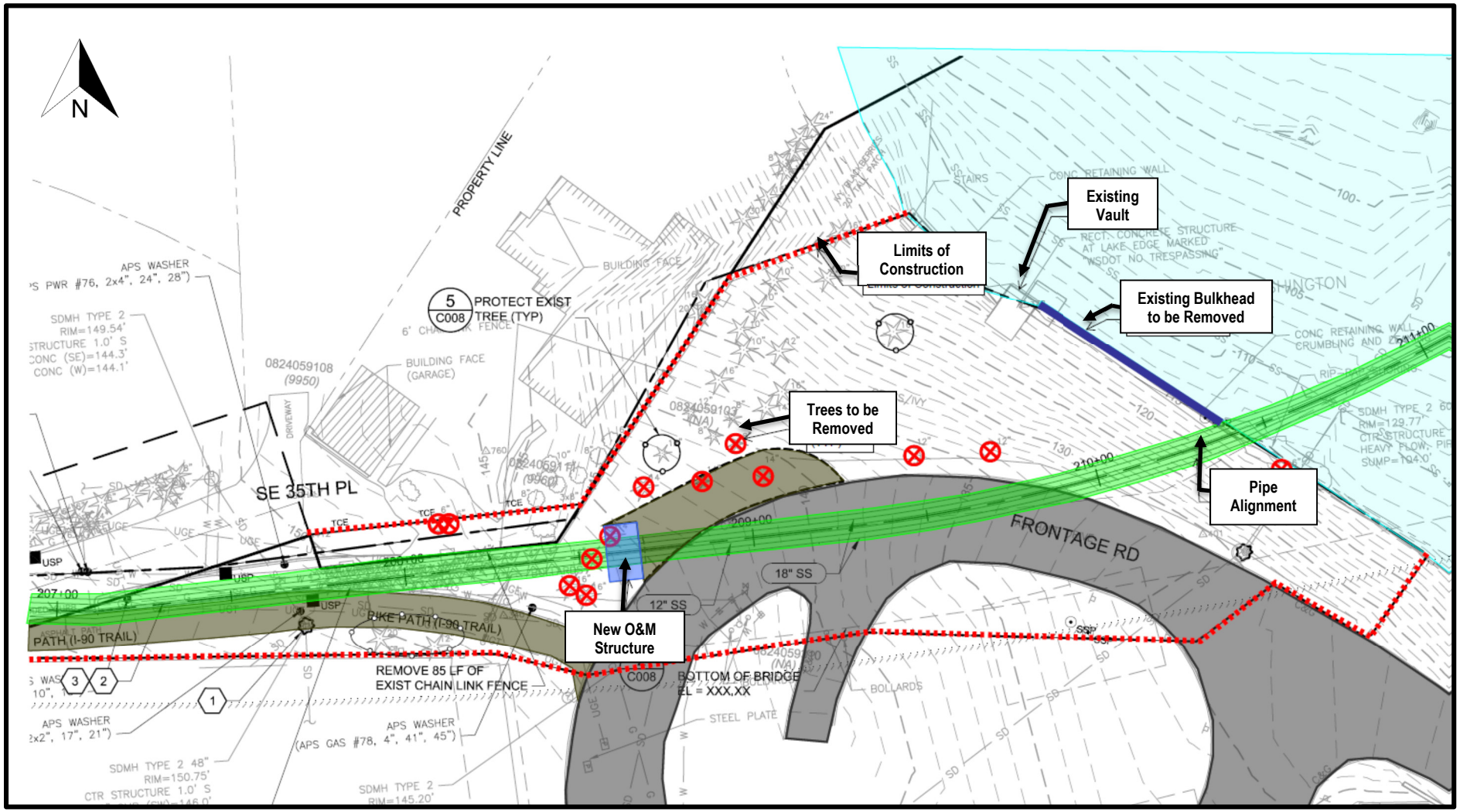


Figure 10 – Proposed Construction Activities at the Mercer Island Boat Launch

The existing concrete bulkhead will be removed in the vicinity of the pipeline construction area, and a temporary barrier will be constructed to provide isolation of the upland construction area from Lake Washington. Construction below the isolation system will occur via a floating derrick with a clamshell dredge (i.e., "in the wet"). Anchor blocks will be installed and used to secure the pipe in the trench for the East Channel Siphon and will be constructed of concrete that is precast off-site. The pipe will then be installed, and the trench will be backfilled. After pipe installation, and after turbidity has subsided below regulatory levels, the turbidity curtain will be removed.

In-Water Dredge and Fill

The clean dredged materials will be stored on barges and transported to Elliott Bay for open-water disposal, pursuant to the DNR Site Use Authorization. Figure 11 provides the location of the Elliott Bay open-water disposal site in relation to the NME Project area. New clean fill material may be used as backfill, as necessary.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable once construction activities are completed within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. Pavement and hardscapes (e.g., roadways, curbs, gutters) removed during construction will be replaced or moved. General site restoration includes a total of 44,390 SF within WSDOT ROW and Mercer Island parks property.

In addition to general site restoration for the Mercer Island Boat Launch, the NME Project proposes to replace a large portion of the existing shoreline stabilization structure at Mercer Island Boat Launch, which is currently failing. The portion of the existing structure that will be replaced will use soft shore stabilization design elements, including anchor logs to prevent erosion, gravel supplementation in the nearshore below the OHWM, and upland landscape restoration and planting. The proposed design will increase habitat complexity along the shoreline. Anchor logs will be placed parallel to the shoreline, reinforced soil lifts with live stakes will be used to provide overhanging vegetation and additional stabilization, and placement of beach nourishment will provide areas for benthic invertebrates to colonize. The primary design criteria of the shoreline treatment was to balance shoreline stabilization with improving habitat complexity for fish and invertebrates. The additional ecological enhancements along the Mercer Island Boat Launch shoreline are consistent with opportunities for restoration identified as Project Number LW-S3-2, LW-S3-3, and LW-S3-4 in the WRIA 8 Chinook Salmon Conservation Plan (WRIA 8 Salmon Recovery Council 2017). In addition, the design meets or exceeds the criteria for shoreline stabilization replacement, as discussed under MICC 19.13.050(B).

The proposed shoreline enhancement area is approximately 6,190 SF of new plantings and 1,920 SF of in-water improvements. The goal is to replace the existing shoreline armoring with soft shore design elements including large wood, gravels, and overhanging vegetation. Restoration also includes replacing the curb, gutter, and a portion of the road and sidewalk removed during construction.

Additional details on the site restoration and enhancement plan are provided in Section 6.

4.2.6 East Channel

Within the East Channel Siphon construction segment, the NME Project proposes to construct a new in-water siphon via in-water, open cut-and-cover construction. The East Channel Siphon is the portion of the pipeline in Lake Washington below the OHWM between the Mercer Island and Bellevue shorelines, just north of the I-90 East Channel Bridge. The pipeline will parallel the bridge on the northern side. Figure 12 depicts the pipeline alignment and dredge limits.

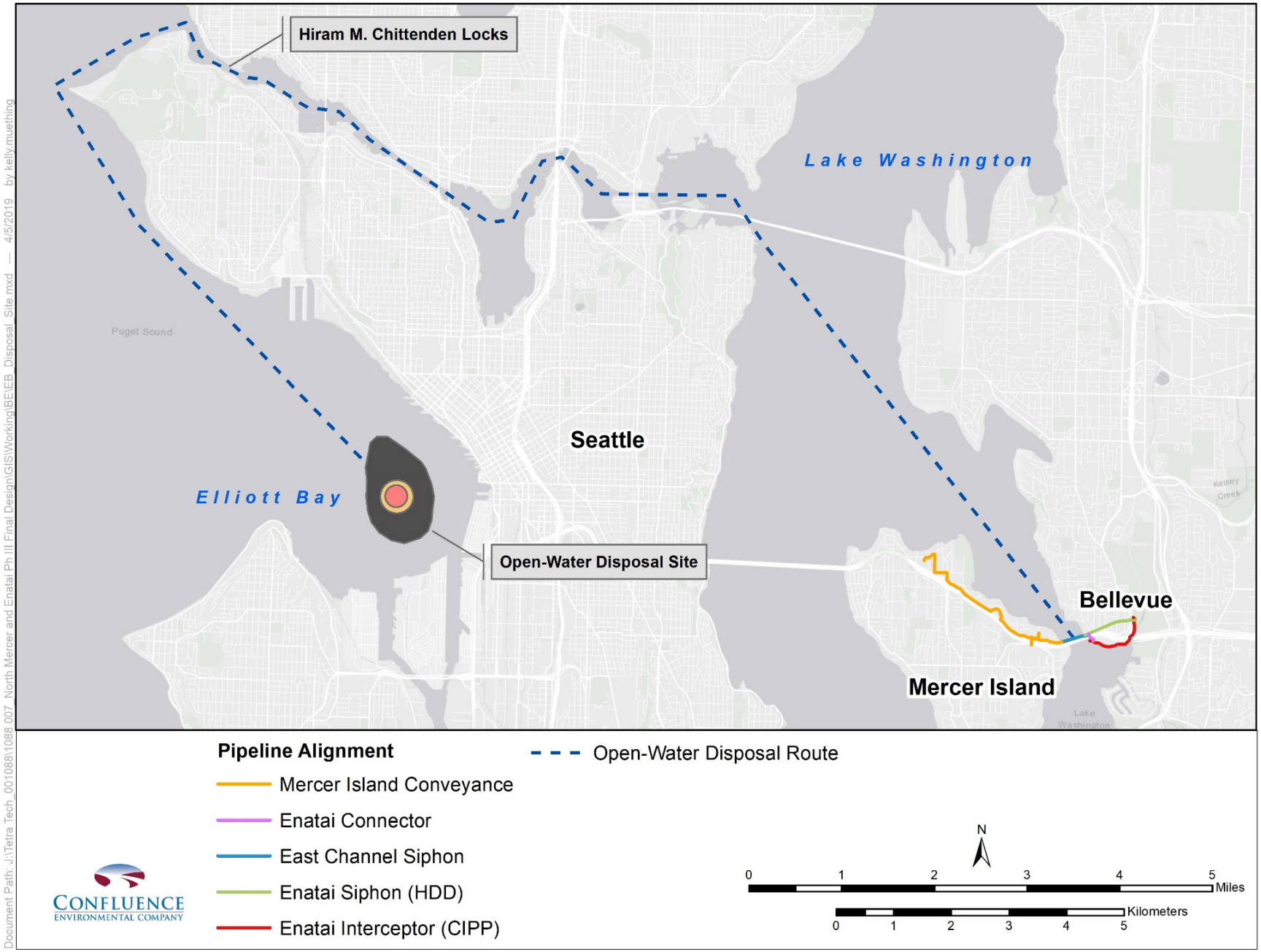


Figure 11 – Open Water Disposal Site in Elliott Bay

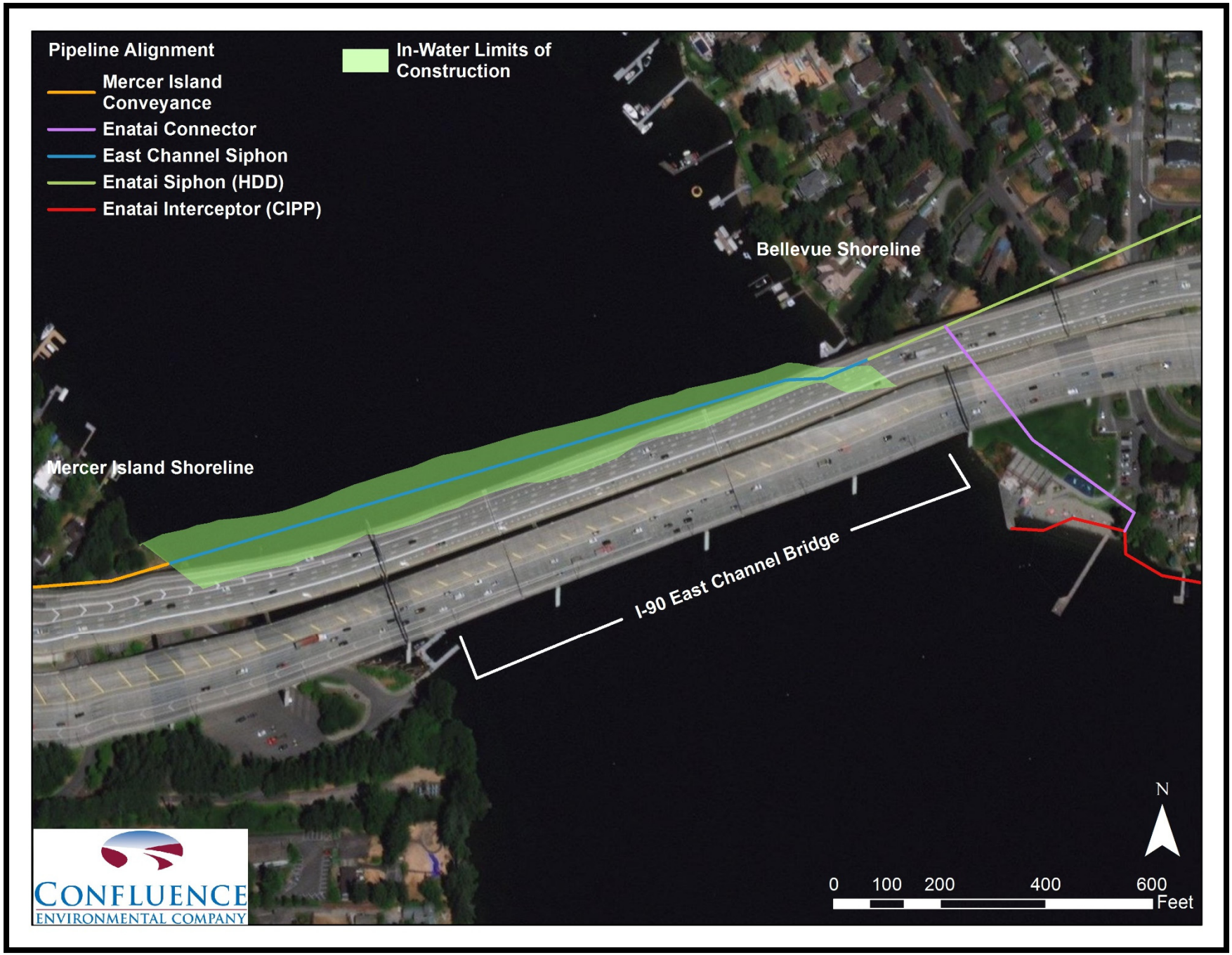


Figure 12 – East Channel Crossing and Proposed Dredging Limits

Water depths in the East Channel segment of Lake Washington range from 0 feet to approximately 60 feet. Substrate in the shallower depths is a mix of gravel, sand, muck (mud), and cobble, with occasional boulders. At depths below 10 feet, sand and muck dominate the substrate.

Construction Staging and Access

Primary construction staging will be located on barges. Additional upland staging or access may be used for the East Channel Siphon at the Mercer Island Boat Launch, as described above. Because the East Channel of Lake Washington is an active navigation channel, a navigable passage through the channel will be maintained during construction activities. This will be done by maintaining at least one navigable passage channel at a time. The duration of construction within the East Channel will be 5 months (July 2022 to November 2022).

Locate Existing Utilities and Support in Place

Existing utilities will be located by divers and excavated by hand. A temporary support for fiber-optic lines and sewer lake lines will be installed. Utilities will likely be supported and protected with a webbed truss that will span the width of the trench. The area under the existing utilities will be excavated by jetting out the sediment within the area isolated by a turbidity curtain. Equipment for locating and protecting existing utilities will include a derrick and trash pump with jetter hose. Other necessary equipment will be determined by the contractor.

Install In-Water Pipe

New pipe will be installed in the East Channel of Lake Washington using open cut-and-cover construction methods (refer to Figure 12). The trench will be excavated in a linear fashion with a clamshell bucket, but the trench will not be shored. The excavated trench is expected to be up to 50 feet wide by 10 feet deep, to accommodate required width for work area isolation and depth for pipe installation. The pipe will be installed in segments and attached to precast anchor blocks using a controlled sink from the lake surface into the trench.

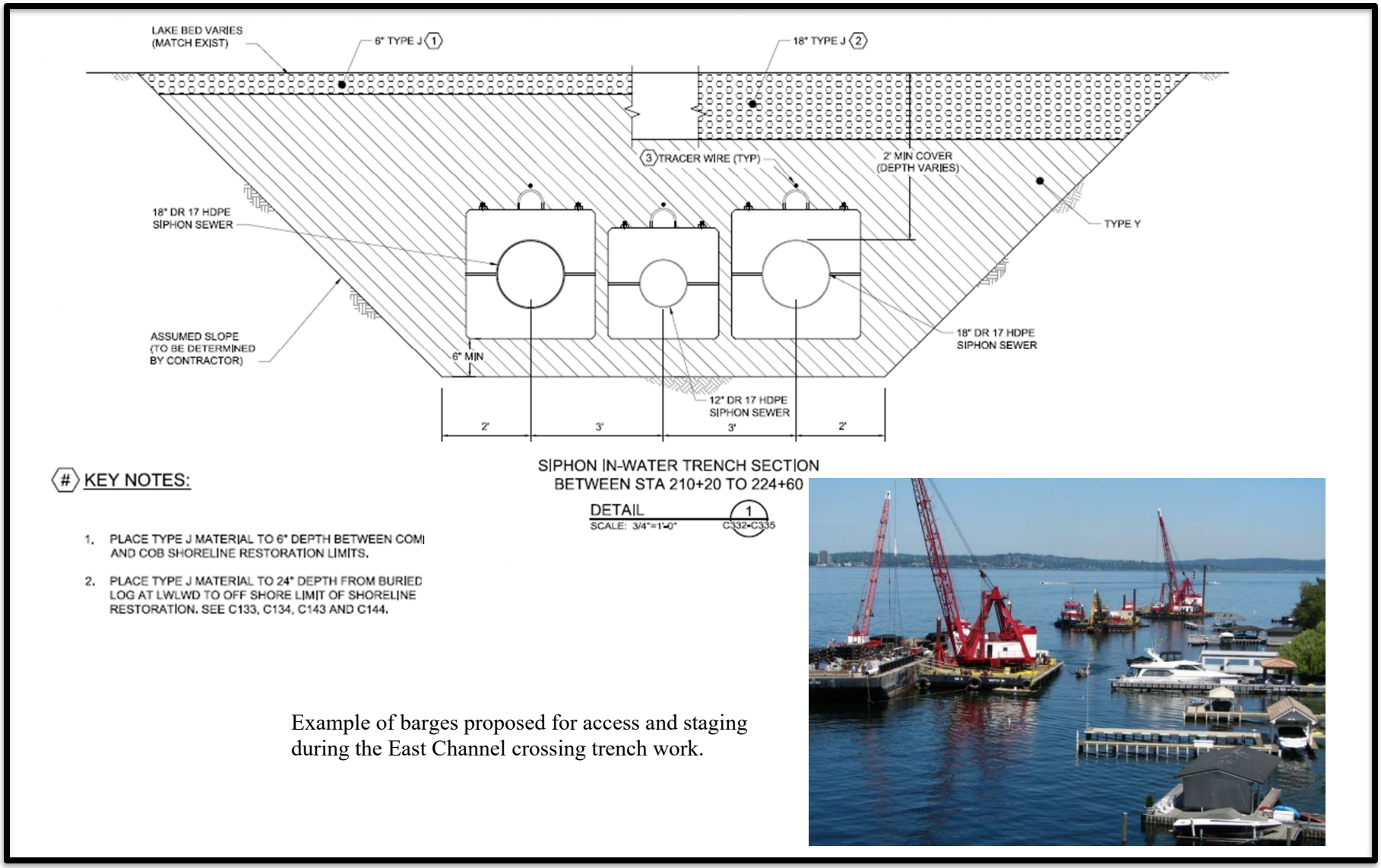
The trench will be backfilled with washed gravel, and the pipe and anchor blocks will be covered with a depth between 1 foot and 3 feet (Figure 13). The equipment used for the pipe installation will include a derrick, crane with clamshell bucket, and trash pump with jetter hose. Other necessary equipment will be determined by the contractor. A portion of the substrate materials excavated from the East Channel will be disposed of off-site. These materials will be transported by barge to Elliott Bay for open-water disposal (refer to Figure 11).

A turbidity curtain will be used to minimize turbidity effects in Lake Washington. The turbidity curtain will remain in place while work is occurring in the East Channel to prevent excessive turbidity releases into Lake Washington. After pipe installation, and after turbidity has subsided below regulatory levels (refer to WAC 173-201A-200 (1)(e) Table 200), the turbidity curtain will be removed.

The timing for the work will be during agreed timeframes based on discussions with the Corps and WDFW.

Site Restoration and Cleanup

All construction equipment will be removed as soon as practicable once construction activities are completed within the limits of construction. Temporarily affected areas will be restored in-kind to baseline conditions. The lakebed within the East Channel of Lake Washington will be restored to better than baseline conditions, and a WDFW-approved gravel substrate deemed to be beneficial for fish will be added to enhance the existing bottom substrate.



Example of barges proposed for access and staging during the East Channel crossing trench work.

Figure 13 – In-Water Trench Cross Section for the East Channel Crossing

4.3 BEST MANAGEMENT PRACTICES

Avoidance of NME Project impacts are provided through design and construction methods proposed. Minimization measures include BMPs that will be used during all construction activities to avoid or minimize potential environmental impacts. Many of these BMPs are standards that will apply universally to many NME Project construction activities, including upland staging areas. Certain BMPs are also used during operations and maintenance, which are also discussed in this section.

4.3.1 Avoidance Measures

The following construction methods have been selected to avoid unnecessary environmental impacts:

- Constructing a new pipeline in upland habitat and decommissioning a large portion of the degraded existing pipeline currently located in Lake Washington.
- Crossing the East Channel of Lake Washington at its narrowest point to install the new East Channel Siphon, which will replace the existing pipe that is located farther to the south at a wider crossing of the channel.
- Using shoring systems that avoid driving and removing sheet piling (e.g., slide rail or trench box system) for the shoreline transition work to and from the East Channel crossing for the East Channel Siphon work.

4.3.2 Erosion Control Measures

The following BMPs will be used during construction to reduce or control erosion:

- A Temporary Erosion and Sediment Control (TESC) Plan and a Source Control Plan will be developed and implemented for all clearing, vegetation removal, grading, ditching, filling, soil compaction, or excavation. The BMPs in the plans will be used to control sediments from all vegetation removal or ground disturbing activities.
- The contractor will designate at least 1 employee as the erosion and spill control (ESC) lead. The ESC lead will be responsible for the installation and monitoring of erosion control measures and maintaining spill containment and control equipment. The ESC lead will also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements.
- All temporary and permanent erosion and sedimentation control measures will be inspected, maintained, and repaired on a regular basis to assure continued performance of their intended function. Silt fences will be inspected immediately after substantial rainfall, and at least daily during prolonged rainfall. Sediment will be removed as it collects behind the silt fences and prior to their final removal. Regular street cleaning will occur where necessary to control mud and dust, and minimization measures will be taken to minimize tracking of sediment onto public roadways by construction vehicles.
- Erosion control blankets will be installed on steep slopes that are susceptible to erosion and where ground-disturbing activities have occurred. This will prevent erosion and assist with establishment of native vegetation.
- All exposed soils will be stabilized during the first available period, and no soils will remain without stabilization for more than 2 days from October 1 to April 30, and for more than 7 days from May 1 to September 30.
- Disturbed areas will be returned to existing or improved conditions (e.g., replanting or repaving) as soon as practical after construction is completed.
- Should any BMPs not function as intended, the contractor will take additional action to minimize erosion, maintain water quality, and achieve the intended environmental performance.

4.3.3 Air Quality Control Measures

The following BMPs will be used during construction to reduce or control air quality:

- BMPs will be implemented for the proper use, storage, and disposal of equipment and materials within the construction limits. These BMPs will minimize or eliminate the discharge of potential pollutants that may contribute to exceeding applicable air quality standards.
- Structures and pipelines will be hydraulically designed to reduce potential emissions during operation, particularly by reducing turbulence in wastewater conveyance segments, thus reducing the release of dissolved hydrogen sulfide (the primary source of odors) at the force main discharge and siphon structures.

Operational and maintenance practices that will be implemented to control odor and emissions include the following:

- Require regular maintenance of equipment to minimize emissions.
- Use electrically powered equipment where practical.
- Avoid prolonged idling of vehicles and equipment.
- Operate pumps daily at a high capacity to produce scouring velocities in the pump station force mains.
- Use fresh water to scour and flush the force mains.
- Ensure force main check valves are leak tight.
- Install pigging (i.e., pipeline cleaning) station in the force mains.

Odor control systems will be either upgraded or added to NMPS and along the proposed North Mercer Island Interceptor alignment to avoid and minimize visual, noise, and air impacts to the community that will have an above-grade odor control stack. The above-grade portion will be located above the nearest receptacle (more than 6 feet in height). Carbon scrubber odor control systems will be designed to ensure high level odor prevention and ensure emission levels are held below the existing conditions. The carbon media proposed to be used in these systems is a highly reliable odor control technology with minimal risk and is effective for removal of the hydrogen sulfide gases.

4.3.4 Water Quality Control Measures

The following BMPs will be implemented to reduce or control water quality impacts:

- Turbidity curtains will be used for all in-water work to confine the impact to the local area and exclude fish from the work area as outlined below. Turbidity curtain removal will only occur after water quality sampling shows that water quality has returned to allowable limits according to the WAC 173-201A-200 (1)(e) Table 200.
- Turbidity monitoring will occur during dredging and filling of the pipeline alignment zone to ensure that water quality standards are met.
- A Sampling and Analysis Plan (SAP) to test sediment was prepared, executed, and submitted to King County in July 2017. The sediments met all standards to be approved for open water disposal at authorized open water disposal locations. The SAP identifies contingency measures for the inadvertent discovery of contaminated sediments.
- Seasonal restrictions (i.e., in-water work windows) will be applied to the project to avoid or minimize potential impacts on fish species, following approval from the regulatory agencies.

4.3.5 Surface, Ground, and Runoff Water, and Drainage Pattern Control Measures

The following BMPs, in addition to what is identified above, will be implemented to reduce or control surface, ground, and runoff water, and drainage impacts:

- Store fuels and other potential contaminants in secured containment areas.
- Contain equipment, materials, and wash water associated with construction.
- Conduct regular inspections, maintenance, and repairs of fuel hoses, hydraulically operated equipment, lubrication equipment, and chemical/petroleum storage containers.
- Regularly maintain spill containment and cleanup material at construction sites.
- Establish a communication protocol for handling spills (e.g., ESC lead).
- Refuel construction equipment and vehicles away from surface waters whenever practicable.
- If warranted, place an impervious material over concrete or asphalt after pouring to avoid direct contact with stormwater as the pavement cures.
- Do not dump washout from concrete trucks into storm drains or onto soil or pavement that carries stormwater runoff.

In addition to the above BMPs, the contractor will be responsible for preparing and implementing the Construction Stormwater Pollution Prevention Plan according to the criteria established by Ecology through the Clean Water Act Section 401 permitting process.

4.3.6 Landscaping, Use of Native Plants, or Other Measures to Preserve or Enhance Vegetation

King County WTD is working with Mercer Island and WSDOT on tree replacements and other ecological enhancements along the pipeline alignment. All temporarily disturbed vegetation areas will be graded to pre-NME Project contours and replanted with native vegetation suitable for site conditions. Permanent impacts will be mitigated per the applicable local codes and WSDOT requirements.

Several locations are proposed for ecological enhancements that go beyond standard site restoration following construction activities. The enhancements will use native plants to off-set potential NME Project impacts, and preserve, restore, or enhance existing vegetation on-site. Please refer to the additional ecological enhancement proposed for the temporary reduction in habitat functions and values along the NME Project pipeline alignment, and is described in Section 6. Overall, there will be more than a 1:1 ratio of site restoration activities within the limits of construction that include planting native vegetation, including trees, and removing non-native or invasive plant species intended to improve ecological conditions.

Construction activities will follow vegetation and tree protection BMPs including:

- Minimize clearing to the extent necessary to complete the project.
- Minimize disturbance to riparian vegetation by straddling the vegetation with heavy equipment (or by pruning branches without damaging the roots) to allow for the operation of heavy equipment.
- Avoid disturbance to riparian vegetation outside of the work area.
- Mark the extent of clearing before construction begins.
- Install and maintain tree protection fencing to protect the critical root zone of all trees to be retained.
- Replant vegetated areas as soon as practicable after construction activities are complete.
- Establish a tree protection zone (TPZ) or recommended limit of disturbance (RLOD) identified in the *Arborist Report* (Tree Solutions 2019) for each tree, using a distance from each tree based on a direct correlation to tree diameter. This distance is calculated by multiplying the trunk diameter by a TPZ factor.

- Reduce the RLODs based on site conditions, proposed work, and tree protection measures that are implemented. As necessary, the RLOD for individual trees may be reduced if determined that the type of work will not be detrimental to the long-term survivability of the tree.
- Refer to additional tree protection specifications in the *Arborist Report* (Tree Solutions 2019).
- Remove noxious species in compliance with King County's Noxious Weed Program's BMPs and replant areas of removal with native species.

4.3.7 Measures to Reduce or Control Noise Impacts

BMPs that will be used to reduce noise generated from equipment used during construction activities include:

- The contractor will equip construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise by 5 to 10 dBA.
- The contractor will turn off construction equipment during prolonged periods of non-use to eliminate extraneous noise.
- The contractor will maintain all equipment and train equipment operators in good practices to reduce noise levels.
- Temporary diesel generators and temporary pumping equipment to be operated at night will be required to be fitted with sound attenuation equipment.

The only noise generated during typical operations will include the fans for the odor control at NMPS and along the proposed North Mercer Island Interceptor alignment. Sound enclosures will be provided for the fan in the odor control vault and silencers on the exhaust stack if the acoustical analysis identifies a need.

4.3.8 Measures to Reduce or Control Environmental Health Hazards

During construction, BMPs will be implemented to minimize the potential for spills or mechanical failures to occur, and to minimize the potential for adverse effects from fuels, fluids, and lubricants to workers, nearby residents, or the environment. During construction, it will be the responsibility of the contractor to adhere to all applicable regulations.

Applicable project BMPs identified above will also reduce or control environmental health hazards. Additionally, the NME Project will comply with following regulations by Mercer Island: fire code, wastewater treatment codes, and construction spill protocols.

For dredged materials, prior to their disposal, sediments excavated from the lakebed will be tested for the presence of contaminants. If contaminated sediments are encountered, containment BMPs will be implemented to avoid or minimize the introduction of contaminated sediments to the water column.

4.4 OPERATIONS AND MAINTENANCE

Operations and maintenance will continue at NMPS similar to the existing operations and maintenance. Additional quarterly maintenance trips will occur to maintain the new odor control vaults at the 90th Place SE cul-de-sac, intersection of E Mercer Way and SE 35th Place, and the 96th Avenue Siphon. These maintenance events are expected to occur via surface streets and existing access roads with light- to medium-duty vehicles. Equipment used for odor control system maintenance includes vactor trucks, gantry crane mounted utilities and trucks, and utility vehicles.

5. IMPACTS ANALYSIS

This section focuses on potential direct, indirect, and cumulative impacts of the NME Project construction activities to critical areas and shorelands. According to MICC 19.07.170(B)(1)(d), a CAS should include an "evaluation of direct and indirect potential impacts on habitat by the project, including potential impacts to water quality." Direct impacts include all immediate impacts (adverse and beneficial) from project-related actions, and disturbances that are directly related to NME Project components. Indirect impacts include those impacts that are caused by, or will result from, the proposed action and are later in time but still reasonably certain to occur.

Impacts were analyzed using the results of site inspections, the views of subject matter experts and regulatory agency staff on the species and habitat at issue, information from literature reviews, professional knowledge and experience, reviews of engineering drawings and technical specifications, and discussions with NME Project engineers. The analysis of impacts includes the use of the best scientific and commercial data available pursuant to MICC 19.07.110(B).

5.1 DIRECT IMPACTS

The discussion of direct impacts within this section is paired with the proposed site restoration and ecological enhancement plan to provide an overall understanding of the final NME Project impacts, although more details on the site restoration and ecological enhancement plan are provided in Section 6. Presented below are main topics for the direct impacts discussion, including:

- Watercourses and Watercourse Buffers
- Geologically Hazardous Areas
- Wildlife Habitat Conservation Areas
- Shorelands
- Outside of Critical Areas and Shorelands

5.1.1 Watercourses and Buffers

The only potentially fish-bearing (Type F) watercourse that will be directly impacted by the NME Project is the NMPS stream located on King County utility parcels. The buffer associated with the NMPS stream, located both within the King County parcels and private property, will also be affected. As described in Section 4.2.1, the proposed pipe will be constructed using typical open cut-and-cover methods, which include crossing the stream perpendicular to the stream banks. Construction activities require establishment of a dry work zone. Seasonal restrictions (i.e., in-water work windows) will be used to avoid or minimize potential impacts on fish species, following approval from the regulatory agencies (refer to Section 4.3.4). Prior to water diversion, block nets will be installed upstream and downstream of the construction area and any fish will be removed with seine nets. Diverted stream waters will then be fed into a gravity system upstream of the work zone and returned downstream. Following installation of the new pipe, bank stabilization will be installed along the stream bed similar to the existing rip-rapped conditions. Upgrades to the NMPS will require encroachment into the watercourse buffer. However, a robust planting plan will provide ecological enhancements within NMPS buffer

areas. A detail description of conditions and proposed changes to the buffer at the NMPS site is provided in Appendix D, and a summary of that information is discussed below.

All piped streams along the proposed North Mercer Island Interceptor pipeline route will be avoided by at least 2 vertical feet, and there are no buffers associated with piped streams. There is a piped stream at Fruitland Landing Park that will be moved by Mercer Island prior to NME Project construction, which will be avoided by construction activities for LS-11. There will likely be permanent impacts to the 25-foot stream buffer at Fruitland Landing Park, but the exact location is not yet determined. While temporary impacts within the stream buffer are estimated below based on the existing location of the stream buffer, permanent impacts will be calculated under impacts within the shorelands (Section 5.1.4) below. Potential changes to the vegetation above piped stream locations are not addressed within this section, but are addressed within Geologically Hazardous Areas (Section 5.1.2) and within the *Tree Management Plan* (Appendix A).

Finally, there are two perennial streams and a seasonal stream with a 60-foot buffer that overlap with the limits of construction: one stream adjacent to the Luther Burbank Park parking lot (Type Np), and two streams along the proposed North Mercer Island Interceptor pipeline alignment (Type NP and Ns). Staging in the Luther Burbank Park parking lot will only use existing impervious surface area. Although a portion of this includes the watercourse buffer, no vegetation will be affected and the functional buffer is protected from the existing parking lot by a curb. The two streams along the North Mercer Island Interceptor pipeline are roadside swales for stormwater control that have at least a portion that is piped and a portion that is exposed (Type Np and Ns). The majority of these two stream buffers are currently composed of impervious surfaces, and there will only be temporary NME Project impacts to these buffers. The first stream (Type Np) is located adjacent to the 96th Avenue Siphon work area. The second stream (Type Ns) is located along the I-90 Trail north of I-90 and just east of Fruitland Landing Park. The impacts to the buffers along the proposed North Mercer Island Interceptor pipeline alignment will be discussed in more detail below. There are no impacts to the stream buffer at the Luther Burbank Park parking lots, and so this buffer will not be discussed further.

Existing Functions and Values within Watercourses and Buffers

The existing conditions of the watercourses and buffers was described in Section 3.2 above. Based on this information, the existing functions and values associated with the NMPS stream are considered degraded due to the channelized conditions of the stream and lack of suitable habitat for salmonids. The stream itself is composed primarily of stormwater flows from the NMPS facility, surrounding residential properties, and the Mercer Island downtown core. The primary inflow to this area of the NMPS stream comes from large culverts crossing under I-90. On the NMPS property, the channel is incised with riprap along both banks, and flows into a 700 LF underground box culvert. The buffer habitat for the NMPS stream is impacted by both invasive species and impervious surface area. There is approximately 5,800 SF (16% out of a total of 37,253 SF) of existing impervious surface area on King County property. This includes an existing access road, parking lot, and buildings. Within the NMPS stream buffer (120 feet from OHWM), the impervious surface interrupts buffer functions for the stream, resulting in approximately 28,960 SF of existing functional buffer on the King County property (Appendix D).

Fruitland Landing Park is a public shoreline access park located at the end of 97th Avenue SE, adjacent to the Lake Washington shoreline. The piped stream at the park is located underground and is a 12-inch concrete storm drain that exits near the OHWM of Lake Washington. The functions and values of this stream are limited by location and existing conditions. Fish do not use this stream, and there is no buffer for piped streams under the revised CAO (MICC 19.07.180(C)(1)). Note that the stream will be moved by Mercer Island prior to the NME Project, which will move the stream out of the area impacted by construction. The NME Project is working in close coordination with Mercer Island to provide the necessary functions within this work area.

The perennial stream (Type Np) adjacent to the 96th Avenue Siphon work area is a roadside swale that collects stormwater from the adjacent roadways and buildings. There is a narrow vegetated area surrounding the stream before it intersects with SE 36th Street and I-90. Work in this area will only disturb the existing impervious surface, which does not provide any functions to the adjacent stream. Similarly, the seasonal stream (Type Ns) adjacent to the I-90 Trail and east of Fruitland Landing Park is a swale that collects stormwater from the multi-use trail. There is vegetated buffer associated with the stream that will be temporarily affected during construction, which is associated with the trail ROW, but most of the buffer that will be affected is impervious surface area along the I-90 Trail that does not offer any functions to the stream.

Impacts to Functions and Values within Watercourses and Buffers

NME Project impacts within watercourses and buffers were avoided and minimized to the extent practicable. For example, the proposed upgrades to the NMPS facility will be located as far from the stream as possible on King County property, and in an area that is already interrupted by impervious surface (Appendix D). However, upgrades at NMPS will result in encroachment of the existing buffer, and will require a Public Agency Exception, which is discussed in more detail in Appendix D. The NMPS stream will be crossed perpendicular to the stream banks to minimize the area of impact, the streams along the I-90 Trail will be avoided, and buffer impacts along the proposed North Mercer Island Interceptor pipeline alignment will be temporary. Additional minimization measures will be used to avoid and minimize impacts, such as the construction BMPs described in Section 4.3. Despite the avoidance and minimization measure, there will be unavoidable temporary and permanent impacts to these areas.

There are approximately 680 SF of temporary impacts to watercourses, 23,870 SF of temporary impacts to watercourse buffers, and 5,300 SF of permanent impacts to watercourse buffers within the NME Project construction limits (Table 11). The largest direct impacts to watercourses and buffers will occur at NMPS during facility upgrades and crossing the NMPS stream to construct the new pipe. Buffer encroachment at NMPS will be mitigated through removal of invasive species and planting native species (see Section 6). NMPS upgrades also include removing 25 regulated trees within the NMPS stream buffer (Tree Solutions 2019). Proposed tree protections and replacements along the proposed NME Project pipeline alignment are presented in the *Tree Management Plan* (Appendix A). Because the calculation of impacts includes improved areas (e.g., gravel, concrete, asphalt), the values presented in Table 11 are considered conservative estimates. Therefore, impacts to watercourse buffers will be an overestimation of potential impacts to functioning buffers.

Table 11. Direct Impacts to Watercourses and Buffers

Critical Area/ Shoreline	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Temporary Impacts (Watercourse)						
King County	680	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Temporary Impacts (Watercourse Buffer)						
King County	8,560	--	--	--	--	--
Mercer Island	1,590	3,130	5,240	740	--	--
Private	500	40	--	--	--	--
WSDOT	--	3,880	--	190	--	--
Permanent Impacts (Watercourse Buffer)						
King County	5,300	--	--	--	--	--

Table 11. Direct Impacts to Watercourses and Buffers

Critical Area/ Shoreline	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.

The duration of temporary direct impacts depends on the location along the proposed pipeline alignment. Impacts associated with NMPS facility upgrades will occur for approximately 33 months (April 2021 to December 2023). Impacts associated with the NMPS stream crossing will occur for approximately 2 months (July 2022 to August 2022). Impacts to the buffers of the perennial stream within the 96th Avenue Siphon work area and seasonal stream along the I-90 Trail will occur for approximately 2 to 6 months. As described above, the buffer habitat for these smaller streams is either entirely comprised of impervious surface or part of the trail ROW. The overall timeframes are identified above in Table 8, and additional discussion related to the timing of site restoration is provided in Section 6 below.

During the time when construction activities are occurring, the functions and values associated with watercourses and buffers (if present) will not be provided or will be reduced until site restoration of these areas. Native vegetation will be established within impacted areas as soon as feasible, with planting occurring during the spring or fall when conditions are suitable. To make up for this temporal loss of functions and values, the NME Project proposes to provide additional ecological enhancements to currently degraded areas within the NMPS stream buffer and at Fruitland Landing Park (see Section 6). Mitigation requirements within watercourse and buffers are provided under MICC 19.07.180(E), which were taken into consideration by the NME Project. The overall goal of mitigation for watercourse and buffers is to result in a no-net-loss of ecological impacts.

5.1.2 Geologically Hazardous Areas

Nearly the entire North Mercer Island Interceptor pipeline alignment is within areas mapped as geologically hazardous areas (refer to Figure 5). There are 3 categories of geologically hazardous areas identified under MICC 19.07.160(A): (1) landslide hazard areas (including steep slopes, deep seated landslide hazard areas, and shallow seated landslide hazard areas), (2) seismic hazard areas, and (3) erosion hazard areas. As discussed in Section 3.3 above, only the first two categories will be discussed in the impacts section. Erosion hazard areas overlap with the other two categories and are dealt with through construction BMPs to control erosion.

The proposed work in these areas includes open cut-and-cover construction for the new pipe within existing Mercer Island and WSDOT ROWs. The NME Project will be constructed in shallow trenches of 15 feet or less and will be backfilled to match the existing grade and surface conditions. For the majority of the pipeline alignment, the work will occur along the I-90 Trail, which will also include widening the trail per the Aubrey Davis Park Master Plan concept alternatives (Mercer Island 2018) and WSDOT (2015) Roadside Policy Manual. The proposed trail improvements include trail widths of at least 12 feet and up to 14 feet with a 2-foot gravel shoulder along each side. This is compared to an existing condition of a trail that is typically 10 feet to 11 feet wide. Considerations for geologically hazardous areas were incorporated into the overall NME Project design, including locations where a retaining wall will be added or the trail could not be constructed at the full 14-foot width with a 2-foot shoulder on either side (PLAN Volume 2: C456).

Existing Functions and Values within Geologically Hazardous Areas and Buffers

The existing conditions of the geologically hazardous areas and buffers was described in Section 3.3 above. Based on this information, the existing functions and values have been modified through the construction of I-90, the I-90 Trail, and various street ROWs. For example, the entire proposed pipeline route contains existing asphalt and concrete, and in some locations there are retaining walls to control the potential for landslide hazards (e.g., along I-90). The NME Project is located in soils that are either glacially overridden very dense or hard deposits. However, there is a diversity of vegetation along the I-90 Trail and street ROWs that include several regulated trees (Tree Solutions 2019). Some of these areas will not be replaced due to the requested widening of the I-90 Trail by Mercer Island per conceptual designs for the Aubrey Davis Park.

The discussion below on impacts to functions and values within geologically hazardous areas and buffers is organized as discussed in Section 3.3 above: (1) landslide hazard areas, and (2) seismic hazard areas. Additional details on impacts to trees within geologically hazardous areas are provided in the *Arborist Report* (Tree Solutions 2019) and the *Tree Management Plan* (Appendix A).

Impacts to Functions and Values within Geologically Hazardous Areas and Buffers

NME Project impacts within geologically hazardous areas and buffers were avoided to the extent practicable. For example, the proposed pipeline alignment uses existing Mercer Island and WSDOT ROWs that are currently improved surfaces to avoid impacts to sensitive habitat. By moving the North Mercer Island Interceptor pipeline alignment to upland habitat, there will be a large portion of the degraded existing pipeline in Lake Washington that is decommissioned. This will avoid future impacts to sensitive aquatic habitat during regular maintenance activities, and avoids potential impacts to aquatic habitat from failures due to pipe degradation and potential leaks.

There were also several design considerations that were made to avoid creating erosion risk within geologically hazardous areas. Trail restoration criteria accounted for geotechnical hazardous areas by realigning the trail's centerline to route through shallow grades, optimizing the trail's width extension along flat terrain to the extent possible. Where site constraints prevent the trail width from widening, physical features such as a segmented block retaining wall are proposed. In one circumstance near 97th Avenue SE, the existing trail width of 10 feet, 2 feet shorter than the preferred shared-use path width, is being maintained as part of the proposed trail restoration, as the WSDOT shared-use path design manual provides allowance for existing site-constrained trails. Additional minimization measures will be used to avoid and minimize impacts, such as the BMPs described in Section 4.3 above that will be used during proposed construction activities.

Overall, there was no technically feasible alternative that fully avoids impacts to geologically hazardous areas. Almost the entire NME Project along street ROWs and the I-90 Trail also overlap with geologically hazardous areas or associated buffers. The use of these areas for the proposed North Mercer Island Interceptor pipeline alignment avoids sensitive aquatic habitat, and design considerations minimizes impacts along the pipeline alignment. Existing conditions include impervious surfaces, where impacts were prioritized, but the expansion of the I-90 Trail per the Aubrey Davis Park Master Plan will increase the disturbance area of the NME Project.

Landslide Hazard Areas and Buffers

Impacts to landslide hazard areas and buffers will be located within street and WSDOT ROWs (refer to Figure 5). With the exception of locations along the I-90 Trail where trail widening will occur, temporary impacts will be restored to existing conditions, which includes replacing the street or curb surfaces and existing vegetation (PLAN Volume 2: C451-456). The areas with permanent impacts to landslide hazard areas are located along the I-90 Trail and are a product of the proposed trail widening, as requested by Mercer Island per the Aubrey Davis Park Master Plan concept alternatives (Mercer Island 2018).

Impacts to landslide hazard areas and buffers will occur for a total of 20 months (March 2021 to November 2022), located within all of the work areas outside of the East Channel of Lake Washington. However, impacts within individual locations (one street or continuous I-90 Trail segment) will occur for approximately 2 to 6 months. This is because the progress along the North Mercer Island Interceptor pipeline route will occur linearly and in small sections of the NME Project area, as described in Section 4.1 above. Areas where vegetation and trees will be removed will include planting native species and trees. Because trail widening will remove more trees than there is room for replacement within the NME Project area, a portion of the replacement needs will be through in-lieu fee. One area of project activity associated with steep slopes, the Mercer Island Boat Launch, will receive additional ecological enhancements. For example, the proposed improvements to the failing existing shoreline stabilization will increase support of the steep slope at the boat launch and increase habitat complexity for fish and wildlife. Replacement trees within landslide hazard areas and buffers are addressed in the *Tree Management Plan* (Appendix A), and the site restoration and ecological enhancement plan is provided in Section 6 below.

Seismic Hazard Areas and Buffers

As described in Section 3.3 above, there is a fault zone that follows I-90 and runs through the majority of the NME Project area. This area also overlaps with landslide hazard areas, and the impacts identified below are only areas that do not overlap. Because there is already development through the seismic hazard area (e.g., I-90, I-90 Trail, residential neighborhoods), the NME Project was not considered to pose a threat to public health and safety by proposing a pipeline within this area. Further, Shannon & Wilson (2018b) indicated that the seismic hazard area is interpreted, deep, and not representative of the location near the surface. In other words, the risk to this area from the proposed installation of a new sewer pipeline is minimal. The duration of impacts within seismic hazard areas, and proposed site restoration, is the same as described above for landslide hazard areas. Replacement trees within seismic hazard areas and buffers are addressed in the *Tree Management Plan* (Appendix A), and the site restoration and ecological enhancement plan is provided in Section 6 below.

Summary of Impacts to Functions and Values within Geologically Hazardous Areas and Buffers

Overall, the NME Project is avoiding impacts to sensitive habitats (e.g., Lake Washington) by moving the North Mercer Island Interceptor pipeline alignment to upland areas. This will avoid future potential impacts to aquatic habitat. Although the proposed pipeline alignment will be located within geologically hazardous areas and buffers, NME Project BMPs and siting of the alignment avoided or minimized impacts to the extent possible. Further, proposed site restoration and ecological enhancements along the street ROWs and I-90 Trail will provide native plant species to support wildlife habitat conservation areas (discussed in Section 5.1.3 below). Additional details on tree removals and replacements along the proposed North Mercer Island Interceptor pipeline alignment are provided in the *Tree Management Plan* (Appendix A). Finally, the proposed changes at the Mercer Island Boat Launch will result in improvements to the existing functions and values associated with the Lake Washington shoreline and the steep slope that is located within the NME Project area. Additional details on site restoration and ecological enhancements are provided in Section 6.

5.1.3 Fish and Wildlife Habitat Conservation Areas

The areas identified for fish and wildlife habitat conservation along the proposed NME Project pipeline alignment include both terrestrial and aquatic habitat (refer to Section 3.6 above). Terrestrial habitat overlaps with the critical areas described above, including watercourse buffers and geologically hazardous areas. The proposed NME Project activities within these locations (i.e., open cut-and-cover construction of the North Mercer Island Interceptor) will also affect wildlife habitat conservation areas, including biodiversity areas and corridors.

Aquatic habitat overlaps with changes within the NMPS stream and Lake Washington. However, the designation and typing of aquatic habitat (MICC 19.07.170(A)) for the NME Project area results in just salmonids being identified. Because there are appropriate minimization and avoidance measures for the NMPS stream, including

BMPs and riparian and stream channel restoration, the focus of the discussion on direct impacts to aquatic habitat will be in relation to Lake Washington. The proposed pipeline will cross the East Channel of Lake Washington (i.e., East Channel Siphon) at its narrowest point (1,400 LF) where water depths are shallow. The maximum depth through the East Channel is approximately 45 feet. There are also proposed actions along the shoreline transition area between the North Mercer Island Interceptor and East Channel Siphon. This includes changes associated with the shoreline stabilization at the Mercer Island Boat Launch.

Existing Functions and Values within Fish and Wildlife Habitat Conservation Areas

Based on the information presented in Section 3.6.1 above, use of terrestrial habitat by wildlife species is likely limited. The majority of the proposed North Mercer Island Interceptor pipeline alignment is located within street ROWs and the I-90 Trail, which are modified habitats. Existing conditions include residential neighborhoods, the multi-use trail, and a significant amount of built environment (e.g., asphalt, pavement, concrete, buildings). Although the limited vegetation surrounding the NME Project likely prevents nesting or breeding of birds, there is likely use of some of these areas for foraging and/or resting. As noted in Table 6 above, the species identified within the wildlife habitat conservation areas include bald eagles, great blue heron, and the Rufous hummingbird. The trees and vegetation located along the I-90 Trail are locations where foraging or resting habitat is likely provided for hummingbirds, but is unlikely to provide habitat for eagles or heron.

Substrate within the East Channel is a mix of gravel, sand, mud, and cobble, with occasional boulders. At depths below 10 feet, sand and mud dominate the substrate. Along the shoreline adjacent to Mercer Island Boat Launch, invasive aquatic vegetation, primarily Eurasian watermilfoil, was documented during underwater video surveys. Other aquatic vegetation species included hydrilla and Brazilian elodea. Between depths of approximately 15 feet and 20 feet, patches of green filamentous algae were observed growing on hard substrates.

A population of sockeye salmon spawns on Lake Washington beaches. Spawning takes place in Lake Washington wherever suitable gravel beaches with upwelling are available (WDFW 2019a). However, the shoreline associated with the NME Project in Lake Washington is not mapped as historical sockeye salmon spawning habitat (WDFW U.D.). Lake Washington is used by sockeye salmon, bull trout, Chinook salmon, steelhead, coho salmon, and coastal cutthroat trout for foraging and migration (refer to Section 3.6.2 above). Timing of juvenile outmigration for the ESA-listed species in Lake Washington typically peaks between May and July (Figure 14), which is why the in-water work window for Lake Washington between I-90 and State Route 520 is July 16 through April 30. The NME Project will adhere to all in-water work windows, following approval from the regulatory agencies.

Species		Life Stage	Month											
Common Name	Scientific Name		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chinook salmon	*Oncorhynchus tshawytscha*	Adult												
		Juvenile Outmigration												
Steelhead trout	*O. mykiss*	Adult												
		Juvenile												
Bull trout	*Salvelinus*	Sub Adult												

Sources:	Key:
Fresh 1994; Fevold et al. 2001; Celedonia et al. 2008; WDFW 2019a,b	Nominal Presence Low Presence High Presence

Figure 14 – Expected Occurrence of ESA-Listed Fish Species in the Action Area by Life History Stage

Impacts to Functions and Values within Fish and Wildlife Habitat Conservation Areas

The discussion on impacts to functions and values within fish and wildlife conservation areas is organized by direct impacts to terrestrial and aquatic habitat. Note that terrestrial habitats overlap with watercourse buffers and geologically hazardous areas that are discussed in Section 5.1.1 and Section 5.1.2, respectively. Therefore, the focus of the discussion on impacts related to terrestrial habitat will be to species use of these areas. Impacts to aquatic habitats will be related to the proposed NME Project actions within Lake Washington and potential impacts to species use.

Terrestrial Habitat

NME Project impacts within terrestrial habitat were avoided to the extent practicable. As described above in Section 5.1.2, the proposed pipeline alignment uses existing Mercer Island and WSDOT ROWs. These areas primarily include improved surfaces and will avoid impacts to sensitive habitat. Additional minimization measures will be used to avoid and minimize impacts, such as the BMPs described in Section 4.3 above that will be used during proposed construction activities. Unavoidable impacts to terrestrial habitats include up to 43,840 SF within watercourse buffers and impacts to vegetation along the I-90 Trail.

Wildlife use within the NME Project will primarily be in the form of foraging or migrating, when these species are present. However, it is unlikely that temporary impacts during NME Project construction will have a significant impact on habitat. This is based on the conclusions that disturbances to habitat will be temporary, most of the NME Project construction limits are currently degraded or improved surfaces, and most species will have limited interactions with the surrounding habitat due to seasonal and temporary usage. Sensitive life stages of the birds identified in Table 6 above are not located within the NME Project construction limits. For example, the closest documented Bald Eagle nest is located more than 1,500 feet from the NME Project area (Mercer Island 2016). According to USFWS (2007), a distance of 330 feet from nests if the activity will not be visible from the nest.

The other birds identified in Table 6 (Great Blue Heron and Rufous Hummingbird) have nesting areas or at least have been identified within 1,000 feet from the NME Project area. Waterbirds have shown behavioral changes in response to noise, but not to the extent that will cause impacts that will decrease survival when nesting habitats are located 150 feet or more from the activity (Carney and Sydeman 1999). However, the removal of flowering vegetation, which is foraging habitat for at least hummingbirds, will result in temporary impacts to wildlife habitat.

Impacts to terrestrial habitat will occur for a total of 33 months (April 2021 to December 2023). This duration is associated primarily with the facility upgrades at NMPS, which affect the buffer habitat for the NMPS stream. Impacts along the proposed North Mercer Island Interceptor pipeline alignment will occur sequentially as construction progresses. Although the total duration of construction within the street ROW and I-90 Trail work area is a total of 20 months (March 2021 to November 2022), impacts within individual locations (one street or continuous I-90 Trail segment) will occur for approximately 2 to 6 months. During these construction periods, trees and native vegetation will be removed and unavailable for wildlife.

Proposed site restoration and ecological enhancement through tree replacement, native vegetation planting, and removal of invasive plant species along the pipeline alignment will directly improve foraging habitat for wildlife species. For example, the species proposed for planting along the I-90 Trail include baldhip rose, vine maple, western serviceberry, and snowberry, which provide food and shelter for birds and small mammals, as well as nectar for insects and pollinators (Cooke 1997, SAS U.D. (unknown date), USDA 2008.). Additional details of the trees proposed for replacement along the proposed North Mercer Island Interceptor alignment are presented in the *Tree Management Plan* (Appendix A), and additional details of the proposed site restoration and ecological enhancement are presented in Section 6 below.

Aquatic Habitat

As described above in Section 5.1.2 above, future impacts to Lake Washington will be avoided by decommissioning a large portion of the degraded existing pipeline that is currently located within the lakebed along Mercer Island. Other measures were used to reduce impacts, such as replacing the existing pipeline with a shorter crossing within the East Channel. Minimization measures during construction also include the use of BMPs (Section 4.3) to minimize impacts to water quality during dredging operations. However, even with these avoidance and minimization measures, there was no technically feasible alternative to replacing the existing pipeline within the East Channel.

Construction-related impacts from the proposed NME Project work in Lake Washington are considered temporary (Table 12). No permanent impacts will result to lake habitat. There are long-term improvements proposed associated with the proposed shoreline restoration and the addition of gravel within the East Channel of Lake Washington and along the OHWM of the Mercer Island Boat Launch (Section 6).

Table 12. Direct Temporary Impacts to Lake Washington

Jurisdiction	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	70,260

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.

Temporary impacts to Lake Washington will occur for approximately 2 months (July 2022 to August 2022) for the shoreline transition work at the Mercer Island Boat Launch, approximately 1 month (fall 2022) for the shoreline restoration work, and 5 months (July 2022 to November 2022) for the East Channel Siphon work. During this time, the functions and values associated with Lake Washington in the area directly impacted will not be provided or will be reduced until site restoration occurs. Site restoration will occur directly following construction for each area identified above.

Potential impacts to aquatic habitat of Lake Washington, as discussed below, will include: (1) increased suspended sediment and turbidity, (2) benthic habitat disturbances, (3) changes in dissolved oxygen, and (4) the potential to release pollutants into the surrounding environment. The spatial extent of impacts will be limited by isolating the construction area using isolation around the work areas (e.g., turbidity curtain).

Suspended Sediment and Turbidity

NME Project construction activities will result in short-term increases in suspended sediments and turbidity. The greatest potential for sediment suspension will result from in-water trenching and backfilling (open cut-and-cover) methods of the pipeline installation in the East Channel and along the shorelines. The substrate sediments in the East Channel area are generally characterized by normally consolidated deposits of organic soils with inclusions of silty clay. The spatial extent of increased turbidity is expected to be limited by the lack of currents in the action area, and the implementation of BMPs such as turbidity curtains. The spatial extent of increased turbidity is

expected to be limited by the low velocity of water movement in the lake, implementation of BMPs such as turbidity curtains, and adherence to state water quality standards (refer to Section 4.3 above).

Other short-term increases in turbidity will occur from propeller wash from tugboat activity in the shallow shoreline areas and depositing of fill material and gravels after the pipe has been installed during site restoration and from propeller wash during vessel activities. Potential for scour is variable, and depends on the type of substrate, clearance between the propeller tip and the substrate, power of tugboat engines, and amount of thrust applied. Tugboat activity will be operated as to minimize the potential for substrate disturbance within sensitive nearshore habitat. Although a possible source of turbidity, it is expected that disturbance from propeller wash will be avoided or limited by BMPs and operational controls.

Overall, increased turbidity is expected to occur episodically throughout the time frame of the construction activities in the East Channel, which is a total of up to 5 months for the East Channel crossing. The in-water activities are expected to result in localized, intermittent, and short-term increases in turbidity. The NME Project will comply with 401 water quality certification conditions and adhere to state water quality standards for turbidity, which limit increases in turbidity to less than 5 nephelometric turbidity units over background at 150 feet. Finally, the activities that generate turbidity will be limited to in-water work windows when construction activities occur, or agreed timeframes based on discussions with the Corps and WDFW.

Proposed nearshore habitat enhancement at the Mercer Island Boat Launch will result in long-term stabilization of soils within the riparian zone, which has the potential to decrease turbidity long-term in the system. For example, the existing bulkhead at the boat launch is currently failing in several places. Repairing the bulkhead, providing an increase to habitat complexity along the shoreline (e.g., adding anchor logs and gravel), and adding native vegetation will all combine to improve habitat quality and ecosystem functions along this shoreline. Other enhancement actions associated with proposed North Mercer Island Interceptor pipeline alignment are all intended to improve the stability and quality of riparian habitat. Adding native vegetation along the water, especially overhanging vegetation (e.g., live willow stakes), will also contribute to food sources for salmonids (Christensen et al. 1996, Corps 2007, Tabor et al. 2011).

Benthic Habitat Disturbance and Displacement

Pipeline installation will disturb and displace aquatic benthic habitat in Lake Washington. As discussed above, existing functions and values in Lake Washington are impacted. For example, the aquatic vegetation is primarily the nonnative species Eurasian watermilfoil. However, the benthic habitat of Lake Washington likely provides adequate aquatic macroinvertebrates that support an abundant food base, even if there is also an abundance of nonnative aquatic and emergent vegetation.

The NME Project will result in temporary impacts within a relatively small portion of Lake Washington (<0.01%) for up to 5 months. Because of site restoration following construction activities, these habitat areas are expected to quickly recover, and no permanent alterations to the epibenthic and upper benthic habitat layers are expected. Additionally, BMPs will be implemented (refer to Section 4.3 above) to avoid and minimize potential effects to fish should they occur in Lake Washington during the in-water work. Finally, impacted areas will be top-dressed with fish-mix gravels (where appropriate) during site restoration. Upland enhancement actions will provide additional food resources to the lake, which will be similar to or better in terms of function compared to baseline conditions.

Overall, benthic habitat disturbance and displacement will be minimized through the appropriate use of BMPs. Although there will be temporary displacement of aquatic vegetation, benthic invertebrates, or changes to substrate and bathymetry, these changes are expected to be localized. The majority of aquatic vegetation in Lake Washington includes a nonnative species (i.e., Eurasian watermilfoil), and adding fish-mix gravels to the substrate may temporarily control the presence of this aquatic vegetation. The impacted habitat will be improved with the

use of anchor logs and gravels during site restoration in areas where species, such as juvenile salmon, will be present along the shoreline habitat. Therefore, benthic habitat will be improved within the action area through proposed NME Project actions.

Dissolved Oxygen

An increase in turbidity can cause a decrease in dissolved oxygen (DO) if biological or chemical oxygen demand in the sediments are high. Because projected increases in turbidity from the construction activities are anticipated to be localized, intermittent, short-term, isolated from the surrounding area using turbidity curtains, and in compliance with state water quality standards and in-water work windows, it is expected that DO concentrations will not be significantly affected by NME Project actions. State water quality standards require that DO levels do not drop below a daily minimum of 6.5 mg/L (the DO criteria for salmonid rearing and migration). The NME Project intends to maintain water quality standards and exclude fish and wildlife from the work area through the proper application and maintenance of NME Project BMPs (refer to Section 4.3 above). In addition, both site restoration and proposed ecological enhancement actions (see Section 6 below) will reduce the potential for soils to erode and deposit in aquatic areas or for turbidity to be generated, which will also result in long-term, improvements in the amount of DO available in the system. Overall, conditions that result in decreased DO will be avoided and minimized through proposed NME Project construction methods and BMPs.

Pollutants

Pollutants can be introduced to the system through accidental fuel leaks or spills, or stormwater runoff from pollution generating surfaces (e.g., parking lot or roadway). Changes to stormwater and runoff are discussed below in relation to indirect impacts (see Section 5.2 below). Fuel leaks and spills have the potential to introduce pollutants into aquatic habitat during the East Channel Siphon construction activities, such as boat and equipment operations. The implementation of BMPs are expected to minimize or avoid this risk (refer to Section 4.3 above). Finally, planting trees and native vegetation will improve the filtration of pollutants before they reach Lake Washington (see Section 6 below). The combination of properly functioning NME Project BMPs and ecological enhancement actions will reduce or avoid introducing pollutants to the system.

Summary of Impacts to Functions and Values within Fish and Wildlife Habitat Conservation Areas

The NME Project will avoid direct impacts to terrestrial habitat by prioritizing project activities in areas that is already impacted or part of the built environment, and will avoid future impacts to aquatic habitat by decommissioning the existing pipeline in Lake Washington. Sensitive habitat and life stages of fish and wildlife identified in Table 6 above will be avoided. However, there will be temporary impacts to both terrestrial and aquatic habitat during construction of the proposed pipeline. This includes impacts to foraging habitat. Site restoration and ecological enhancements will provide native plant species to support terrestrial habitat along the proposed pipeline alignment and long-term improvements to aquatic habitat. The largest improvements for fish and wildlife habitat conservation areas is at the Mercer Island Boat Launch. The shoreline restoration proposed along the Lake Washington shoreline will provide habitat complexity, connectivity to Lake Washington habitat, and other biological functions. Additional details on tree removals and replacements along the proposed North Mercer Island Interceptor pipeline alignment are provided in the *Tree Management Plan* (Appendix A), and additional details on site restoration and ecological enhancements are provided in Section 6.

5.1.4 Shorelands

Shorelands associated with the NME Project includes the area extending for 200 feet from the OHWM (MICC 19.13). The shorelands within the proposed NME Project includes the Mercer Island Boat Launch and Fruitland Landing Park work areas. The information in this section primarily focuses on lands at these 2 locations, with special attention to trees that are proposed to be removed.

Existing Functions and Values within Shorelines

The NME Project overlaps with several zoning districts and environmental designations. As described in Section 3.1, the zoning districts include residential, multi-family, and public institution. Environmental designations along the proposed NME Project alignment include urban residential environment and urban park environment. A map showing all of the zoning districts and shoreline environmental designations that overlap with the NME Project is provided above in Figure 3 above. Use regulations for the NME Project is under "Utility," which is a permitted use within both the environmental designations (MICC 19.13.040).

The shoreline of Fruitland Landing Park includes: (1) trees; (2) large shrubs; (3) a gravel beach; (4) park features such as grass, a bench, and stone steps to access the lake; and (5) other native and ornamental vegetation. The shorelands surrounding the park include single family residences.

The shoreline of the Mercer Island Boat Launch includes: (1) trees; (2) small and large shrubs; (3) park features such as grass, a parking lot, a public art installation, and a concrete boat launch; and (4) access to a sandy gravel beach. The shorelands surrounding the park include single family residences.

Impacts to Functions and Values within Shorelands

As described above, future impacts to Lake Washington and shoreland habitat were avoided by decommissioning a large portion of the existing pipe in the lake. Other measures were used to reduce impacts within shorelands, such as concentrating impacts within upland areas that currently have impervious surface areas to the extent practicable. BMPs will be used to avoid construction-related impacts, as described in Section 4.3 above. NME Project impacts could not be fully avoided to shorelands, including the following proposed actions:

- Access, staging, and site preparation within Fruitland Landing Park;
- Upgrades to LS-11 that required a larger impervious footprint;
- Access, staging, and site preparation within the Mercer Island Boat Launch;
- Construction of vaults, maintenance holes, and an access area at the boat launch under the I-90 East Channel Bridge;
- Replacement of the East Channel Siphon;

Permanent impacts will occur at both Fruitland Landing Park and the Mercer Island Boat Launch (Table 13). Permanent impacts include an addition of 400 SF of impervious surface at Fruitland Landing Park and 860 SF at the Mercer Island Boat Launch. Impervious surface area is discussed more thoroughly in Section 5.2 below. However, as identified in Table 13, the majority of impacts associated with the NME Project within shorelands are temporary. Temporary impacts are related to construction activities during pipe installation along the North Mercer Island Interceptor pipeline alignment and upgrades at Fruitland Landing Park. Both temporary and permanent impacts to shorelands will be offset, as discussed in Section 6, through tree planting and ecological enhancements along the Mercer Island Boat Launch shoreline. All other temporary impacts within shorelands will be mitigated through site restoration.

Table 13. Direct Impacts to Shorelands*

Jurisdiction	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail**	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Temporary Impacts (Shorelands)						
King County	--	--	--	--	--	--
Mercer Island	--	--	7,520	--	420	--
Private	--	--	--	--	--	--

Table 13. Direct Impacts to Shorelands*

Jurisdiction	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail**	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
WSDOT	--	--	--	--	47,270	--
Permanent Impacts (Shorelands)						
King County	--	--	--	--	--	--
Mercer Island	--	--	400	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	860	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*Defined as 200 feet landward of ordinary high water mark (OHWM).
**The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.

Impacts to shorelands will occur for a total of 14 months (March 2021 to May 2022) at Fruitland Landing Park and 18 months (June 2021 to November 2022) at the Mercer Island Boat Launch. Areas where vegetation and trees will be removed will include planting native species and trees. Replacement trees and alternative replacement approaches are addressed in the *Tree Management Plan* (Appendix A). As noted above, shoreline restoration at the Mercer Island Boat Launch will provide an increase in functions and values provided within shorelands and along the shoreline of Lake Washington. Details on the proposed site restoration and ecological enhancements within shorelands is provided in Section 6 below.

5.1.5 Outside of Critical Areas

As discussed throughout Section 5.1, NME Project impacts were prioritized into upland areas that include existing street ROWs and the I-90 Trail corridor. Although the majority of the proposed pipeline alignment falls within critical areas or shorelines, there is a small portion that will occur outside of these areas. For example, one of the long-term storage areas proposed for the project is within the Luther Burbank Park parking lot. Although there may be some tree trimming, there will be no significant impacts from the use of the off-site staging area. It should be noted that there are critical areas surrounding the Luther Burbank Park parking lot, including several trees that will need protection. These areas are described in the *Arborist Report* (Tree Solutions 2019) and the *Tree Management Plan* (Appendix A). The Luther Burbank Park staging area was estimated in the overall calculation for impacts outside of critical areas and shorelands (Table 14). This category also includes direct impacts within geologically hazardous areas where mitigation is not required (i.e., potential impacts were controlled through design or BMPs) or habitat that is not identified as a critical area or shoreland. Impacts to these areas are considered below.

Table 14. Direct Impacts in Other Areas

Jurisdiction	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Temporary Impacts (Other)						
King County	1,210	--	--	--	--	--
Mercer Island	--	206,490	12,910	8,970	11,660	--
Private	50	7,250	--	--	--	--

Table 14. Direct Impacts in Other Areas

Jurisdiction	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
WSDOT	--	161,050	--	6,150	21,780	--
Permanent Impacts (Other)						
King County	--	--	--	--	--	--
Mercer Island	--	230	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	19,930	--	--	--	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.

Impacts to areas outside of critical areas and shorelands will occur for a total of 17 months (only during the winter) for staging at Luther Burbank Park. Impacts along the proposed North Mercer Island Interceptor pipeline alignment will be for a total of 20 months, although impacts within individual locations (one street or continuous I-90 Trail segment) will occur for approximately 2 to 6 months. Areas along the trail where vegetation and trees will be removed will include planting native species and trees. Because trail widening will remove more trees than there is room for replacement within the NME Project, a portion of the replacement needs will be through in-lieu fee. Replacement trees and alternative replacement approaches are addressed in the *Tree Management Plan* (Appendix A) and Section 6 below.

5.1.6 Summary of Direct Impacts

The total NME Project on Mercer Island includes approximately 608,490 SF (refer to Table 4). The proposed project will result in up to 150,810 SF of total impacts within critical areas and shorelands (Table 15). The majority (581,770 SF or 96%) of the total NME Project impacts are temporary and will occur during construction. The construction-related impacts will extend over a 3-year time frame within different areas of Mercer Island. Permanent impacts within Mercer Island's jurisdiction total approximately 26,720 SF (4%) of the total project impacts. Permanent impacts are associated with improvements at NMPS, I-90 Trail widening, and additional maintenance areas at the Mercer Island Boat Launch.

Table 15. Summary of Direct Impacts of the NME Project

Critical Area/ Shoreline	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Temporary Impacts						
Watercourse	680	--	--	--	--	--
Watercourse Buffer	10,650****	7,050	5,240	930	--	--
Lake Washington	--	--	--	--	--	70,260
Shorelands**	--	--	1,750	--	47,690	--
Outside of Critical Area***	1,260	374,790	12,910	15,110	33,440	--

Table 15. Summary of Direct Impacts of the NME Project

Critical Area/ Shoreline	Project Impacts (SF) by Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
Permanent Impacts						
Watercourses	--	--	--	--	--	--
Watercourse Buffers	5,300	--	--	--	--	--
Lake Washington	--	--	--	--	--	--
Shorelands**	--	--	400	--	860	--
Outside of Critical Area***	--	20,160	--	--	--	--

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.
**Defined as 200 feet landward of ordinary high water mark (OHWM).
***Defined as areas outside of critical areas, shorelands, and geologically hazardous areas that do not require mitigation.
****This value excludes impacts to existing impervious surfaces within the watercourse buffer.

The loss of critical area functions and values from the NME Project will be fully restored at a minimum ratio of 1:1 through site restoration. Shorelines that do not overlap with critical areas will also be restored at a minimum ratio of 1:1 through site restoration. Vegetation to be replaced will consist of a variety of ground cover shrubs and trees native to the central Puget Sound lowland ecoregion, as defined under MICC 19.13.050. Trees will be replaced using the same species that was removed, if native, or a suitable alternative. Additional ecological enhancements (beyond site restoration) is also proposed within areas of sensitive habitat where the temporal loss during construction may affect the functions and values of that habitat until the proposed plantings reach maturity (Section 6).

5.2 INDIRECT IMPACTS

The main indirect impact associated with the NME Project is increased stormwater and runoff along the proposed pipeline alignment. There will be an increase in impervious surface associated with several areas along the proposed pipeline alignment (Table 16), and other changes at the NMPS site that will increase stormwater flows. Note that the changes along the I-90 Trail are beyond the impacts of the changes to the regional wastewater system, and include widening of the multi-use trail to meet current WSDOT (2015) trail standards and support some of the goals of the Aubrey Davis Park Master Plan (Mercer Island 2018). As noted above, the NME Project is working with both Mercer Island and WSDOT to ensure that changes are consistent with current regulations. Calculations of increased impervious surface area from new maintenance holes are not included in the calculations of impervious surface area because they are a minor contribution (4 SF) to the system and will be located in already improved areas (with existing impervious surface). The potential indirect impacts from increased stormwater discharge and runoff are discussed below.

Table 16. Increase in Impervious Surface Area within the NME Project Area

Affected Area	Existing Impervious Surface Area (SF)	Change in Impervious Surface Area (SF)	Total Area (SF)	Change in Impervious Surface (%)
Work Area: NMPS and NMPS Stream				
<100 LF OHWM – station upgrade and force main work	4,941	+3,905	31,859	12%
>100 LF OHWM station upgrade and force main work	856	+1,394	5,394	26%
Work Area: Street ROWs and I-90 Trail (North Mercer Island Interceptor)				
>100 LF OHWM – odor Control Vaults and I-90 Trail Widening	319,135	+20,160	547,469	4%
Work Area: LS-11 (Fruitland Landing Park)				
<100 LF OHWM – station upgrades and force main work	795	529	3,629	15%
>100 LF OHWM – station upgrades and force main work	13,598	-127	15,698	-1%
Work Area: Mercer Island Boat Launch**				
<100 LF OHWM – maintenance and access	13,598	-127	15,698	-1%
>100 LF OHWM – maintenance and access	31,772	+990	33,610	3%

SF = square feet

**The values for Enatai Beach Park area considered conservative because the overhead impervious surface area of the I-90 East Channel Bridge was not considered as baseline impervious surface area. Adding in the bridge will result in a higher baseline impervious surface area and lower change in impervious surface area from the NME Project.

Upgrades to NMPS and the force main work will result in an increase of 14% out of a total parcel area of 37,253 SF. This increase will result in an increase in stormwater that is discharged into the NMPS stream. Additional increases to the stormwater flow directed to the stream include the pump station yard and roof drains. These sources will be combined to flow out of a replacement 12-inch HDPE pipe (refer to Section 4.2.1). The flow increase is below 0.05 cubic feet per second (cfs) for the 100-year flow frequency using 1-hour times steps in Western Washington Hydrology Model (WWHM) and below 0.10 cfs for the 100-year flow frequency using the 15-minute time steps in WWHM. Compared to existing conditions, frequency of access to the NMPS site will be the same and so the increased impervious surface will not increase the amount of pollution potentially generated from vehicle use of the access road and parking lot. The discharge from NMPS will then travel over 700 LF in a box culvert to then discharge into Lake Washington. Due to the size of Lake Washington, the additional discharge will be imperceptible.

Along the proposed North Mercer Island Interceptor pipeline alignment, increased impervious surface area will include: (1) addition of 6 vaults along the pipeline alignment; (2) widening of the I-90 Trail along the pipeline route; (3) upgrades to LS-11; and (4) maintenance areas at the Mercer Island Boat Launch.

Each vault adds approximately 36 to 127 SF of impervious surface area, depending on the equipment necessary for maintenance vs. odor control (e.g., carbon filter, access hatch, vent stacks). The type of impervious surface added will not be pollution-generating. In addition, the location of the odor control vaults is either within existing maintenance holes or surrounded by pervious surfaces and located more than 100 LF from the OHWM. The

contribution of runoff from the increased impervious surface associated with the odor control vaults will add sheet flow to the system, although the increase from the vaults is likely to be imperceptible.

As described in Section 5.1.2 above, the NME Project has agreed to help redesign (widen) sections of the I-90 Trail that are impacted during construction, which will result in an increase of impervious surface area. Although maintenance vehicles may be used on the I-90 Trail, use of the trail is not typically pollution-generating. In addition, stormwater is being considered during the design phase, and will be controlled using existing systems or adding additional stormwater treatment areas. For example, installing new storm drain systems along the I-90 Trail will reduce the concern along the WSDOT ROW for directing surface flows. Therefore, widening the I-90 Trail should not significantly contribute to stormwater discharge or runoff into adjacent aquatic areas.

Upgrades to LS-11 at Fruitland Landing Park will also increase the amount of impervious surface area. Upgrades to this site will result in reducing the surrounding lawn of the Fruitland Landing Park to provide a larger pump station. The upgrades are being requested by Mercer Island and will not be pollution-generating.

Finally, there will be access improvements at the Mercer Island Boat Launch to provide regular maintenance access for the North Mercer Island Interceptor. These improvements include improving the access to the new vault and existing maintenance holes. The area that will be improved is currently paved, but the NME Project will be adding impervious surface area for the East Channel Siphon maintenance structure. While there is an overall increase in impervious surface, the change represents a reduction of paved area closer to the shoreline and prioritizing areas farther for the proposed development. However, the increase in impervious surface area will contribute to pollution-generating surfaces, but in an area that currently has vehicle traffic.

Overall, it is not expected that stormwater and runoff associated with the additional impervious surface area, or other changes to stormwater flows, at NMPS or along the proposed North Mercer Island Interceptor pipeline route will reach Lake Washington or impact water quality conditions in the surrounding habitat. More importantly, these impacts will be paired with enhancements in buffer and shoreland habitat (see Section 6).

5.3 CUMULATIVE IMPACTS

Cumulative impacts result from individual effects of multiple actions over time. According to the suggested changes within the revised CAO, “an assessment of the probable cumulative effects to critical areas resulting from the development of the site and the proposed development” (ESA 2018). This change was suggested to improve the use of best available science for a *Critical Area Study*.

The proposed NME Project is an expansion of the regional wastewater system to accommodate increased demand on Mercer Island. The proposed improvements are designed to convey the 20-year peak wastewater flows projected through the year 2060 from service areas in North Mercer Island, the southwest portion of Bellevue, and the Town of Beaux Arts Village. The NME Project on Mercer Island will result in impacts that extend over a 3-year period (April 2021 to December 2023). The goal of the project is to result in a no-net-loss of ecological function. While there are increases in permanent impacts, primarily from upgrades at NMPS and widening of the I-90 Trail, there are also ecological enhancements that will improve critical areas and shorelines. Overall, the NME Project will result in a balance between impacts (150,810 SF) and restoration/enhancements (197,284 SF).

Aside from the NME Project itself, there is one main project in the same area that may contribute to cumulative impacts. This is the East Link Project. Permits have been obtained, and construction is projected to occur at the Mercer Island station area in 2023 (Sound Transit 2019). The NME Project and the East Link Project share common staging areas at Mercer Island Boat Launch, and the East Link Project corridor covers a similar area from Mercer Island over to Bellevue across the I-90 East Channel Bridge ROW, and along the I-90 corridor (Sound Transit 2015).

The East Link Project includes a tunnel and surface route along the I-90 corridor on Mercer Island that will be within the same critical areas and shorelines with which the NME Project will overlap. There are also areas that resulted in higher impacts from the East Link Project compared to the NME Project. For example, there are both temporary and permanent impacts due to I-90 access changes due to the project, and .2-.3 acres of permanent impacts to Mercer Island Parks.

While the activities between the NME Project and East Link Project will be separated by timing, some impacts from the NME Project will occur within a few years of the East Link Project finishing (e.g., at Mercer Island Boat Launch and in-water areas adjacent to the I-90 bridge). The advantage of the close timing is that the use of already disturbed areas for staging and access will occur before restoration actions are needed. The disadvantage is the continued impacts to the same habitat. King County is coordinating with Sound Transit to ensure that the overlapping areas used for construction and staging will be fully restored by the end of the NME Project. Therefore, cumulative impacts shall not result in substantial adverse effects to the shoreline.

Overall, the East Link Project will result in a no-net-loss habitat (after mitigation) and will include enhancing existing parks or other compensation for the temporary loss of park use. Similarly, the NME Project will have impacts from construction activities to critical areas and shorelands. The NME Project will also result in a no-net-loss of critical area function, including improvements to native species and removal of invasive species within the work areas.

Finally, from a cumulative impacts perspective, the Lake Washington area is also subject to developmental pressure from increasing population growth. According to the U.S. Census Bureau (2019), the City's population as of April 1, 2017, is 25,261. Since incorporation in 1990, Mercer Island has grown at an average rate of 6.7% a year. Because of this growth, it will be important to provide utilities that meet human demand while protecting the environment from events such as sewer overflows.

6. SITE RESTORATION AND ECOLOGICAL ENHANCEMENT PLAN

This section describes site restoration, and additional ecological enhancements that could occur beyond site restoration, to account for the temporary loss of habitat function and permanent impacts. Note that this section focuses on areas of sensitive habitat where mitigation is required.

- **Work Area: NMPS and NMPS Stream**
  - Project Impacts: Upgrading the NMPS facility, which will include an increase of impervious surface area in watercourse buffer areas, and installing a new sewer pipe using open cut-and-cover methods across the NMPS stream (both permanent impacts and temporary impacts for 33 months).
  - Site Restoration/Enhancement Activities: Removing invasive species, planting native species, and replacing trees or other impacted areas (e.g., curbs, pavement, sidewalks).

- **Work Area: Street ROWs and I-90 Trail**
  - Project Impacts: Installing a new sewer pipe using open cut-and-cover methods within street ROWs and the I-90 Trail in areas that overlap with geologically hazardous areas and buffers; which will include widening of the I-90 Trail to address requested changes by Mercer Island through the Aubrey Davis Park Master Plan (both permanent impacts and temporary impacts for 17 months).
  - Site Restoration/Enhancement Activities: Installing stormwater upgrades, removing invasive species, planting native species, replacing trees or other impacted areas (e.g., curbs, pavement, sidewalks), and providing fee in-lieu for additional tree impacts that could not be replaced due to the trail widening.

- **Work Area: LS-11 (Fruitland Landing Park)**
  - Project Impacts: Upgrading the existing duplex pump station (LS-11) located below the ground surface at Fruitland Landing Park (both permanent impacts and temporary impacts for 14 months).
  - Site Restoration/Enhancement Activities: Replacing grasses and repairing impervious surfaces to existing conditions. Planting of native species to improve current habitat functions.

- **Work Area: 96th Avenue Siphon**
  - Project Impacts: Installing a temporary bypass and working within an existing maintenance hole to remove the existing siphon and install a new siphon and odor control vault; impacts on the surface will be from staging and access through existing structures (temporary impacts for 6 months).
  - Site Restoration/Enhancement Activities: Restoring existing structures (e.g., curbs, pavement, sidewalks).

- **Work Area: Mercer Island Boat Launch**
  - Project Impacts: Installing a new sewer pipe using open cut-and-cover methods, connecting the in-water portions of the East Channel Siphon to the North Mercer Island Interceptor, installing a new

rock catcher to prohibit solids from entering the East Channel Siphon, and installing a new access vault for operations and maintenance (both permanent impacts and temporary impacts for 18 months).

- Site Restoration/Enhancement Activities: Replacing the existing bulkhead that is removed with a shoreline stabilization that has more habitat complexity, including anchor logs, gravel supplementation, and live willow stakes. Site restoration will also include replacing existing structures (e.g., curbs, pavements, sidewalks).

- **Work Area: East Channel of Lake Washington**

  - Project Impacts: In-water trenching from open cut-and-cover activities for the East Channel Siphon that occur below OHWM (temporary impacts for 5 months).
  - Site Restoration/Enhancement Activities: Enhancing the substrate with gravels where appropriate.

Although most impacts were avoided or minimized through NME Project design and construction BMPs (refer to Section 4.3), there are unavoidable impacts that will occur to critical areas and shorelines. The majority (96%) of these impacts are temporary, although impacts will occur over a 3-year construction period and up to 6 months in any one location (outside of general staging areas). Due to this temporary loss (or reduction) of habitat functions and values, the NME Project is proposing to increase habitat functions and values within specific locations along the pipeline alignment. This concept follows the Ecology (2010) framework to achieve no-net-loss of ecological functions (Figure 15). Overall, the NME Project provides just over a 1:1 ratio of restoration and ecological enhancement (197,284 SF) to areas of impacts (150,810 SF) for critical areas and shorelines. Tree replacements are through a separate process, and include the areas along the I-90 Trail that include removal of vegetation to widen the existing trail. Tree replacement is discussed in the *Tree Management Plan* (Appendix A). Through all of these efforts, the NME Project will result in no-net-loss of ecological functions along the pipeline alignment.

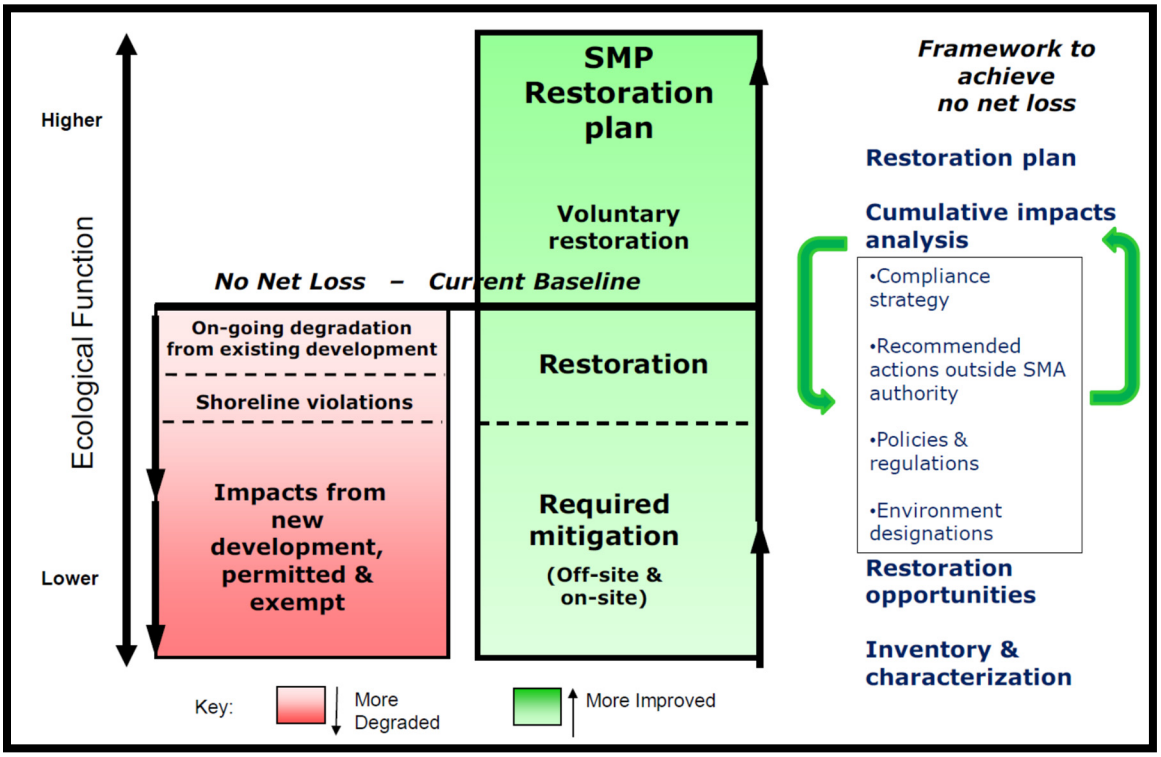


Figure 15 – Framework to Achieve No Net Loss of Ecological Function
Source: Ecology (2010)

6.1 AVOIDANCE, MINIMIZATION MEASURES, AND ALTERNATIVE SITE DESIGNS

The first steps in mitigation sequencing are avoidance and minimization (MICC 19.07.100). In 2014, fifteen alternative pipeline alignments for the NME Project were evaluated based on construction feasibility, technical requirements, operations and maintenance requirements, existing ROWs, permitting, community impacts, and applicability to sustainable development targets for King County. The current 60% design is considered to be the best compromise between all categories.

The current design of the NME Project prioritized avoiding impacts to sensitive areas. This can be observed by comparing the existing sewer line (in blue dashes) to the proposed alignment in Figure 1, which shows that substantial in-water and shoreline impacts were avoided along Lake Washington. For example, the pipeline route was shortened through the East Channel of Lake Washington, compared to the existing pipeline route, and the entire length of pipeline along the northern Mercer Island shoreline will be decommissioned. Decommissioning this older pipe will avoid future impacts to sensitive aquatic habitat during regular maintenance or pipe failures.

Other design approaches prioritized adding new sewer pipe to areas that already have impervious surface (e.g., street ROWs and the I-90 Trail) or have habitat that is degraded. For example, the area where NMPS facility upgrades are proposed is within vegetated habitat that is between impervious surfaces and the NMPS stream (refer to more details on this habitat in Appendix D). Similarly, the new pipe for the North Mercer Island Interceptor will be installed through habitat that is dominated by invasive species and existing impervious surface. These areas offer the NME Project opportunities to improve the impacted habitat with ecological enhancements.

Specific construction methods (e.g., sheet piling) are also being avoided because they typically result in more ground disturbance and noise impacts compared to alternatives. The alternative being proposed for shoring in the NME Project includes a slide rail or trench box system along the shoreline transition from the North Mercer Island Interceptor to the East Channel Siphon. Other common construction impacts, including noise, temporary lighting, in-water turbidity/contaminants, and barge operation, have been avoided and/or minimized to the extent that compensatory mitigation will not be required (refer to Section 4.3).

6.2 RESTORATION PLAN PHASES AND TIMING

Site restoration for structures (e.g., curbs, pavement, sidewalks, trails) will happen directly after installation of the new sewer pipe. Timing for the proposed planting will follow NME Project construction sequencing as close as possible, but is limited by seasons that are appropriate for planting (i.e., fall, spring). Based on the sequencing and durations presented in Section 4.1 above, site restoration or enhancement will occur with as little as a 1-month delay and up to a 9-month delay (Table 17). All site restoration work will be completed prior to the final NME Project inspection.

Table 17. General Construction Sequencing and Timing for Plantings

Work Area Activity	Construction Sequencing	Duration	Proposed Timing for Plantings
NMPS and NMPS Stream			
Facility upgrades/staging	Apr 2021 to Dec 2023	33 months	Fall 2023
Stream crossing/outfall modifications	Jul 2022 to Aug 2022	2 months	(up to 9-month delay)
Street ROWs and I-90 Trail			
Pipe installation	Jul 2021 to Nov 2022	17 months	Jul 2021 to Nov 2022 (2- to 9-month delay)

Table 17. General Construction Sequencing and Timing for Plantings

Work Area Activity	Construction Sequencing	Duration	Proposed Timing for Plantings
LS-11 (Fruitland Landing Park) Facility upgrades	Mar 2021 to May 2022	14 months	Spring 2022 (no delay)
96th Avenue Siphon Siphon/vault installation	May 2022 to Oct 2022	6 months	N/A
Mercer Island Boat Launch Pipe installation	Jun 2021 to Nov 2022	18 months	Fall 2022 (no delay)
East Channel Pipe installation	Jul 2022 to Nov 2022	5 months	No plantings proposed; gravel placement in Fall 2022

LS-11 = Lift Station 11; NMPS = North Mercer Pump Station

6.3 DRAFT RESTORATION PLAN DETAILS

All of the work areas overlap with sensitive habitat that requires restoration (Table 18). However, only a small portion of the street ROWs and I-90 Trail work area and 96th Avenue Siphon include critical areas that require restoration (e.g., watercourse buffers). There are additional impacts to trees within the street ROW and I-90 Trail, but replacement of vegetation is discussed in the *Tree Management Plan* (Appendix A). The 96th Avenue Siphon work area will have subsurface impacts and surface impacts to existing impervious surface areas, but no impacts to critical areas or shorelines. Temporary impacts are expected to occur for up to 9 months prior to planting activities (excluding general staging), and the functions and values of these areas will be lost or reduced during the construction activities. The proposed restoration and ecological enhancement includes on-site improvements to habitat above the existing conditions, including planting native species to Western Washington. Existing conditions for these work areas are provided in Section 3 above.

Table 18. Proposed Restoration Areas

Habitat	Impact Area (SF)	Restoration (SF)	Site Restoration Actions	Enhancement (SF)	Enhancement Actions
NMPS and NMPS Stream					
Watercourse	680	622	Removal of temporary diversion; fill trench from open cut-and-cover	62	Addition of substrate material appropriate for flow conditions in the stream to avoid future erosion
Watercourse Buffer	15,950	19,050	Fill trench from open cut-and-cover; repair structures; modify stormwater outfall	26,530	Removal of invasive species, planting native species
Lake Washington	--	--	--	--	--
Shorelands*	--	--	--	--	--
Street ROWs and I-90 Trail					
Watercourse	--	--	--	--	--
Watercourse Buffer	7,050	--	--	7,050	Removal of invasive species, planting native species
Lake Washington	--	--	--	--	--

Table 18. Proposed Restoration Areas

Habitat	Impact Area (SF)	Restoration (SF)	Site Restoration Actions	Enhancement (SF)	Enhancement Actions
Shorelands*	--	--	--	--	--
LS-11 (Fruitland Landing Park)					
Watercourse	--	--	--	--	--
Watercourse Buffer	5,240	--	--	--	--
Lake Washington	--	--	--	--	--
Shorelands*	2,150	19,660	Replace the grasses and repair impervious surfaces and structures	620	Planting of native species
96th Avenue Siphon					
Watercourse	--	--	--	--	--
Watercourse Buffer	930	930	Repair impervious surfaces and structures	--	--
Lake Washington	--	--	--	--	--
Shorelands*	--	--	--	--	--
Mercer Island Boat Launch					
Watercourse	--	--	--	--	--
Watercourse Buffer	--	--	--	--	--
Lake Washington	--	--	--	1,920	Addition of anchor logs and gravel
Shorelands*	48,550	44,390	Repair impervious surfaces and structures	6,190	Removal of invasive species and planting native species
East Channel Siphon					
Watercourse	--	--	--	--	--
Watercourse Buffer	--	--	--	--	--
Lake Washington	70,260	--	--	70,260	Gravel supplementation
Shorelands*	--	--	--	--	--
Total	**150,810**	**84,652**		**112,632**	

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

*Defined as 200 feet landward of ordinary high water mark (OHWM).

6.3.1 NMPS and NMPS Stream

Site restoration at the NMPS stream crossing will include restoring the streambed, and restoring the open-cut and cover locations. The NME Project will change substrate conditions within the NMPS stream, resulting in a 20% increase in cobbles compared to existing conditions. This change is expected to reduce the erosion potential of the stream and is based on expected velocities based on stormwater modeling.

The ecological enhancement within the NMPS stream buffer will specifically address the criteria under MICC 19.07.180(E)(1), to improve habitat complexity, connectivity, and other biological functions. Ecological enhancement will include removing invasive species along the stream buffer, and planting native species along the pipeline route and staging areas. The conceptual restoration layout is provided in PLAN Volume 1: L101. The proposed native species to be planted are summarized in PLAN Volume 1: C083-084, and includes Planting Mix A through D and Planting Mix G. The benefits to wildlife for the native species planted within the watercourse buffer are provided in Table 19. Compared to the existing plant community, the proposed species provide enhanced riparian functions such as pollutant-filtering, shelter, and food resources for wildlife.

Table 19. Proposed Planting Schedule for the NMPS Enhancement

Common Name	Scientific Name	Spacing	Plant Quantities	Wildlife Benefit*
Trees				
Cascara	*Rhamnus purshiana*	10-14 ft OC	21	The fruit is a food source for a variety of wildlife species.
Douglas fir	*Pseudotsuga menziesii*	10 ft OC	35	Cones are food source for wildlife.
Western hemlock	*Tsuga heterophylla*	10-14 ft OC	37	Provides habitat for numerous wildlife species.
Western red cedar	*Thuja plicata*	10-14 ft OC	58	Snags are valuable habitat for cavity nesting birds.
Large Shrubs				
Indian plum	*Oemleria cerasiformis*	5-7 ft OC	120	Fruits are eaten by birds.
Pacific wax myrtle	*Myrica californica*	5-7 ft OC	245	Fruits are eaten by some birds. Dense cover provides habitat for birds.
Tall Oregon grape	*Mahonia aquifolia*	7 ft OC	34	Fruits are eaten by numerous birds.
Vine maple	*Acer circinatum*	5-7 ft OC	172	Provides nesting habitat for small birds. Twigs, buds, and seeds are eaten by a variety of wildlife and bird species.
Evergreen huckleberry	*Vaccinium ovatum*	Per plan	14	Fruits and buds are eaten by upland game birds.
Small Shrubs/Ferns				
Baldhip rose	*Rosa gymnocarpa*	2.5 ft OC	230	Fruits eaten by herbivores and upland birds. Leaves and twigs eaten by browsers. Provides habitat for songbirds.
Creeping mahonia	*Mahonia repens*	2 ft OC or 2 per spot	1,419	Leaves and twigs are browsed by deer. Fruits are eaten by birds.
Low Oregon grape	*Mahonia nervosa*	2 ft OC	392	Leaves and twigs are browsed by deer. Fruits are eaten by birds.
Salal	*Gaultheria shallon*	2 ft OC or 2 per spot	930	Fruits are eaten by wildlife including upland game birds. Leaves, buds, and twigs are browsed by deer and elk.
Western sword fern	*Polystichum munitum*	4 ft OC or 2 per spot	1,195	Provides cover for insects and small birds.
Shrubs (Live Stakes)				
Red-twig dogwood	*Cornus sericea*	3 ft OC	68	Fruit is eaten by birds.
Sitka willow	*Salix sitchensis*	3 ft OC	204	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Scouler's willow	*Salix scouleriana*	3 ft OC	68	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Groundcovers				
Slough sedge	*Carex obnupta*	1 ft OC	631	Seeds are eaten by a wide variety of waterfowl and wildlife. Provides nesting cover for ducks.
Common rush	*Juncus effuses*	1 ft OC	159	Provides food and shelter for small animals.

*Based on information presented in Cooke 1997, SAS U.D. (unknown date), and USDA 2008.
OC = on center

Please note that Planting Mix E and Mix F are non-native plant species associated with site restoration along the buildings. The species used along the buildings were chosen for their durability, and are considered separate from the restoration along the NMPS stream. Detailed landscape plans for site-specific conditions and constraints will be developed during the final design phase. The proposed species include ones that survive within shady and dry sites. Irrigation will be provided as needed throughout the period of plant establishment. The landscaping contractor will be responsible for determining the most effective approach to irrigation.

Overall, there is a total of 26,592 SF of onsite enhancement available along the entire length of the NMPS stream. These enhancement measures will provide improved riparian functions, including shading, pollutant filtration, and organic material recruitment to the stream. Given the predominance of invasive species in the riparian understory, as described in Section 3.2, the proposed enhancement actions will improve the habitat functions along the NMPS stream riparian area over existing conditions. Please refer to Appendix D for more details on the proposed enhancements within the NMPS stream buffer.

6.3.2 Street ROWs and I-90 Trail

The majority of the street ROWs and I-90 Trail does not overlap with sensitive habitat. There is overlap with geologically hazardous areas, but the there are no mitigation requirements within these areas. According to MICC 19.07.160(B)(3), if there is an alteration of landslide hazard areas, seismic hazard areas, or associated buffers, the alteration may occur if the following conditions are satisfied:

- An evaluation of site-specific subsurface conditions demonstrates that the proposed development is not located in a landslide hazard area or seismic hazard area;
- The landslide hazard area or seismic hazard area will be modified or the development has been designed so that the risk to the site and adjacent property is eliminated or mitigated such that the site is determined to be safe;
- Construction practices are proposed for the alteration that would render the development as safe as if it were not located in a geologically hazardous area and do not adversely impact adjacent properties; or
- The development is so minor as not to pose a threat to the public health, safety and welfare.

The conditions above are met through the NME Project, as discussed in the *Geotechnical Report* (Shannon & Wilson 2018a,b) and Section 5.1.2 above. The project has designed the North Mercer Island Interceptor pipeline alignment to control for potential geologically hazardous risks, including adding retaining walls, maintaining vegetation, adding new vegetation, and adding a new stormwater system along the I-90 Trail (refer to the Site PLAN Volumes 1 and 2). These measures will all work to avoid erosion or risks within landslide hazard areas and seismic hazard areas. There are tree replacement requirements throughout this work area, but those are addressed within the *Tree Management Plan* (Appendix A). Additional mitigation measures for alterations within geologically hazardous areas are not necessary.

The Street ROWs and I-90 Trail work area does overlap a small portion of watercourse buffer habitat (7,050 SF) where a piped stream is daylighted and changes to a seasonal stream for a short distance (PLAN Volume 2: C329). As described in Section 3.2 above, the existing conditions within this buffer include grasses along the edge of the I-90 Trail and some trees. This area will be temporarily affected, and then replanted with Planting Mix D (refer to PLAN Volume 2: C083) after construction.

6.3.3 LS-11 (Fruitland Landing Park)

Fruitland Landing Park is within the shorelands because it is within 200 feet of the OHWM of Lake Washington. Although most of the work will be subsurface at the park, existing park features will be impacted. The majority of restoration at Fruitland Landing Park will include replacing the grass or other features in the park (PLAN Volume 1: C612-613). There is a small section that includes additional enhancements (620 SF). This area will

include planting of native species to enhance aesthetics and add a vegetated screen for neighboring residents. Overhead power lines will also be under-grounded as part of the station modifications, enhancing park scenery and habitat function.

6.3.4 96th Avenue Siphon

There is a small section of perennial stream buffer adjacent to the 96th Avenue Siphon work area (930 SF) that will be affected (PLAN Volume 2: C116). This buffer currently has asphalt, and the vegetated portion associated with the roadside swale will be avoided. Aside from general site restoration (repairing the asphalt in the street ROW), no other restoration is proposed for this area.

6.3.5 Mercer Island Boat Launch

The ecological enhancement at the Mercer Island Boat Launch will specifically address the criteria under MICC 19.13.020(C) that indicates that "no development shall be approved unless the applicant demonstrates to the code official's satisfaction that the shoreline development will not create a net loss of ecological function in the shorelands" and will also adhere to the criteria for bulkheads and stabilization structures under the revised SMP (Table 20). Proposed ecological enhancements at the Mercer Island Boat Launch will remove a portion of the existing bulkhead, add anchor logs to increase habitat complexity, add gravel to the substrate, remove invasive plant species in riparian areas adjacent to the shoreline, and add native plant species to riparian areas. These combined efforts will provide an improvement to the ecological functions in the shorelands.

Table 20. Consistency with MICC 19.13.050(B) Bulkheads and Shoreline Stabilization Structures

Criteria	NME Project Compliance
1. An existing shoreline stabilization structure may be replaced with a similar structure if there is a demonstrated need to protect principal uses or structures from erosion caused by currents or waves, and the following conditions shall apply:	
a) The replacement structure should be designed, located, sized, and constructed to assure no net loss of ecological functions.	The NME Project proposes to replace a large portion of the existing shoreline stabilization structure at Mercer Island Boat Launch, which is currently failing. The portion of the existing structure that will be replaced will use soft shore stabilization design elements, which will extend waterward of the OHWM and provide ecological enhancements above existing conditions.
b) Replacement walls or bulkheads shall not encroach waterward of the ordinary high water mark or existing structure unless the primary structure was occupied prior to January 1, 1992, and there are overriding safety or environmental concerns. In such cases, the replacement structure shall abut the existing shoreline stabilization structure. Soft shoreline stabilization measures that provide restoration of shoreline ecological functions may be permitted waterward of the ordinary high water mark.	The structured designed along the Mercer Island Boat Launch shoreline uses soft shore design elements to improve the habitat functions provided. For example, the design proposes the use of anchor logs rather than a vertical bulkhead. The proposed design fits in the description of a soft shoreline stabilization measure, and will move waterward of the OHWM. The design is based on the water levels and wind-wave exposure along the Mercer Island shoreline.
c) For purposes of this section standards on shoreline stabilization measures, "replacement" means the construction of a new structure to perform a shoreline stabilization function of an existing structure which can no longer adequately serve its purpose. Additions to or increases in size of existing shoreline stabilization measures shall be considered new structures.	The proposed design is a replacement of a portion of the existing bulkhead that is both ecologically inferior (i.e., vertical concrete wall) and is failing in places that result in concrete being deposited into Lake Washington. The length of the portion of the bulkhead will be the same, but the width will expand waterward to provide soft shoreline stabilization measures to increase habitat complexity.

Table 20. Consistency with MICC 19.13.050(B) Bulkheads and Shoreline Stabilization Structures

Criteria	NME Project Compliance
d) Construction and maintenance of normal protective bulkhead common to single-family dwellings requires only a shoreline exemption permit, unless a report is required by the code official to ensure compliance with the above conditions; however, if the construction of the bulkhead is undertaken wholly or in part on lands covered by water, such construction shall comply with SEPA mitigation.	The bulkhead will be partly on lands covered by water, and will comply with SEPA mitigation.

OHWM = ordinary high water mark; SEPA = State Environmental Policy Act

The portion of the existing concrete bulkhead that is removed (65 LF out of 128 LF) will be replaced with a stabilization treatment that has more habitat complexity (refer to PLAN Volume 2: C133, C134, and C087). The design includes the placement of anchor logs at various lake levels and wave exposure potential, gravel supplementation in front of the anchor logs, and reinforced soil lifts with live stakes. This design used best available science, including a wind-wave analysis to model design waves and water levels and sediment transport potential (Confluence 2019). The primary design criteria of the shoreline treatment included: (1) protect the toe of slope from wave energy, (2) protect newly installed sewer pipes, (3) replace shoreline hard armoring with soft shore design elements, and (4) augment the shoreline with native vegetation and wood that provide shoreline complexity.

The other component of the habitat improvements along the Mercer Island Boat Launch shoreline includes removing invasive plant species and planting native plant species along the Lake Washington shoreline. One of the main species to be removed within the limits of construction is an existing patch of Japanese knotweed, which is identified as a noxious weed by the Washington State Noxious Weed Control Board. Japanese knotweed is listed by King County (2019b) as a non-regulated Class B noxious weed (control is recommended) except in specific locations of the Green and Cedar rivers or associated tributaries, where control is required.

Ecological enhancement actions will occur in consultation with Mercer Island and WSDOT. The layout of the changes to shoreline stabilization along the Mercer Island Boat Launch shoreline is provided in PLAN Volume 2: C133, and include planting native plants within the riparian area identified as Planting Mix E (Shoreline Restoration Mix) and willow live stakes (refer to PLAN Volume 2: C084 and C134). The benefits of planting live stakes is to provide overhanging vegetation that is slope stabilizing and will also provide shade and leaf litter to Lake Washington. The benefits to wildlife for the native species planted along the shoreline are provided in Table 21. Compared to the existing conditions, which include English ivy and Japanese knotweed, the proposed species provide enhanced riparian functions.

Table 21. Proposed Native Species within Shoreline Restoration Planting Mix

Common Name	Scientific Name	Spacing	Plant Quantities	Wildlife Benefit*
Large Shrubs				
Bitter cherry	*Prunus emarginata*	12 ft OC	5	Fruits are important food source for many bird species.
Pacific rhododendron	*Rhododendron macrophyllum*	12 ft OC	7	Fruits are eaten by birds. Provides nesting and habitat for songbirds.
Medium Shrubs				
Indian plum	*Oemleria cerasiformis*	4 ft OC	32	Fruits are eaten by birds. Pollinators collect nectar from flowers.

Table 21. Proposed Native Species within Shoreline Restoration Planting Mix

Common Name	Scientific Name	Spacing	Plant Quantities	Wildlife Benefit*
Mock orange	*Philadelphus lewisii*	4 ft OC	34	Seeds are consumed by birds and squirrels and bees/butterflies collect nectar from flowers.
Beaked hazelnut	*Corylus cornuta*	4 ft OC	32	Nuts are eaten by wildlife, particularly squirrels. Nesting by low-nesting songbirds.
Small Shrubs and Sedge				
Baldhip rose	*Rosa gymnocarpa*	2 ft OC	214	Fruits eaten by herbivores and upland birds. Leaves and twigs eaten by browsers. Provides habitat for songbirds.
Low Oregon grape	*Mahonia nervosa*	2 ft OC	214	Leaves and twigs are browsed by deer. Fruits are eaten by birds.
Common spikerush	*Eleocharis palustris*	2 ft OC	85	Stems and fruit are used by birds for nesting material and food. Roots are eaten by mammals.

*Based on information presented in Cooke 1997, SAS U.D. (unknown date), and USDA 2008.
OC = on center

Irrigation or watering will be provided as needed throughout the period of plant establishment. The landscaping contractor will be responsible for determining the most effective approach to irrigation. Adding native vegetation along the shoreline of Lake Washington will provide a source of organic matter to the lake, an input of terrestrial invertebrates into the nearshore habitat for fish, and shade if there is overhanging vegetation along the water's edge (Christensen et al. 1996, Corps 2007, Tabor et al. 2011). The ecological enhancements along the Mercer Island Boat Launch shoreline are also consistent with opportunities for restoration identified as Project Number LW-S3-2, LW-S3-3, and LW-S3-4 in the WRIA 8 Chinook Salmon Conservation Plan (WRIA 8 Salmon Recovery Council 2017).

Overall, there is a total of 8,110 SF of ecological restoration proposed, which includes 6,190 SF of native vegetation plantings and 1,920 SF of increasing the in-water habitat complexity. Juvenile salmonids will benefit from the conversion of the bulkheads to a gradually-sloping natural condition with functional riparian vegetation. These improved habitat features will provide a more naturalized migratory pathway, protection from piscivorous and avian predators, and enhanced food sources from the natural sediments and overhanging vegetation. The proposed shoreline and riparian enhancement actions will improve the habitat functions along the Mercer Island Boat Launch shoreline over the existing conditions.

6.3.6 East Channel of Lake Washington

Impacts from the open cut-and-cover construction through the East Channel of Lake Washington will be restored to existing conditions, and then a layer of gravels (size determined through consultation with WDFW – Fisher, pers. comm., 2019) will be added to the final top layers of substrate. Within areas that are deeper than 6 feet, a 6-inch layer of gravel will be added. For areas shallower than 6 feet, an 18-inch layer of gravel will be added. The exception to this will be in front of the shoreline restoration areas at Mercer Island Boat Launch (discussed above) and Enatai Beach Park (discussed below). The gravel additions outside of the open cut-and-cover trench associated with restoration areas will be 6 inches thick. Although there is documented sockeye spawning habitat surrounding the East Channel, there is no spawning habitat within the East Channel portion where the pipeline will cross Lake Washington.

A total of 70,260 SF of substrate enhancement is proposed. There will be some loss of non-native submerged aquatic vegetation, but the majority in Lake Washington is Eurasian watermilfoil and Brazilian elodea. According

to King County (2019b), Brazilian elodea is classified as a regulated Class B noxious weed (control is required) and Eurasian watermilfoil is classified as a non-regulated Class B noxious weeds (control is recommended). The NME Project is expected to enhance fish and wildlife use in the long-term. For example, adding gravels to the sediment surface can stabilize the substrate and may suppress noxious weed growth. Stabilizing the substrate can result in a higher diversity of benthic invertebrates used as prey organisms for fish and wildlife compared to the chironomids that are typical in the soft substrate found in Lake Washington (Toft 2001), which will be a benefit to fish and bird foraging habitat. Toft (2001) also indicated that stabilizing an eroding beach can result in a higher diversity of benthic invertebrates.

Overall, the proposed substrate enhancement actions are expected to improve habitat functions within the East Channel of Lake Washington over existing conditions.

6.4 ENVIRONMENTAL GOALS AND OBJECTIVES

The following goals and objectives of the on-site restoration and ecological enhancement are proposed to compensate for the temporary loss of functions associated with the Project:

- Goal 1: to improve the existing functions and values of the watercourse and buffer habitat at NMPS. This goal will be achieved through the following objective:
  - Objective 1a: Remove invasive species and plant native species associated with buffer habitat.
- Goal 2: to improve the existing functions and values of native vegetation within Fruitland Landing Park. This goal will be achieved through the following objective:
  - Objective 2a: Plant native species associated with shoreland habitat.
- Goal 3 – to provide habitat complexity along the Lake Washington shoreline at the Mercer Island Boat Launch. This goal will be achieved through the following objectives:
  - Objective 3a: Add more habitat complexity (e.g., anchor logs and gravel) along the shoreline.
  - Objective 3b: Remove invasive species and plant native species in the riparian buffer.
- Goal 4 – to improve existing the functions and values of lakebed habitat in the East Channel of Lake Washington. This goal will be achieved through the following objective:
  - Objective 4a: Restore the area where open cut-and-cover construction occurs and add gravels to the lakebed substrate based on WDFW specifications.

6.5 EVALUATION CRITERIA: PERFORMANCE STANDARDS

Performance standards are measurable, quantifiable indicators of ecological enhancement performance relative to objectives and goals. The proposed restoration areas will be monitored for 5 years (MICC 19.07.080(C)(1)). Table 22 summarizes the performance standards and success criteria for each objective based on a 5-year monitoring plan. Note that, per MICC 19.07.080(C)(3), monitoring during the first 2 years will require 2 site visits in each monitoring year. In addition, these performance standards depend on a Year 0 report that provides an accurate accounting of the actual plantings on-site compared to the planting plan.

Table 22. Performance Standards and Success Criteria for each Monitoring Year

Objective	Performance Standard	Monitoring Year					
		Year 0*	Year 1	Year 2	Year 3	Year 4	Year 5
Objectives 1a, 2a, and 3b	PS1 - Percent Survival	100%	100%	70%	NC	NC	NC
	PS2 - Percent Cover						
	Tree/Shrub Wetland/Buffer	NC	NC	≥30%	≥40%	≥60%	≥75%
	Herbaceous Buffer/ Emergent Wetland	NC	≥20%	≥35%	≥50%	≥75%	≥80%
	PS3 - Invasive Species Percent Cover	NC	≤15	≤10%	≤10%	≤10%	≤10%
Objective 3a	PS4 – Shoreline Complexity	Verify as-built	100% log retention	100% log retention	100% log retention	100% log retention	100% log retention
Objectives 3a and 4a	PS5 – Substrate Enhancement	6 inches	NC	NC	6 inches	NC	6 inches

*Year 0 is as-built condition

PS = Performance Standard; NC = No Criterion that year; LWD = large woody debris

6.5.1 Performance Standard 1 (PS1) – Percent Survival

Planted vegetation will be monitored for survival 3 times (Year 0, Year 1, and Year 2) during the 5-year monitoring period. Survival will not be monitored after Year 3 because it is expected that the growth of planted vegetation and natural recruitment will make identifying planted vegetation extremely challenging to accurately assess. It is also anticipated that natural recruitment will occur throughout the enhancement sites. Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out for easier identification. Table 22 shows the success criteria for plant survival for each year of monitoring.

6.5.2 Performance Standard 2 (PS2) – Native Species Percent Cover

Buffer and shoreland enhancement areas will be monitored for percent cover every year over the 5-year monitoring period. Both planted and native volunteer species will be counted in the cover measurements. Monitoring will occur during the growing season after deciduous plants have flowered or fully leafed-out for easier identification. Table 22 shows the success criteria for percent cover for each year of monitoring.

6.5.3 Performance Standard 3 (PS3) – Invasive Species Percent cover

The percent cover of area occupied by invasive species will be monitored every year over the 5-year monitoring period. Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out for easier identification. Table 22 shows the success criteria for invasive species cover for each year of monitoring. Invasive species are defined as Class A, B, and C weeds, with distinctions between regulated and non-regulated status, listed in the King County Noxious Weed List (King County 2019b). Invasive species are of concern with the proposed enhancement sites include Himalayan blackberry, Japanese knotweed, reed canarygrass, and English ivy, which are non-regulated Class B and C noxious weeds and control is recommended but not required.

6.5.4 Performance Standard 4 (PS4) – Habitat Complexity

The anchor logs added to the Mercer Island Boat Launch shoreline will be monitored every year over the 5-year monitoring period as a measure of habitat complexity. In all years, applicable sites will have 100% retention of installed logs, and logs will be hydraulically engaged with the wetted perimeter of the lake during normal high lake levels (e.g., May – June).

6.5.5 Performance Standard 4 (PS5) – Substrate Enhancement

The lake substrate along the pipeline and at the Mercer Island Boat Launch shoreline will be visually monitored following construction to assess whether long-term maintenance is required. If visual monitoring indicates substantial changes in the gravels, then additional gravels may need to be added to the substrate.

7. MONITORING PLAN

Monitoring activities in the restoration and enhancement areas will change throughout the duration of the monitoring and maintenance period. The main activities will be concentrated immediately after installation through the first and second years post-installation as the vegetation survives and grows. Monitoring activities should decline as the vegetation matures, but will be based on meeting success criteria (see Table 22 above). Depending on construction permits and changes in construction schedule, installation of on-site enhancement will occur according to Table 18 above.

Data collected in Year 0 will provide the as-built conditions for the success criteria in subsequent monitoring years. Should the ecologist determine that any portion of the enhancement area needs to be replanted, a survey will be conducted after the replanting has been completed. This survey will then become the baseline for subsequent monitoring surveys. For example, if survival success criterion is not met in Year 1, and the ecologist determines that additional plants need to be planted, a survey will be conducted after the addition of new plants. This survey will then provide the baseline for remaining monitoring events.

The following sections describe the proposed methods for the monitoring plan. As described above, MICC 19.07.080(C)(3) requires site visits (and reporting) 2 times per year for the first 2 years of monitoring, followed by annual visits for subsequent years of the monitoring period. These methods are subject to change if final site-design and as-built conditions warrant modification of monitoring methods.

7.1 TRANSECTS AND PHOTO POINTS

Using rebar sheathed in white polyvinyl chloride (PVC) pipe, up to 6 permanent transects will be established within the restoration and enhancement areas (T1, T2, etc.). The actual location of the transects will be determined in the field after plant installation. Coordinates for the end points of each transect will be recorded using a global positioning system (GPS) system and reported in the Year 0 Report.

Permanent photo points will be established at each end of each transect (e.g., T1-P1, T1- P2, T2-P1, T2-P2) to document the site over time. At each of the photo points, a fixed-lens digital camera will be used to take photographs, either a panoramic photo or 1 at every 90 degrees of the compass.

7.2 PERCENT SURVIVAL

Interim and final restoration and enhancement success will be defined by meeting the success criteria shown in Table 22. Because of the relatively small quantity of plants installed in the on-site restoration and enhancement areas, all installed plants will be counted to calculate percent survival. The number of living plants for that survey year will be divided by the number of living plants identified during the Year 0 monitoring event to determine the percent survival.

Survival monitoring will not continue beyond Year 2 because it is expected that plant growth and the substantial number of natural recruits will make identifying planted vegetation extremely difficult. Monitoring will occur during the growing season after deciduous plants have flowered or fully leafed-out for easier identification.

It is the expectation that all plants be monitored for survival for 2 years. Plants installed after Year 0 will be monitored for survival for an additional 2 years. For example, if additional plants are installed during Year 2 as a contingency measure, those plants will be monitored for survival during Year 3 and Year 4 monitoring events (i.e., unless percent cover standards are met).

7.3 PERCENT COVER

Interim and final restoration and enhancement success will be defined by meeting the success criteria for percent cover and invasive species performance standards shown in Table 22. The line intercept method will be used to determine the percent cover for woody vegetation and percent cover plots will be used to calculate the percent cover for emergent vegetation.

7.3.1 Line Intercept Method

The line intercept method will be used to record the percent cover of trees and shrubs along each of the permanently marked transects (USDA and USDI 1999). After laying a tape measure along a transect, the lengths of tape directly under the branches and foliage of a tree or shrub will be recorded along with the species. The percent cover of each species is then calculated by dividing the sum of lengths intercepted for that species by the total length of the transect.

7.3.2 Percent Cover Method

At 1 point along each transect, a permanent circular plot that 15 feet in diameter will be marked (T1-A, T2-A, etc.). The location of each circular plot along the transect will be determined during the Year 0 monitoring by using a random number generator. In each circular plot, the percent cover of herbaceous species, including bare ground, will be estimated and recorded.

7.4 SHORELINE COMPLEXITY

Success of shoreline complexity will be defined by meeting criteria for LWD retention and hydraulic engagement performance standards shown in Table 22. Each installed piece of LWD will be visually monitored in each applicable monitoring year.

7.5 SUBSTRATE ENHANCEMENT

Success of substrate enhancement will be defined by meeting criteria for gravel depth performance standards shown in Table 22. Coordinates for the areas of substrate enhancement will be recorded using a GPS system and reported in the Year 0 Report. Transects will be spaced every 50 feet along the long axis of substrate enhancement. The gravel depth will be measured down to underlying native substrate at 5-foot intervals along each transect using certified divers with boat support. Additional visual surveys can be provided using an underwater video camera with an integrated GPS system.

7.6 REPORTING

For each site visit, the ecologist will prepare a report. One copy of each report will be provided to King County, who will distribute it to the appropriate recipients. The following will be included in each report:

- Data tables
- Species lists
- Date of survey

- A narrative description of methods and contingency measures taken
- Identification of planted and naturally recruited trees and shrubs
- Identification of log and gravel retention
- Interpretation of results
- Color photos from each of the permanent photo points

The Year 0 report and as-built drawing will be completed within 30 days after planting is completed. In addition to the general reporting requirements stated above, the following will be included in the post-construction impact assessment:

- Actual planting density (container size)
- Coordinates of actual location of transects and photo points
- Location of transects and photo points depicted on a figure
- Description of changes from original design
- Planting schedule

The first report is due within 6 months after King County WTD and any other appropriate agencies accept the Year 0 report. All reports will be submitted by July 31 and December 31 of the monitoring year (for the first 2 years) and then December 31 for subsequent monitoring years.

8. CONTINGENCY PLAN

Contingency measures are provided in case performance measures are not met during the 5-year monitoring period. These include measures for plant mortality, percent cover, invasive species, shoreline complexity, and stable lakebed substrate. These measures are consistent with MICC 19.07.080(C)(4), which indicates that "where monitoring reveals a significant difference from predicted impacts or a failure of protection measures, the applicant shall be responsible for appropriate corrective action, which may be subject to further monitoring."

8.1 PLANT MORTALITY

High mortality could result from improper installation, diseased or infested plants, inadequate watering, or extreme weather. If more than 25% of new plantings die in a single year, the cause of the high losses will be investigated and corrected before dead plants are replaced. Dead plant material may only be removed after that year's scheduled monitoring. If WTD will prefer to use this material to aid the ecosystem, that should be noted within the monitoring report.

If during the Year 2 monitoring, the PS1 criterion is not met (i.e., less than 70% of the total plants installed have survived), then additional native plants will be installed to bring the planting schedule back into original specifications and monitoring for plant survival will continue for 2 additional years (i.e., Years 3 and 4).

8.2 PERCENT COVER

If the percent cover of success criterion is not met, the cause will be investigated and corrected. Correction measures may include increased watering, soil amendments, or additional plantings. The cause may also be dominance by invasive species, discussed in the following section.

8.3 INVASIVE SPECIES

Dominance by invasive species could result from the disturbance of the soil, a high mortality rate of the native planted vegetation, or colonization by windborne seeds. If more than 10% of the area is covered by invasive species, the cause of infestation will be investigated, and corrective actions will be taken before weeds are removed. Contingency measures could include increasing the frequency of weeding or herbicide use (if applicable) during the monitoring period until native vegetation can grow and dominate the area, or increasing the density of native vegetation with additional plantings.

8.4 SHORELINE COMPLEXITY

If the stabilization solution designed to increase habitat complexity is not successful, then the cause will be investigated and corrected. The investigation may include survey transects and analysis of the results compared to the as-builts. Correction measures may include repairing/reconfiguring shoreline stabilization measures or replacing anchor logs.

8.5 SUBSTRATE ENHANCEMENT

If the substrate enhancement success criteria are not met for gravel performance, the cause will be investigated and corrections to the design may be made. The investigation may include survey transects of the lake and adjacent bathymetry and analysis of the results compared to the as-builts.

9. DISCLAIMER

The information contained in this document is based on a combination of site visits, online databases, existing scientific literature, and the application of technical guidelines currently accepted as the best available science. This work was also performed in conjunction with the manuals and criteria outlined in the methods section. All discussions, conclusions, and recommendations reflect the best professional judgment of the authors (Table 23) and are based upon information available to us at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, state and federal regulatory authorities. No other warranty, expressed or implied, is made.

Table 23. List of Authors, Affiliations, and Qualifications

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Appendix A. Tree Management Plan

A. TREE MANAGEMENT PLAN

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

TETRA TECH
and Associated Firms

North Mercer Island Interceptor and Enatai Interceptor Upgrade Project

City of Mercer Island Tree Management Plan

Final



CONFLUENCE
ENVIRONMENTAL COMPANY

September 2019

NME Project: City of Mercer Island Tree Management Plan

September 2019

PREPARED FOR

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ACRONYMS/ABBREVIATIONS

Acronym or Abbreviation	Definition
ANSI	American National Standards Institute
ASCA	American Society of Consulting Arborists
BMP	best management practice
CAS	Critical Area Study
DSH	diameter at standard height
I-90	Interstate 90
ISA	International Society of Arboriculture
LOD	limits of disturbance
LS-11	Lift Station 11
MICC	Mercer Island City Code
NME Project	North Mercer Island Interceptor and Enatai Interceptor Upgrade Project
NMPS	North Mercer Pump Station
OHWM	ordinary high water mark
PLAN	Development Plan Set
PS	pump station
RLOD	recommended limits of disturbance
ROW	right-of-way
SMP	Shoreline Master Program
TPZ	tree protection zone
WSDOT	Washington State Department of Transportation
WTD	King County Wastewater Treatment Division

1. INTRODUCTION

King County Wastewater Treatment Division (WTD) is applying for environmental and construction permits from the City of Mercer Island (Mercer Island) for a project to improve reliability and increase the capacity of a portion of the existing regional wastewater system. King County's Conveyance System Improvements Program identified a need for capacity upgrades for the North Mercer Island and Enatai interceptors. The North Mercer Island Interceptor and Enatai Interceptor Upgrade Project (NME Project) is intended to improve the existing facility and pipeline components of the regional wastewater system to convey the 20-year peak wastewater flows projected through the year 2060 from service areas in North Mercer Island, the southwest portion of Bellevue, and the Town of Beaux Arts Village (Figure 1).

Construction of the NME Project will result in the removal of trees on Mercer Island. This document serves to fulfill the requirements of Mercer Island City Code (MICC) 19.10.090.C *Tree Removal Application Requirements*, which are not met in full by the Development Plan Set (PLAN) or Arborist Report (Tree Solutions 2019). Tree application requirements, including the locations of all tree information within the land use package, are outlined in Sections 1.2 and 1.3 of this report. Tree removals are discussed within Section 2, tree protections are discussed within Section 3, and tree retention ratios and replacement strategies are discussed within Section 4 of this report.

There are six work areas of the NME Project proposed on Mercer Island (Table 1; Figure 2). Work within these areas includes constructing new pipe or upgrading pump stations of the regional wastewater system, and can be divided into five NME Project segments (refer to Table 1). These five NME Project segments that make up the proposed action on Mercer Island overlap in terms of the geographical work areas where construction will take place. Please note that the work area identified as the Interstate 90 (I-90) Trail is the proposed route that primarily follows the I-90 Trail, but also includes private land, Mercer Island right-of-ways (ROWs), Washington State Department of Transportation (WSDOT) ROWs, and WSDOT Limited Access ROWs. In this report we will be using the six NME work areas to reference tree locations and tree management areas.

Table 1. Construction Segments and Work Areas for the NME Project

NME Project Segment*	Work Area					
	NMPS and NMPS Stream	Street ROWs and I-90 Trail*	LS-11 (Fruitland Landing Park)	96th Avenue Siphon	Mercer Island Boat Launch	East Channel
NMPS	●					
North Mercer Island Interceptor	●	●	●	●	●	
96th Avenue Siphon				●		
LS-11			●			
East Channel Siphon						●

I-90 Trail = Interstate 90 Trail; LS-11 = Lift Station 11; NMPS = North Mercer Pump Station, ROW = right-of-way

● = at least a portion of the NME Project segment occurs in the identified work area.

*The North Mercer Island Interceptor proposed alignment primarily follows the I-90 Trail, but also includes private land, Mercer Island ROWs, and other WSDOT ROWs.



Figure 1. NME Project Alignment Overview

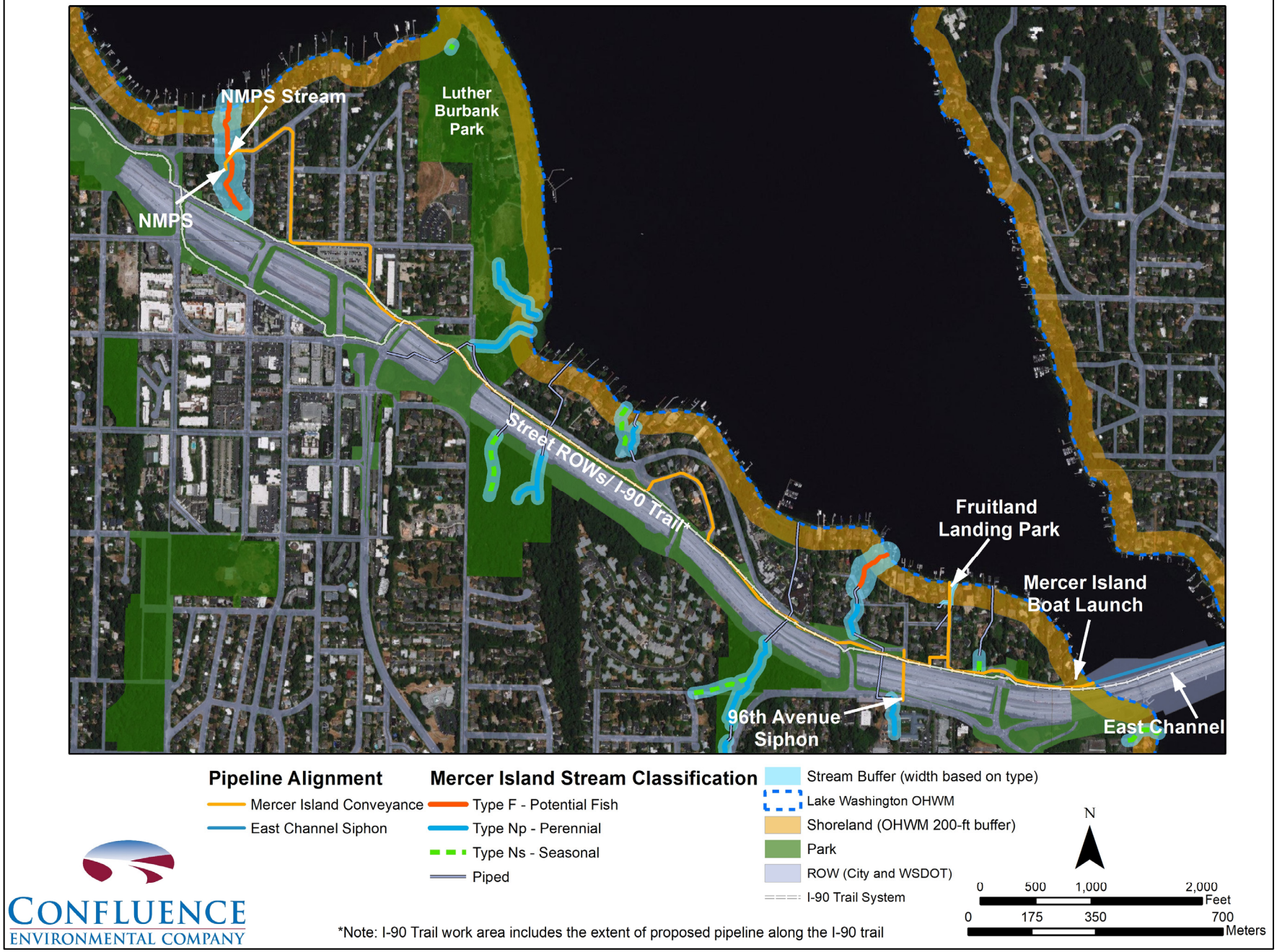


Figure 2. Work Areas, Watercourses, and Shorelands that Overlap with the NME Project on Mercer Island

1.1 KEY TERMS

There are several key terms for tree management identified in both the MICC and Arborist Report (Tree Solutions 2019). The location and types of trees determine the application requirements for a tree removal permit through Mercer Island and WSDOT, including the replacement ratios for trees that are removed. The following is a summary of the terms that will be used throughout this document that refer to the location and types of trees.

1.1.1 King County/ Private/ City of Mercer Island Trees

Specific types of trees are regulated by Mercer Island using criteria established under the MICC 19.16.010. Regulated improvements include "any development of any property within the city" with some exceptions that are not relevant to the NME Project. The definition of each type of regulated tree located on King County property, private property, or Mercer Island ROWs is provided below.

Exceptional Grove (Regulated): A group of 8 or more trees each 10 inches or more in diameter that form a continuous canopy. Trees that are part of a grove shall also be considered exceptional trees, unless they also meet the definition of a hazardous tree (MICC 19.16.010).

Exceptional Tree (Regulated): A tree or group of trees that because of its unique historical, ecological, or aesthetic value constitutes an important community resource. An exceptional tree is a tree that is rare or exceptional by virtue of its size, species, condition, cultural/historic importance, age, and/or contribution as part of a tree grove. Exceptional trees are trees measuring 36 inches in diameter at standard height (DSH) or greater, or with a diameter that is equal to or greater than the diameter listed in the Exceptional Tree Table (MICC 19.16.010).

Large Tree (Regulated): Any tree with a DSH of ≥10 inches, and any tree that meets the definition of an exceptional tree. Note that, specifically within the Mercer Island ROW, regulated trees also include all trees that are >6 inches in diameter, as requested by the Mercer Island arborist.

Small Tree (Unregulated): Any non-exceptional tree with a DSH of <10 inches on private property or Mercer Island property, and <6 inches in Mercer Island ROW.

1.1.2 WSDOT Trees

Trees that are located in WSDOT ROWs are regulated by a separate set of criteria. WSDOT manages roadsides, balancing operational and environmental functions and lowest life cycle costs consistent with a reliable, safe, and sustainable transportation system, and endeavors to preserve mature roadside vegetation and soils to the greatest extent feasible (WSDOT 2015). The definition of each type of regulated tree located within WSDOT ROWs is provided below.

Category 1 Tree[1] (Regulated): Mature, old-growth, large specimen or heritage trees >30 inches DSH

Category 2 Tree (Regulated): Moderate-size trees (excluding alder and cottonwood) with DSH between 4 inches and 30 inches

Category 3 Tree (Unregulated): Small-size trees (excluding alder and cottonwood) with DSH <4 inches

[1] Category 1, 2, and 3 trees are defined in WSDOT Roadside Policy Manual M 3110.03, dated August 2015.

Early Successional Species Tree: Early successional species trees such as red alder (*Alnus rubra*), willow (*Salix spp.*), and black cottonwood (*Populus trichocarpa*), which are only regulated if they are Category 1 or street trees.

Street Tree[2] (Regulated): The first row of trees that parallel a road, trail, or plaza to accentuate the pavement edge and/or provide user guidance, have an upright branching pattern to provide adequate vertical room for vehicles and bicyclists, provide canopy over the pavement, and typically have consistent spacing and setback along the pavement. Street trees are specifically identified by WSDOT Landscape Architect.

1.1.3 Additional Terms

Caliper: Tree diameter measured 6 inches above grade.

DSH: Diameter at standard height – the diameter of the trunk measured 54 inches (4.5 feet) above grade; if multiple stems, single-stem equivalent is used for replacement calculations per the *Plant Appraisal Guide* (ASCA 2018).

LOD: Limits of disturbance, calculated for each individual tree, delineated with tree protection barriers, determined by a qualified arborist (Tree Solutions 2019).

RLOD: Recommended limits of disturbance – as outlined in International Society of Arboriculture (ISA) *Best Management Practices: Managing Trees During Construction* (Fite and Smiley 2016). RLOD is calculated as a radial distance 8 times the trunk diameter. Some cases require 12 times the trunk diameter. For the purpose of this report, this represents the critical root zone (CRZ). The RLOD is determined by a qualified arborist.

TPZ: Tree protection zone, calculated for each individual tree, using a distance from each tree based on species tolerance to construction damage, relative tree age, and trunk diameter (Fite and Smiley 2016). The TPZ is determined by a qualified arborist.

1.2 TREE REMOVAL PERMIT AND APPLICATION REQUIRMENTS

This section focuses on the application requirements for a Tree Permit through Mercer Island. Although WSDOT requirements are identified throughout this document, the focus of the Tree Management Plan is addressing permit conditions for Mercer Island.

1.2.1 MICC 19.10.020 Applicability and Permit Required

According to MICC 19.10.020, the following provisions are required to be approved prior to removing trees on Mercer Island, with the exception of trees that are exempt pursuant to MICC 19.10.030.

- Permit approval to remove 1 or more nonhazardous trees may take the form of a tree removal permit or other construction permit approval.
- Permit approval to remove 1 or more trees that pose an imminent threat to life or property, such as tree limbs or trunks that are demonstrably cracked, leaning toward overhead utility lines or structures, or uprooted by flooding, heavy winds, or storm events, in which event the permit must be applied for within 14 days of the removal. Permit applications shall be accompanied by documentation of the imminent threat to life or property, ideally in the form of a report by a qualified arborist, but at least in

[2] Language in proposed WSDOT Roadside Policy Manual currently under revision, provided by a WSDOT Landscape Architect

the form of photographs that clearly depict the threat. Prior notice of the impending tree removal should be provided to the city.

- For the purposes of this section, tree removal includes the cutting or removing directly or indirectly through site grading of any tree, or root destruction that will result in a tree ultimately becoming a hazardous tree. (Ord. 17C-15 § 1 (Att. A)).

1.2.2 MICC 19.10.090 Tree Removal Application Requirements

The NME Project will comply with the tree removal application requirements described in MICC 19.10.090. Because the supporting documentation that shows compliance with these requirements will be spread across multiple documents within the land use package, Table 2 identifies the location of each of the requirements within the land use package and where the information can be found. Please note that the final tree permit will be applied for during the construction permit process (e.g., building permits, clearing and grading permits). Additional MICC code compliance related to tree and vegetation activities within the NME Project area is discussed in the Code Compliance Narrative.

Table 2. Locations of Tree Information within the NME Project Land Use Package for Mercer Island

Tree Removal Application Requirements	Located within the Land Use Package Document				
	Arborist Report	CAS	Land Use Drawings	Application Materials	Tree Management Plan
A. General Information					
1. Name, address, and telephone of applicant and property owners, and address of the property.	--	--	--	●	--
2. Proposed location, species, diameter, and number of trees proposed to be cut or pruned.	●	●	--	--	● (summary tables)
3. Proposed location and number of any required replacement trees.	--	--	● (portion of trees)	--	● (summary tables, remaining fee-in-lieu proposals)
4. Site plan reflecting the location of large trees and relative location of structures, driveways, and buildings.	●	--	●	--	● (summary tables)
5. Additional information required by the city to confirm compliance with this MICC 19.10.090 or MICC 19.07.	●	●	●	--	● (summary tables)
B. Critical Tree Area					
Trees located in a critical tree area, as defined in MICC 19.16, shall include a proposed time schedule for the cutting, land restoration, and implementation of erosion control and other measures to prevent damage in a critical tree area.	●	●	--	--	● (summary tables)
C. Development Plan Set (PLAN)					
1. Detailed Site Plan					
a. Location of all proposed improvements, including building footprint, access, utilities, applicable setbacks, buffers, and required landscaped areas, clearly identified;	●	--	●	--	--
b. Accurate location of large trees on the subject property (surveyed locations may be required). The site plan must also include the trunk location and critical root zone of large trees that are on adjacent property with driplines extending over the subject property line;	●	--	●	--	--

Table 2. Locations of Tree Information within the NME Project Land Use Package for Mercer Island

Tree Removal Application Requirements	Located within the Land Use Package Document				
	Arborist Report	CAS	Land Use Drawings	Application Materials	Tree Management Plan
c. Trees labeled corresponding to the tree inventory numbering system;	●	--	●	--	--
d. Location of tree protection measures;	●	--	●	--	--
e. LOD drawn to scale around all trees potentially impacted by site disturbances resulting from grading, demolition, or construction activities (including approximate LOD of offsite trees with overhanging driplines);	●	--	●	--	--
f. Proposed tree status (trees to be removed or retained) noted by an 'X' or by ghosting out;	●	--	●	--	--
g. Proposed locations of any required replacement trees.		--	● (portion of the trees)	--	● (summary tables, remaining fee-in-lieu proposals)
2. Tree Retention Plan or Arborist Report					
a. Tree inventory;	●	--	--	--	--
b. An arborist report, prepared by a qualified arborist.	●	--	--	--	--
3. Additional Information - the city arborist may require additional documentation, plans, or information as needed to ensure compliance with applicable city regulations.	●	--	--	--	--

CAS = Critical Area Study; LOD = limits of disturbance; MICC = Mercer Island City Code

● = located within the identified land use package document.

1.3 NME PROJECT TREE REMOVAL AND MICC CODE COMPLIANCE

Tree regulations identified in the MICC are to protect, enhance, and maintain trees that were identified as key community values expressed in the Mercer Island comprehensive plan. The purpose of the tree regulations on Mercer Island are to "encourage building and site design to minimize tree removal, and to establish standards and procedures that will result in the retention of trees on Mercer Island."

The NME Project falls under the category identified in the MICC as a "Development Tree Removal." The following requirements are needed for this type of tree removal (MICC 19.10.010.C):

1. A full application is required. The application provides details for the trees onsite, the removed trees, and the proposed protection measures for trees that will remain (see Section 1.2 above and MICC 19.10.090 for details).
2. Retention of some trees is required. At a minimum, 30% of the trees will need to be retained. Trees that are exceptional, are large, and have a high likelihood for long-term survival are prioritized for retention (see Section 4.1 below and MICC 19.10.060 for details).
3. Replacement trees are required for the tree(s) removed, typically between October 1 and April 1 following removal (see Section 4.2 below and MICC 19.10.070 for details). (Ord. 17C-15 § 1 (Att. A)).

In areas of the NME Project that fall within single-family residential zoning designations, the following additional requirements are needed for tree retention and removal (MICC 19.10.060.2-3):

1. Retention Requirement. Development proposals specified under subsection (A)(1) of this section shall retain trees as follows:

    a. A minimum of 30% of trees with a diameter of 10 inches or greater, or that otherwise meet the definition of large tree, shall be retained over a rolling 5-year period.
    b. In addition to the retention required in subsection (A)(2)(a) of this section, the development proposal shall be designed to further minimize the removal of large trees and maximize onsite tree retention as follows:

        i. Site improvements, including but not limited to new single-family homes, additions to a single-family home, appurtenances, accessory structures, utilities, and driveways, shall be designed and located to minimize tree removal during and following construction.
        ii. The following trees shall be prioritized for retention:

            A. Exceptional trees;
            B. Trees with a diameter of more than 24 inches;
            C. Trees that have a greater likelihood of longevity; and
            D. Trees that are part of a healthy grove.

        iii. Trees shall not be removed outside the area of land disturbance except where necessary to install site improvements (e.g., driveways, utilities, etc.).
        iv. Tree removal for the purposes of site landscaping should be limited to those trees that will pose a future safety hazard to existing or proposed site improvements.

    c. Provide tree replacement pursuant to MICC 19.10.070.

2. Retention of Exceptional Trees. Development proposals specified under subsection (A)(1) of this section shall retain exceptional trees with a diameter of 24 inches or more. Exceptional trees with a diameter of 24 inches or more that are retained shall be credited towards compliance with the retention requirements of subsection (A)(2) of this section. Removal of exceptional trees with a diameter of 24 inches or more, shall be limited to the following circumstances:

    a. Retention of an exceptional tree(s) with a diameter of 24 inches or more will result in an unavoidable hazardous situation; or
    b. Retention of an exceptional tree(s) with a diameter of 24 inches or more will limit the constructible gross floor area to less than 85% of the maximum gross floor area allowed under Chapter 19.02 MICC; or,
    c. Retention of an exceptional tree(s) with a diameter of 24 inches or more will prevent creation of a residential lot through a subdivision or short subdivision that is otherwise allowed by this title.

2. TREE REMOVALS SUMMARY

The NME Project proposes to remove a total of 380 live regulated trees within the construction limits on Mercer Island, and 67 live unregulated trees or small trees (Table 3). This section summarizes tree removals of regulated trees within critical areas and shorelands (Section 2.1) and outside of critical areas (Section 2.2). Tree removals are summarized by the NME Project work areas (excluding the East Channel of Lake Washington) and relevant jurisdictions.

2.1 TREE REMOVALS WITHIN CRITICAL AREAS AND SHORELANDS

Several critical areas and shorelands are identified within the NME Project on Mercer Island (Table 3). Please note that a full discussion of critical areas and shorelands is in the Critical Area Study (CAS) provided in the land use application package. Shorelands also have specific code requirements under the Shoreline Master Program (SMP) that will also be addressed in the CAS. Critical areas and shorelands within the NME Project, as they fall within NME Project work areas, are show above in Figure 2 above.

Table 3. Critical Areas and Shorelines in the City of Mercer Island

Critical Areas and Shorelines	Mercer Island Code	Buffer Width (feet)	Setback (feet)
Watercourses			
Stream adjacent to NMPS (Type F)	MICC 19.07.180	120	10
Stream adjacent to Luther Burbank Park parking lot and 96th Avenue Siphon (Type Np) and the I-90 Trial (Type Ns)	MICC 19.07.180	60	10
Piped streams	MICC 19.07.180	No buffer	45 (covered) 15 (daylighted)
Geologically Hazardous Areas*			
Steep Slopes	MICC 19.07.160	75**	N/A
Shallow Landslide Hazard Areas	MICC 19.07.160	25	N/A
Deep-Seated Landslide Hazard Areas	MICC 19.07.160	75	N/A
Seismic Hazard Areas	MICC 19.07.160	50	N/A
Fish and Wildlife Habitat Conservation Areas			
Habitat for state or federally-listed endangered, threatened, sensitive, or candidate species, or species of local importance	MICC 19.07.170	Varied, species-specific	N/A
Priority habitats, as identified by WDFW	MICC 19.07.170	Varied, species-specific	N/A
Areas used by bald eagles for foraging, nesting, and roosting, or within 660 feet of a bald eagle nest	MICC 19.07.170	660 330 (minimum)	N/A
Watercourses and wetlands and their buffers	MICC 19.07.170	see watercourses	see watercourses
Biodiversity areas	MICC 19.07.170	N/A	N/A
Shoreline Master Program (SMP)			
Shorelands	MICC 19.13.050***	200****	25

*A geotechnical technical report was conducted for the NME Project (Shannon & Wilson 2018a,b).
**Buffer from top and toe of slope only.
***Note that this document uses the code references for the revised SMP (MICC 19.13), as provided by Mercer Island (2019b) because the older SMP references (MICC 19.07.110) overlap with Critical Area Studies within the revised CAO
****200 feet is the definition of shorelands, which is not technically a "buffer."

Potential impacts to critical areas and shorelands are analyzed for the purposes of preventing undue hazards to public health, safety, and welfare by minimizing impacts to critical areas; of implementing the Mercer Island's comprehensive plan; and responding to the goals and objectives of the Washington State Growth Management Act, while reflecting the local conditions and priorities of Mercer Island (MICC 19.070.010). Requirements of MICC 19.07.050 *Critical Area Study* include the identification of existing trees and vegetation, proposed removals of trees and vegetation, and proposed mitigation for tree and vegetation removal within critical areas on Mercer Island. Proposed tree removals within critical areas, critical area buffers, and shorelands are summarized in Table 4 by NME Project work area and jurisdiction. There are no tree removals within geologic hazardous areas. Note that the table below only includes *regulated* trees, as defined in Section 1.1 above.

Table 4. Proposed Tree Removal within Critical Areas and Buffers

Work Area and Jurisdiction	Total Regulated Tree Removals	Live/ Dead	Qty Live Large/ Moderate-Large*	Qty Live Exceptional/ Mature*	Tree IDs	Land Use Drawing Sheet #
Watercourse Buffers						
NMPS and NMPS Stream						
King County	24	24 live/ 0 dead	17	7	1-16, 38, 45, 50-55	VI: D-101
Mercer Island	1	1 live/ 0 dead	1	--	19593	V2: C201
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Street ROWs and I-90 Trail						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Steep Slopes/Landslide Hazard Areas						
Street ROWs and I-90 Trail						
King County	--	--	--	--	--	--
Mercer Island	3	3 live/ 0 dead	--	--	31452, 31453, 31097	V2: C223-224
Private	--	--	--	--	--	--
WSDOT	22	15 live/ 7 dead	15 (5 street)	--	31099-31100, 31425-27, 31803, 31998, 32058, 32064, 32085, 32087-88, 32114-15, 32118	V2: C221-222, C224
LS-11 (Fruitland Landing Park)						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
96th Ave Siphon						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	4	4 live/ 0 dead	4	--	24340-41, 35757, 35761	V2: C212

Table 4. Proposed Tree Removal within Critical Areas and Buffers

Work Area and Jurisdiction	Total Regulated Tree Removals	Live/ Dead	Qty Live Large/ Moderate-Large*	Qty Live Exceptional/ Mature*	Tree IDs	Land Use Drawing Sheet #
Mercer Island Boat Launch						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Steep Slopes/Landslide Hazard Area Buffers						
Street ROWs and I-90 Trail						
King County	--	--	--	--	--	--
Mercer Island	5	5 live/ 0 dead	5	--	30112, 30904, 31454, 35515, 35517	V2: C214, C223, C225-C226
Private	--	--	--	--	--	--
WSDOT	183	171 live/ 12 dead	171 (33 street)	--	66, 68, 24135-38, 24140, 24142, 24144-48, 24155-57, 24162, 24164, 24166, 24171-73, 24184. 24193, 24197, 24200, 24232-34, 24236, 24299, 24317, 30113, 30137-38, 30887-92, 31101-04, 31422-24, 31436-37, 31455-56, 31624-29, 31631-33, 31635, 31640-42, 31644-48, 31650-51, 31656, 31660-61, 31663, 31666-67, 31671, 31674, 31804-13, 31815, 31817, 31821, 31824, 31826, 31828, 31955, 31969, 31971, 31974, 31991-97, 34284, 34289-90, 34298-99, 34304, 34308, 34311-12, 34316, 34318, 34321, 34325-27, 34333, 34966-72, 34975, 35001, 35005, 35010, 35014-15, 35020-25, 35072, 35075, 35078-79, 35083, 35086-87, 35089, 35218, 35221, 35228-30, 35313, 35317, 35319-21, 35323-24, 35326, 35332, 35336-38, 35344, 35512-14	V2: C214-218, C221-226
LS-11 (Fruitland Landing Park)						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
96th Ave Siphon						
King County	--	--	--	--	--	--
Mercer Island	9	9 live/ 0 dead	9	--	35518-19, 35521, 35525-29, 35531	V2: C213

Table 4. Proposed Tree Removal within Critical Areas and Buffers

Work Area and Jurisdiction	Total Regulated Tree Removals	Live/ Dead	Qty Live Large/ Moderate-Large*	Qty Live Exceptional/ Mature*	Tree IDs	Land Use Drawing Sheet #
Private	--	--	--	--	--	--
WSDOT	6	5 live/ 1 dead	5 (1 street)	--	19147, 35756, 35900-01, 35533	V2: C211-213
Mercer Island Boat Launch						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Seismic Hazard Areas						
Street ROWs and I-90 Trail						
King County	--	--	--	--	--	--
Mercer Island	2	2 live/ 0 dead	2	--	142, 24339	V2: C207, C228
Private	3	3 live/ 0 dead	1	2	21236, 41899, 41900	C228
WSDOT	--	--	--	--	--	--
LS-11 (Fruitland Landing Park)						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT						
96th Ave Siphon						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Mercer Island Boat Launch						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Subtotal						
King County	24	24 live/ 0 dead	17	7		
Mercer Island	20	20 live/ 0 dead	17	0		
Private	3	3 live/ 0 dead	1	2		
WSDOT	215	195 live/ 20 dead	195 (39 street)	0		
Total	**262**	**242 live/ 20 dead**	**230**	**9**		

DSH = diameter at standard height; LS-11 = Lift Station 11; MICC = Mercer Island City Code; NMPS = North Mercer Pump Station; ROW = right-of-way; WSDOT = Washington State Department of Transportation

*See Section 1.1 for definitions of trees.

Table 5. Proposed Tree Removal within Shorelands

Work Area and Jurisdiction	Total Regulated Tree Removals	Live/ Dead	Qty Live Large/ Moderate-Large*	Qty Live Exceptional/ Mature*	Tree IDs	Land Use Drawing Sheet #	Critical Area Overlap (accounted for)
Shorelands							
LS-11 (Fruitland Landing Park)							
King County	--	--	--	--	--	--	--
Mercer Island	1**	1 live/ 0 dead	--	1**	10855	VI: C602	Landslide Hazard Buffer
Private	--	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--	--
Street ROWs and I-90 Trail							
King County	--	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--	--
Private	--	--	--	--	--	--	--
WSDOT	19	18 live/ 1 dead	18	--	156, 158, 160, 162, 164, 166, 168-69, 171-80	V2: C231	--
Mercer Island Boat Launch							
King County	--	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--	--
Private	--	--	--	--	--	--	--
WSDOT	11	live	11 (incl. 3 street)	--	93, 97, 13946-13948, 14273-14277, 16147	V2: C231, C232	no
Subtotal							
King County	--	--	--	--			
Mercer Island	1**	1 live/ 0 dead	--	1**			
Private	--	--	--	--			
WSDOT	30	29 live/ 1 dead	--	--			
Total	**31**	**30 live/ 1 dead**	**29**	**1**			

DSH = diameter at standard height; LS-11 = Lift Station 11; MICC = Mercer Island City Code; NMPS = North Mercer Pump Station; ROW = right-of-way; WSDOT = Washington State Department of Transportation

*See Section 1.1 for definitions of trees.
**Mercer Island has asked to take responsibility for replacement quantities and locations for this tree, therefore, this exceptional tree will not be accounted for within tree replacement quantities of the NME Project

2.2 TREE REMOVALS OUTSIDE OF CRITICAL AREAS AND SHORELANDS

Tree removals outside of critical areas and shorelands associated with development proposals are regulated under MICC 19.10.060, and require similar reporting requirements to critical area trees. Proposed tree removals outside of critical areas and shorelands are summarize in Table 6 by NME Project work area and jurisdiction. As in Section 2.1 above, the table only includes *regulated* trees, as defined in Section 1.1 above.

Table 6. Proposed Tree Removals Outside of Critical Areas and Shorelands

Work Area and Jurisdiction	Total Reg. Tree Removals	Live/ Dead	Qty Live Large/ Moderate-Large*	Qty Live Exceptional/ Mature*	Tree IDs	Land Use Drawing Sheet #
NMPS and NMPS Stream						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Street ROWs and I-90 Trail						
King County	--	--	--	--	--	--
Mercer Island	4	3 live/ 1 dead	3	--	10178, 31004, 30127	C224, C227
Private	9	9 live/ 0 dead	7	2	10171-72, 10172, 20183-85, 21318, 21320, 36485-86	C227, C228
WSDOT	63	57 live/ 5 dead	57 (26 street)	--	143, 149-50, 11174, 11228, 11230, 15276-79, 15297, 19667, 19672, 30114, 30131-36, 30883-86, 30986, 30991-92, 30994-95, 30997-100, 31003, 31005-07, 31009, 31011, 31105-06, 31419-20, 31438-40, 31964, 31970, 31972-73, 36459-65	C221, C223-227, C229-231
LS-11 (Fruitland Landing Park)						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
96th Avenue Siphon						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	19	16 live/ 3 dead	16	--	19010-11, 19013, 19117-22, 24343-45, 35753, 35755, 35770, 35786	V2: C211-213
Mercer Island Boat Launch						
King County	--	--	--	--	--	--
Mercer Island	--	--	--	--	--	--
Private	--	--	--	--	--	--
WSDOT	--	--	--	--	--	--
Subtotal						
King County	--	--	--	--		
Mercer Island	4	3 live/ 1 dead	3	--		
Private	9	9 live/ 0 dead	7	2		
WSDOT	82	73 live/ 8 dead	73 (26 street)	--		
Total	**95**	**85 live/ 9 dead**	**83**	**2**		

DSH = diameter at standard height; MICC = Mercer Island City Code; NMPS = North Mercer Pump Station; ROW = right-of-way; WSDOT = Washington State Department of Transportation

*See Section 1.1 for definitions of trees

3. TREE PROTECTION SUMMARY & STRATEGY

Mercer Island requires development projects to identify trees for protection and use best management practices (BMPs) to ensure the long-term viability of those trees (MICC 19.10.080). Below, is a summary of the proposed trees identified for protection (Section 3.1), tree protection criteria identified in the MICC (Section 3.2), and the NME Project's tree protection techniques (Section 3.3). A tree protection plan is required by MICC 19.10.080 and is discussed in further detail in Section 4.3 of the Arborist Report (Tree Solutions 2019). An additional tree protection plan will be required as a submittal by the contractor's project arborist.

3.1 TREE PROTECTION SUMMARY

MICC 19.10.080 requires that a tree protection plan be prepared by a qualified arborist. The majority of details in the tree protection plan are provided in the Arborist Report (Tree Solutions 2019), which was prepared by a qualified arborist. Table 7 provides a summary of the proposed trees to be protected by work area and jurisdiction. Protected trees are those within 20 feet of the alignment which overlap with work limits or access and require protection action to preserve their current conditions. Further tree protection details are included in Sections 4.3 and Appendix F of the Arborist Report.

Table 7. Proposed Trees to be Protected

Work Area and Jurisdiction	# of Total Trees Protected	Quantity Large/ Moderate-Large*	Quantity Exceptional/ Mature*	Land Use Drawing Sheet #
NMPS and NMPS Stream				
King County	25	1	24	V1: D-C101
Mercer Island	1	--	1	V1: D-C101
Private	1	--	1	V1: D-C101
WSDOT	--	--	--	--
Street ROWs and I-90 Trail				
King County	--	--	--	--
Mercer Island	134	66	17	V2: C116, C162, C202-C208, C218, C220, C221, C225, C227, C230, C231
Private	21	16	4	V2: C202-C205, C218, C220, C227-C229
WSDOT	164	154	--	V2: C161, C209-C210, C214-C217, C221-C224, C226-C227, C229-C231
LS-11 (Fruitland Landing Park)				
King County	--	--	--	--
Mercer Island	8	7	1	V1: C602, C608
Private	--	--	--	--
WSDOT	--	--	--	--

Table 7. Proposed Trees to be Protected

Work Area and Jurisdiction	# of Total Trees Protected	Quantity Large/ Moderate-Large*	Quantity Exceptional/ Mature*	Land Use Drawing Sheet #
96th Avenue Siphon				
King County	--	--	--	--
Mercer Island	1	--	--	V2: C213
Private	7	5	1	V2: C211-212
WSDOT	36	34	--	V2: C211-C213
Mercer Island Boat Launch				
King County	--	--	--	--
Mercer Island	--	--	--	--
Private	--	--	--	--
WSDOT	47	38	--	V2: C131, C231
Subtotal				
King County	25	1	24	
Mercer Island	144	73	19	
Private	29	21	6	
WSDOT	247	226	0	
Total	**445**	**321**	**49**	

DSH = diameter at standard height; NMPS = North Mercer Pump Station; WSDOT = Washington State Department of Transportation

*See Section 1.1 for definitions of trees

3.2 TREE PROTECTION STANDARDS

As required by MICC 19.10.080, tree protection guidelines establish a TPZ for each individual tree. The TPZ uses a distance from each tree based on species tolerance to construction damage, relative tree age, and trunk diameter.

The TPZ for the NME Project was converted to an RLOD by a certified arborist (Arborist Report, Appendix F) and within the Site Plan. The RLOD is the distance from the trunk where no disturbance should occur. This distance is calculated by multiplying the trunk diameter by a TPZ factor. For most trees along the NME Project alignment, a certified arborist applied a TPZ factor of 8. For tree species with a low tolerance to construction damage (e.g., Katsuya, red alder, western red cedar, black cottonwood), and for mature trees greater than 30 inches in diameter, the arborist used a factor of 12. Further discussion of the RLOD calculations and caveats may be found in Section 4.3 of the Arborist Report (Tree Solutions 2019).

Within the Land Use Drawings Volumes I and II, the RLOD for each regulated tree is designated by ◌ symbology. Within the Arborist Report, the RLOD for each tree is designated within Appendix F.

Based on MICC 19.10.080(B), the Mercer Island arborist may approve construction-related activity of work within the tree protection barriers (e.g., RLOD) if the Mercer Island arborist concludes that:

- Such activity of work will not threaten the long-term health of the retained tree(s).
- Such activity of work complies with the protective methods and best building practices established by the ISA.

3.3 TREE PROTECTION TECHNIQUES

Tree protection techniques are based on BMPs, as outlined by Fite and Smiley (2016). Trees proposed to be protected are designated within the Land Use Drawings using the symbology identified in Section 3.2 above. The

proposed tree protection technique for each tree is designated within Appendix F of the Arborist Report (Tree Solutions 2019).

Tree protection techniques proposed for use within the NME Project on Mercer Island include the following:

1. Primary proposed tree protection strategies for the majority of protected trees throughout the Mercer Island alignment.

    a. **Tree Protection Fencing**: All trees planned for retention or on neighboring properties that overhang the site shall be protected when construction activities are occurring within the immediate vicinity. Tree protection fencing shall consist of 6-foot tall chain link fencing installed at the extent of the tree protection area. Fencing should encompass the entire area for groups of trees.
    b. **Signage**: Fencing should also have clear, large signage noting that fencing cannot be moved without an arborist present.
    c. **Soil Protection:** No parking, materials storage, or dumping (including excavated soils) are allowed within the tree protection area. Any heavy machinery should remain outside of the protection area unless soils are protected from the load. Acceptable methods of soil protection include applying 1-inch plywood over 3 to 4 inches of wood chip mulch, steel plates, or use of Alterna mats (or equivalent product).

2. Common proposed tree protection techniques for trees throughout the Mercer Island alignment:

    a. **Clearance Pruning**: Any pruning required for construction and safety clearance shall be done with a pruning specification provided by the project arborist in accordance with 2008 American National Standards Institute (ANSI) A300 Standard Practices for Pruning. Use of an arborist with an ISA Certification to perform pruning is strongly advised.
    b. **Duff/Mulch**: Retain and protect as much of the existing duff and understory as possible. Retained trees in areas where there are exposed soils shall have 4 to 6 inches of wood chips applied to help prevent water evaporation and compaction. Keep mulch 1 foot away from the base of the tree.
    c. **Temporary Irrigation**: Retained trees will require supplemental water if construction occurs during summer drought periods.

3. Other tree protection techniques under consideration:

    a. **Alternative Excavation**: Excavation done at or within the tree protection area should be carefully planned to minimize disturbance. Where feasible, consider using alternative methods such as pneumatic excavation using pressurized air to blow soil away from the root system, directional drilling to bore utility lines, or hand excavation to expose roots. Excavation done with machinery (backhoe) in proximity of trees should be performed slowly with flat front buckets, removing small amounts of soil at a time with one person on the ground spotting for roots. When roots are encountered, excavation should stop, and roots should be cleanly pruned as needed.
    b. **Root Pruning**: Root pruning should be limited to the extent possible. All roots shall be pruned with a sharp saw making clean cuts. Avoid fracturing and breaking roots with excavation equipment. Root cuts shall be immediately covered with soil or mulch and kept moist.

Tree protection techniques should include limiting over-excavation by marking the trench width on the pavement prior to digging, using small equipment (as available) with a narrow flat front bucket, and having someone on the ground spotting for roots greater than 3 inches in diameter.

Alternative trenching methods may need to be considered if a significant root mass is uncovered (i.e., pneumatic /hydro excavation or directional boring), depending on the proposed construction. At this time, no proposed construction techniques would allow for these alternatives.

While not required specifically by WSDOT or Mercer Island, MICC states that BMPs should be followed for tree protection. The above listed methods are components of the BMPs.

4. TREE RETENTION & REPLACEMENT STRATEGY

Mercer Island requires development projects to identify a tree retention and replacement strategy (MICC 19.10.090). WSDOT (2015) also defines specific replacement criteria for trees within their jurisdiction. Below is a summary of the proposed tree retention (Section 4.1) and proposed tree replacements (Section 4.2) for Mercer Island and WSDOT.

4.1 TREE RETENTION

Specific tree retention is not identified under the WSDOT (2015) *Roadside Policy Manual*, but there are specific retention regulations for Mercer Island. According to MICC 19.10.010, a minimum of 30% of the trees within a development project need to be retained. No Action trees were surveyed within twenty feet of the alignment according to the 30% Design and require no action for the preservation of their current conditions. Protected or Removed trees within the survey overlap with work limits or access and require protection action to preserve their current conditions, or removal and replacement. Trees that are exceptional or large, and have a high likelihood for long-term survival, are prioritized for retention (see MICC 19.10.060 for details). Mercer Island tree retention regulations have been applied across all trees within the NME Project and across all jurisdictions on Mercer Island, including WSDOT ROW. The NME Project will retain 48% of impacted trees (Table 8), meeting Mercer Island's 30% minimum for tree retention, including 14 exceptional trees of ≥24-inch DSH that shall be credited towards compliance with the retention requirements (MICC 19.10.060.3).

Table 8. Proposed Tree Retention for the NME Project

Proposed Action	Quantity of Trees
No Action (unimpacted)	224
Protected*	
Exceptional	62 (incl. 11 ≥24-inches DSH**)
Large	313
Small (including early successional)	78
Dead (snag)	3
Total Protected	**456**
Removed*	
Exceptional	19
Large	361
Small (including early successional)	67
Dead	31
Total Removed	**478**
Total Trees Surveyed	**1,158**
Total Trees Impacted (Protected or Removed)	**934**
Percent Retention (Protected/Impacted)	**49%**

DSH = diameter at standard height; NMPS = North Mercer Pump Station; WSDOT = Washington State Department of Transportation

*See Section 1.1 for definitions of trees.
**Retention of exceptional trees ≥24-inches DSH shall be credited towards compliance with the retention requirements (MICC 19.10.060.3).

4.2 TREE REPLACEMENTS

Trees that are removed are required to be replaced in accordance with MICC and WSDOT policies, depending on the location of the tree that is being removed. The following section provides information on the Mercer Island tree replacement requirements (Section 4.2.1), WSDOT tree replacement requirements (Section 4.2.2), tree replacement calculations and quantities (Section 4.2.3), tree replacement locations and design (Section 4.2.4), tree replacement schedule (Section 4.2.5), and in-lieu tree replacement fees (Section 4.2.6).

This information is a combination of direct consultation with Mercer Island and WSDOT on a tree replacement strategy and the requirements specified under each jurisdiction. Please note that the NME Project is in consultation with both Mercer Island and WSDOT on final tree replacement quantities. Replacement locations are being developed for offsite planting, but have not been fully determined. The Arborist Report (Tree Solutions 2019) further describes specifications for planting trees types (Appendix B) and tree replacement regulations for Mercer Island (Appendix C). A summary of tree replacement regulations for the NME Project was identified both above and below (Sections 3.3-3.4, 4.1-4.2).

4.2.1 Mercer Island Tree Replacement Requirements

Trees on King County property, within the Mercer Island ROW, or on private property are subject to replacement requirements under MICC 19.10.070 (Table 9). Additional discussions with Mercer Island on tree replacement requirements are on-going.

Table 9. Mercer Island Tree Replacement Requirements

Diameter of Removed Tree (inches)	Replacements Required (quantity of 6-inch conifer/1.5-inch caliper deciduous/$500)
All exceptional trees	6
>36 (Exceptional - regulated)	6
24 – 36 (Large - regulated)	3
10 – 24 (Large - regulated)	2
< 10* (Small – unregulated)	1

*Trees of this size require replacement on private property only if they were initially planted as required replacement trees and have not yet reached 10 inches. Mercer Island ROW trees >6 inches will likely require a 1:1 replacement as well.

4.2.2 WSDOT Tree Replacement Requirements

Where preservation of vegetation and soil is not practical, WSDOT requires restoration of the disturbed area. This includes tree replacement for all WSDOT street trees, trees greater than 30 inches DSH, and trees (with the exception of red alders, willow, and black cottonwood) larger than 4 inches that will be removed (Table 10). These replacement requirements are based off the replacement ratios in the WSDOT (2015) *Roadside Policy Manual*, and from conversations with the current WSDOT landscape architect, who provided information regarding street tree definitions (WSDOT – Peterson, pers. comm., 2018). WSDOT intends to include street tree designations in their next revised *Roadside Policy Manual* and implement regulations for street trees for the NME Project. However, it is also understood that trees were originally planted at densities that were too high for survival along the I-90 Trail, and expected attrition from the regulated trees may need to be incorporated into the tree replacement requirements. Further discussion of WSDOT tree and vegetation replacement can be found within Section 3.3 of the Arborist Report, and are on-going for the NME Project with WSDOT.

Table 10. Tree Replacement Requirements (WSDOT)

Classification*	Diameter of Removed Tree (inches)	Replacements Required (qty of 1-gallon)	Replacements Required (qty of 2-gallon)	Replacements Required (qty of 2.5-inch caliper)
Category 1	>30	TBD**	--	--
Category 2	10+	10+***	5+	--
Category 2	9	9	4.5	--
Category 2	8	8	4	--
Category 2	7	7	3.5	--
Category 2	6	6	3	--
Category 2	5	5	2.5	--
Category 2	4	4	2	--
Category 3	n/a	1****	--	--
Street Tree	n/a	--	--	1

DSH = diameter at standard height; TBD = to be determined; WSDOT = Washington State Department of Transportation

*Category 1 = Mature trees >30 inches DSH; Category 2 = Moderate-sized trees with 4 inches to 30 inches DSH; Category 3 = Small trees <4-inch DSH; Street trees are designated by a WSDOT landscape architect. Early successional species (such as red alder (*Alnus rubra*), willow (*Salix* spp.), and black cottonwood (*Populus trichocarpa*) only require replacements if they are Category 1 or street trees.

**Category 1 tree replacement requirements (quantity and size) to be determined by highly qualified landscape architect.

***Category 2 trees should be replaced at a ratio of one 1-gallon replacement tree for each 1-inch of trunk diameter. The quantity of required replacements for Category 2 trees can be reduced if the size of nursery stock is increased.

****Category 3 trees should be replaced using a 1:1 ratio, following BMPs for restoration of disturbed areas. Planted material may be a mix of trees and shrubs.

4.2.3 Tree Replacement Calculations and Quantities

Basic tree replacements for the NME Project include all regulated trees by Mercer Island and WSDOT (Table 11), without consideration of existing densities that are not sustainable or other conversations that are on-going with both Mercer Island and WSDOT. This also does not include dead trees, small diameter trees, or early successional species identified in along the proposed NME Project alignment (see Arborist Report for this information).

Table 11. Summary of Required Tree Replacements

Location and Tree Type	Total Live Removals	Replacement Requirements	Quantity of Replacements Required*			
			6-Foot Conifer/ 1.5-Inch Caliper/ $500	1-Gallon	2-Gallon Alternative	2.5-Inch Caliper
King County Property						
Exceptional	2	Six 6-foot conifer / 1.5" caliper deciduous / $500	12	--	--	--
Exceptional - Grove	5	Six 6-foot conifer / 1.5" caliper deciduous / $500	30	--	--	--
Large (Regulated) >10-inch DSH	17	Two 6-foot conifer / 1.5" caliper deciduous / $500	34	--	--	--
Mercer Island ROW						
Exceptional	0	Six 6-foot conifer / 1.5" caliper deciduous / $500	0	--	--	--
10- to 24-inch DSH	23	Two 6-foot conifer / 1.5" caliper deciduous / $500	46	--	--	--
6- to 10-inch DSH	22	One 6-foot conifer / 1.5" caliper deciduous / $500	22	--	--	--
<6-inch DSH**	8	One 6-foot conifer / 1.5" caliper deciduous / $500	8	--	--	--
Private Property* **						
Exceptional	2	Six 6-foot conifer / 1.5" caliper deciduous / $500	12	--	--	--
Exceptional - Grove	9	Six 6-foot conifer / 1.5" caliper deciduous / $500	54	--	--	--
Large (Regulated) >10-inch DSH	8	Two 6-foot conifer / 1.5" caliper deciduous / $500	16	--	--	--
WSDOT ROW						
Category 2	245	Four to >ten 1-gallon (Alt: two to >five 2-gal)	--	2,414	1207	--
Street Tree	68	One 2.5-inch caliper	--	--	--	68
Category 3****	24	One 1-gallon (Alt: two to >five 2-gal)	--	24	12	--
Totals	**433**		**234**	**2,438**	**1,219**	**68**

*Quantities may be reduced if larger plants are installed, or based on other agreements with either Mercer Island or WSDOT.
**Mercer Island ROW trees >6-inch DSH will likely require a 1:1 replacement.
***Trees <10-inches DSH require replacement on private property only if they were initially planted as required replacement trees and have not yet reached 10 inches.
****Category 3 trees should be replaced using a 1:1 ratio, following BMPs for restoration of disturbed areas. Planted material may be a mix of trees and shrubs.

4.2.4 Tree Replacement Locations and Design

Based on the information presented above, a total of 234, 6-foot conifers, 2,438, 1-gallon trees (or 1,219, 2-gallon trees), and 68, 2.5-inch caliper trees are required to be replaced along the NME Project alignment. A total of 675 trees are currently proposed for replacement for the NME Project, with additional trees to be provided using fee-in-lieu of planting onsite or planting other offsite locations due to the restriction in the amount of planting area onsite. The currently proposed locations of the tree replacements proposed will occur in the following work areas:

- **NMPS and NMPS Stream:** The NME Project proposes to conduct facility improvements for the existing pump station located on Mercer Island. Trees will be replaced along the stream buffer on the King County property. The NME Project also proposes to replace the existing pipe by installing new sewer pipe using typical open cut-and-cover construction methods across the stream adjacent to NMPS on King County property. Access for the NMPS stream crossing work will be off the public ROW, and then through existing developed areas associated with the NMPS facility.

  - Conceptual restoration layout: PLAN (V1: L101 – L104; V2: C081 – C086, C401)
  - Total restoration area: 26,524 square feet
  - Proposed trees: A total of 173 trees within Planting Mix A through D and Planting Mix G

- **Street ROWs and I-90 Trail:** The NME Project proposes to install new pipe from the NMPS Stream to the Mercer Island Boat Launch, primarily along street ROWs and the I-90 Trail. Work along the I-90 Trail itself will include widening the trail from an average 10-foot width to an average 12-foot width with 2-foot shoulder on either side. This trail widening is based on requirements from Mercer Island, as defined in the Aubrey-Davis Master Plan (Mercer Island 2018). Trees will be replaced along the Street ROWs and I-90 Trail work area.

  - Conceptual restoration layout: PLAN (V2: C081 – C086, C402 – C431)
  - Total restoration area: 59,442 square feet (excluding lawn seeding)
  - Proposed trees: A total of 300 trees within Planting Mix A through D and Mix J through Q

- **LS-11 (Fruitland Landing Park):** The NME Project proposes to upgrade the pump station at Fruitland Landing Park to allow decommissioning of existing pipe in Lake Washington around the northeast end of Mercer Island and construct new pipe within upland areas. Trees will be replaced in the Fruitland Landing Park work area.

  - Conceptual restoration layout: PLAN (V1: L-602 – L-602)
  - Total restoration area: 331 square feet (excluding lawn seeding)
  - Proposed trees: A total of 1 tree within Planting Mix A.

- **96th Avenue Siphon:** The NME Project proposes to construct a new siphon close to an existing maintenance hole south of I-90 to allow decommissioning of existing pipe in Lake Washington around the northeast end of Mercer Island and construct new pipe within upland areas. Trees will be replaced in the 96th Avenue Siphon work area.

  - Conceptual restoration layout: PLAN (V2: C081 – C086, C427)
  - Restoration and Tress are accounted for within the I-90 Trail values (above)

- **Mercer Island Boat Launch:** The NME Project proposes to install pipe to connect the upland portions of the North Mercer Island Interceptor to the in-water portions of the East Channel Siphon. Upland areas on either side of the channel crossing will be restored with landscaping and habitat improvements (e.g., anchor logs, gravel).

  - Conceptual restoration layout: PLAN (V2: C087, C431 – C432)
  - Total restoration area: 13,125 square feet and 887 square feet of live stakes
  - Proposed trees: A total of 191 trees within the Shoreline Restoration Mix Planting Mix Vegetation and additional live stakes

The total number of trees proposed for replacement along the NME Project alignment is 675 trees (Table 12). These numbers are based on the general site restoration and enhancement plans for each work area and the

planting mixes proposed for each location. The locations of the planting mixes are identified in the PLAN drawings. Note that, due to space limitations and revised criteria for the widening of the I-90 Trail, not all trees will be replaced. The preference is to replace the area with lower-elevation shrubs that will not impact sight lines for trail users. The types and quantities of trees to be replaced along the I-90 Trail are based on negotiations with Mercer Island and WSDOT that pair the public need for an upgraded trail and the amount of trees to be removed.

Table 12. Proposed Tree Replacements

Common Name	Scientific Name	Quantity	Root Size	Height (feet)	Land Use Drawing Sheet #
City of Mercer Island (Mercer Island, Private, King County)					
Trees					
Incense cedar	*Calocedrus decurrens*	8	#95 CONT.	10-12	V1: L101; V2: C413
Magyar ginkgo	*Ginkgo biloba 'magyar'*	4	2.5 IN CAL., B&B	--	V2: C423, C424, C425
American hornbeam	*Carpinus caroliniana*	2	#5 CONT.	--	V2: C413
Red rage tupelo	*Nyssa silvatica 'red rage'*	8	2.5 IN CAL., B&B	--	V2: C413, C414, C426
Persian ironwood	*Parrotia persica*	3	2.5 IN CAL., B&B	--	V2: C414, C415
Vanessa Persian ironwood	*Parrotia persica 'Vanessa'*	3	2.0 IN. CAL., B&B		V1: L101
Italian oak	*Quercus frainetto*	7	2.5 IN CAL., B&B	--	V2: C424, C425
Legacy sugar maple	*Acer saccharum 'legacy'*	3	2.0 IN CAL, B&B	--	V1: L101
Vine maple	*Acer circinatum*	1	1.5 IN CAL, B&B	--	V1: L601
Redmond basswood	*Tilia americana 'redmond'*	13	2.5 IN CAL., B&B	--	V2: C413, C414
Chinese fringe tree	*Chionanthus retusus*	3	2.0 IN CAL, B&B	--	V1: L101
Western redcedar	*Thuja plicata*	2	#95 CONT.	10-12	V1: L101
Western redcedar	*Thuja plicata*	56	#2 CONT.	1.25	V1: L101
Excelsa western redcedar	*Thuja plicata 'excelsa'*	15	#95 CONT.	10-12	V1: L101
Western hemlock	*Tsuga heterophylla*	37	#2 CONT.	1.25	V1: L101
Cascara buckthorn	*Rhamnus purshiana*	21	#2 CONT.	--	V1: L101
Douglas-fir	*Pseudotsuga menziesii*	35	#2 CONT.	1.25	V1: L101
WSDOT Right-of-Way					
Trees					
Incense cedar	*Calocedrus decurrens*	130	#5 CONT.	1.5	V2: C411, C412, C413, C417, C421, C422, C423, C424
Eddie's white wonder dogwood	*Cornus 'eddies white wonder'*	38	#5 CONT.	--	V2: C411, C412, C413, C417, C421, C422, C423, C424
Magyar ginkgo	*Ginkgo biloba 'magyar'*	3	2.5 IN CAL., B&B	--	V2: C423, C424
American hornbeam	*Carpinus caroliniana*	24	#5 CONT.	--	V2: C412, C413, C417, C423
Red rage tupelo	*Nyssa silvatica 'red rage'*	2	2.5 IN CAL., B&B	--	V2: C412,

Table 12. Proposed Tree Replacements

Common Name	Scientific Name	Quantity	Root Size	Height (feet)	Land Use Drawing Sheet #
Persian ironwood	*Parrotia persica*	9	2.5 IN CAL., B&B	0.5	V2: C412, C430, 432
Shore pine	*Pinus contorta*	24	#5 CONT.	--	V2: C411, C412, C417, C421, C422, C423, C424
Italian oak	*Quercus frainetto*	5	2.5 IN CAL., B&B	--	V2: C423, C424
Western redcedar	*Thuja plicata*	31	#5 CONT.	1.5	V2: C412, C417, C421
Willows	*Salix spp.*	188	Live Stakes	--	V2: C430, C432
Shrubs					
Compact strawberry tree	*Arbutus unedo 'compacta'*	33	#2 CONT.	--	V2: C412
Bitter cherry	*Prunus emarginata*	5	#2 CONT.	--	V2: C430, 432
Salal	*Gaultheria shallon*	291	#1 CONT.	--	V2: C430, 432
Tall Oregon-grape	*Mahonia aquifolium*	217	#2 CONT.	--	V2: C412, C413, C414, C415, C416, C417, C421, C428, C429, C430, 432
Low Oregon-grape	*Mahonia nervosa*	897	#1 CONT.	--	V2: C430, 432
Creeping Oregon-grape	*Mahonia repens*	681	#1 CONT.		V2: C430, 432
Indian plum	*Oemleria cerasiformis*	32	#1 CONT.	--	V2: C430, 432
Pacific wax myrtle	*Myrica californica*	107	#2 CONT.	--	V2: C412, C421,C428, C429
Pacific rhododendron	*Rhododendron macrophyllum*	7	#2 CONT.	--	V2: C430, 432
Beaked hazelnut	*Corylus cornuta*	32	#1 CONT.	--	V2: C430, 432
Vine maple	*Acer circinatum*	137	#2 CONT.	--	V2: C413, C414, C415, C416, C417, C421, C428, C429, C430, 432
Red osier dogwood	*Cornus sericea*	94	Live Stakes	--	V2: C430, 432
Kelsey dogwood	*Cornus sericea 'Kelseyi'*	469	#1 CONT.	--	V2: C430, 432
Western serviceberry	*Amelanchier alnifolia*	38	#2 CONT.	--	V2: C413, C414, C415, C416, C417, C429
Evergreen huckleberry	*Vaccinium ovatum*	395	#1 CONT.	--	V2: C412, C413, C414, C415, C416, C417, C421, C428, C429, C430, 432
Thimbleberry	*Rubus parviflorus*	191	#1 CONT.	--	V2: C413, C414, C415, C416, C417, C421, C428, C429, C430, 432
Snowberry	*Symphoricarpos albus*	180	#1 CONT.	--	V2: C413, C414, C415, C416, C417, C429, C430, 432
Baldhip rose	*Rosa gymnocarpa*	214	#1 CONT.	--	V2: C430, 432
Mock orange	*Philadelphus spp.*	34	#1 CONT.	--	V2: C430, 432
Western sword fern	*Polystichum munitum*	244	#1 CONT.	--	V2: C430, 432

CONT. = container; B&B = balled and burlapped; CAL = caliper

4.2.5 Tree Replacement Schedule

In accordance to MICC 19.10.070(B), replacement trees shall be planted in the wet season (October 1 through April 1), following the applicable tree removal or, in the case of a development proposal, completion of the development work, provided the Mercer Island arborist authorizes an extension to ensure optimal planting conditions for tree survival. Table 13 provides the proposed tree replacement planting schedule for the NME Project within Mercer Island.

Table 13. General Construction Sequencing and Proposed Tree Planting Schedule

Work Area Activity	Construction Sequencing	Duration	Proposed Timing for Plantings
NMPS and NMPS Stream Facility upgrades/staging Stream crossing/outfall modifications	 Apr 2021 to Dec 2023 Jul 2022 to Aug 2022	 33 months 2 months	 Fall 2023 (up to 9-month delay)
Street ROWs and I-90 Trail Pipe installation	Jul 2021 to Nov 2022	17 months	Jul 2021 to Nov 2022 (2- to 9-month delay)
LS-11 (Fruitland Landing Park) Facility upgrades	Mar 2021 to May 2022	14 months	Spring 2022 (no delay)
96th Avenue Siphon Siphon/vault installation	May 2022 to Oct 2022	6 months	N/A
Mercer Island Boat Launch Pipe installation	Jun 2021 to Nov 2022	18 months	Fall 2022 (no delay)

LS-11 = Lift Station 11; NMPS = North Mercer Pump Station

4.2.6 NME Project Tree Replacement and Fee-in-Lieu

The NME Project would meet tree replacement requirements of Mercer Island and WSDOT through a combination of plantings and fee-in-lieu negotiations with each jurisdiction. Below, fee-in-lieu of tree replacement strategies for Mercer Island and WSDOT are discussed. An initial summary of NME Project replacements proposed in relation to each jurisdiction's tree replacement regulations is provided in Table 14. As landscape and tree replacement proposals are reviewed by Mercer Island and WSDOT, this section will be finalized with negotiated quantities.

Mercer Island In-Lieu Tree Replacement Fees

In accordance with MICC 19.10.070(C), if the Mercer Island arborist determines that there is insufficient area to replant on the site or within the adjacent public ROW, then the Mercer Island arborist may authorize payment of a fee-in-lieu provided:

- There is insufficient area on the lot or adjacent ROW for proposed onsite tree replacement to meet the tree replacement requirements of this chapter (MICC 19.10.070(C)); or
- Tree replacement or management provided within public ROW or a city park in the vicinity will be of greater benefit to the community.
- Fees provided in-lieu of onsite tree replacement shall be determined based upon:
  - The expected tree replacement cost including labor, materials, and maintenance for each replacement tree; and
  - The most current Council of Tree and Landscaper Appraisers Guide for Plant Appraisal.
- Any fee-in-lieu is also optional for the applicant and requires an explicit written agreement.

WSDOT In-Lieu Tree Replacement Fees

As an alternative to replanting, WSDOT now has a tree mitigation program that allows for projects to fund replacement tree plantings elsewhere in the WSDOT ROW. This typically is about $300 per DBH of impact (WSDOT – Peterson, pers. comm., 2018).

Table 14. Summary of Required Tree Replacements by Jurisdiction

Size of Replacement Required	Quantity of Replacements Required	Planned Replacements	Remainder	Maximum Fee-in-Lieu
City of Mercer Island (Mercer Island, Private, King County)				
Six 6-foot conifer / 1.5" caliper deciduous / $500***	234	221*	13	$6,500****
WSDOT ROW				
1-Gallon	2,438	--	1,428**	TBD*****
2-Gallon Alternative	1,219	--	--	--
5-Gallon Alternative	604	247	--	--
2.5-Inch Caliper*****	68	19	49******	TBD*****
Live Stakes	--	188		
Medium and Large Shrubs	--	4,298	--	--

*Includes larger plantings
**1-Gallon equivalent, not including live stakes or shrubs
***Larger tree plantings may reduce the total amount of required replacements
****Fee-in-lieu to be negotiated with Mercer Island
*****Fee-in-lieu to be negotiated with WSDOT
******Planted material replacing street trees may be a mix of trees and shrubs

4.2.7 Maintenance of Replacement Trees

According to MICC 19.10.070(D), the applicant shall maintain all replacement trees in a healthy condition for a period of five years after planting. According to the WSDOT (2015) *Roadside Policy Manual*, the requirements is for a three year maintenance period. The NME Project will provide maintenance of replacement trees within Mercer Island ROW, WSDOT ROW, and Mercer Island, private, or King County property. The specifics about maintenance and monitoring will be worked out through consultation with Mercer Island and WSDOT.

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North Mercer Island Interceptor and Enatai Interceptor Upgrade Project
Critical Area Study

Appendix B. Results of GIS Database Searches

Appendix B. Results of GIS Database Searches

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PRIORITY HABITATS AND SPECIES REPORT

SOURCE DATASET: PHSPlusPublic Query ID: P190702121019
REPORT DATE: 07/02/2019 12.10

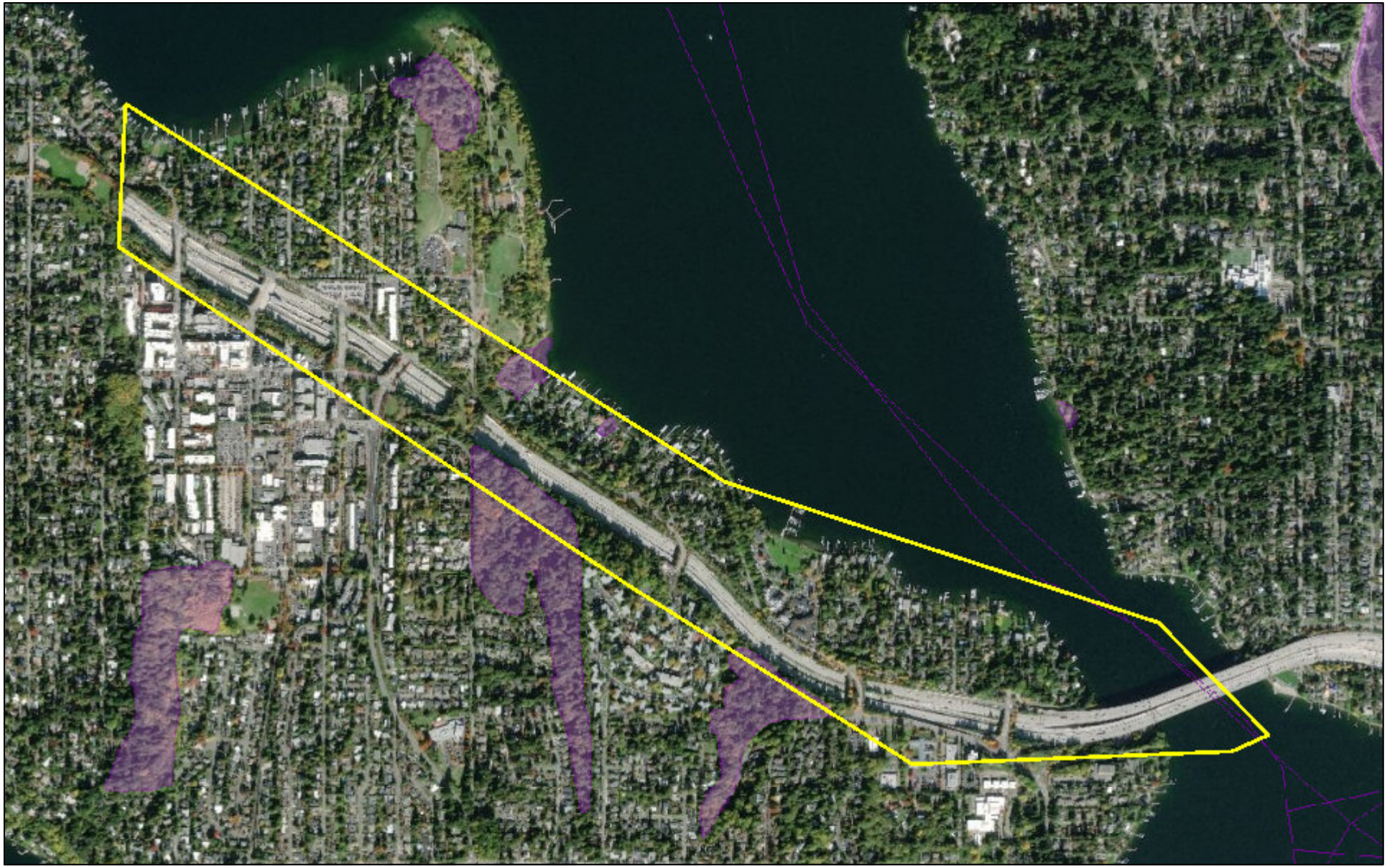
Common Name / Scientific Name / Notes	Site Name / Source Dataset / Source Record / Source Date	Priority Area / Occurrence Type / More Information (URL) / Mgmt Recommendations	Accuracy	Federal Status / State Status / PHS Listing Status	Sensitive Data / Resolution	Source Entity / Geometry Type
Biodiversity Areas And	MERCER ISLAND OPEN SPACE PHSREGION 902041	Terrestrial Habitat N/A http://wdfw.wa.gov/publications/pub.php?	1/4 mile (Quarter	N/A N/A PHS LISTED	N AS MAPPED	WA Dept. of Fish and Wildlife Polygons
Chinook Oncorhynchus tshawytscha	Cedar River SASI 1144	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Threatened N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Coho Oncorhynchus kisutch	Cedar River SWIFD 39531	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	Lines
Coho Oncorhynchus kisutch	Cedar River SASI 3120	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Candidate N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Coho Oncorhynchus kisutch	Cedar River SASI 3130	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Candidate N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Dolly Varden/ Bull Trout Salvelinus malma	Cedar River SWIFD 39537	Breeding Area Breeding area http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	Lines
Fall Chinook Oncorhynchus tshawytscha	Cedar River SWIFD 39527	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	Lines

Common Name Scientific Name Notes	Site Name Source Dataset Source Record Source Date	Priority Area Occurrence Type More Information (URL) Mgmt Recommendations	Accuracy	Federal Status State Status PHS Listing Status	Sensitive Data Resolution	Source Entity Geometry Type
Freshwater Forested/Shrub	N/A NWIWetlands	Aquatic Habitat Aquatic habitat http://www.ecy.wa.	NA	N/A N/A PHS Listed	N AS MAPPED	US Fish and Wildlife Service Polygons
Kokanee Oncorhynchus nerka	Cedar River SWIFD 39538	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	 Lines
Lake	N/A NWIWetlands	Aquatic Habitat Aquatic habitat http://www.ecy.wa.	NA	N/A N/A PHS Listed	N AS MAPPED	US Fish and Wildlife Service Polygons
Resident Coastal Cutthroat Oncorhynchus clarki	Cedar River SWIFD 39526	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	 Lines
Sockeye Oncorhynchus nerka	Cedar River SWIFD 39540	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	 Lines
Sockeye Oncorhynchus nerka	Cedar River SASI 5200	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Not Warranted N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Sockeye Oncorhynchus nerka	Cedar River SASI 5300	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Not Warranted N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Sockeye Oncorhynchus nerka	Cedar River SASI 5400	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Not Warranted N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines

Common Name Scientific Name Notes	Site Name Source Dataset Source Record Source Date	Priority Area Occurrence Type More Information (URL) Mgmt Recommendations	Accuracy	Federal Status State Status PHS Listing Status	Sensitive Data Resolution	Source Entity Geometry Type
Steelhead Oncorhynchus mykiss	Cedar River SASI 6154	Occurrence Occurrence http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	Threatened N/A PHS Listed	N AS MAPPED	WDFW Fish Program Lines
Wetlands	LAKE WASHINGTON PHSREGION 902675	Aquatic Habitat N/A http://www.ecy.wa.	1/4 mile (Quarter	N/A N/A PHS LISTED	N AS MAPPED	WA Dept. of Fish and Wildlife Polygons
Winter Steelhead Oncorhynchus mykiss	Cedar River SWIFD 39543	Occurrence/Migration Occurrence/migration http://wdfw.wa.gov/wlm/diversty/soc/soc.htm http://wdfw.wa.gov/publications/pub.php?	NA	N/A N/A PHS LISTED	N AS MAPPED	 Lines

DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necesssary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to vraition caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

WDFW Test Map



July 2, 2019

PHS Report Clip Area

PT

LN

POLY

AS MAPPED

SECTION

QTR-TWP

TOWNSHIP

1:22,161

0 0.175 0.35 0.7 mi

0 0.3 0.6 1.2 km

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Also in this section

Species & Habitats

Species in Washington (/species-habitats/species)

Living with wildlife (/species-habitats/living)

At-risk species (/species-habitats/at-risk)

Species in Washington

Learn more about a specific fish or wildlife species in Washington.

great blue heron

Search

Name	Latin name
Great blue heron (/species-habitats/species/ardea-herodias)	Ardea herodias

Displaying 1 - 1 of 1

Aquatic Invasive Species (/species-habitats/invasive)

Wildlife diseases (/species-habitats/diseases)

Habitat recovery and protection (/species-habitats/habitat-recovery)

Top tasks

Log in to the WILD licensing website (https://fishhunt.dfw.wa.gov/#/login)

Get razor clam information (/fishing/shellfishing-regulations/razor-clams)

Report a violation (/about/enforcement/report)

Submit a photo (/share)

Report a website error (/website-error-report)

About WDFW

(/about)

Regional offices (/about/regional-offices)

Fish and Wildlife Commission (/about/commission)

Enforcement (/about/enforcement)

Public records requests (/about/administration/public-records)

Contact us (/about/contact)

Jobs at WDFW

Stay connected

WDFW @thewdfw

WDFW @WDFW

Police

TheWDFW WDFW Blog

Join our email lists

Jobs at WDFW
(/about/jobs)

Rule making
(/about/regulations)

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Fish Passage

Culverts

- Total Blockage
- Total Blockage, Fishway Present
- Partial Blockage
- Partial Blockage, Fishway Present
- Unknown Blockage
- Unknown Blockage, Fishway Present

Dams

- Total Blockage
- Total Blockage, Fishway Present
- Partial Blockage
- Partial Blockage, Fishway Present
- Unknown Blockage
- Unknown Blockage, Fishway Present

Other Barriers

- Total Blockage
- Total Blockage, Fishway Present
- Partial Blockage
- Partial Blockage, Fishway Present
- Unknown Blockage

Facilities

Hatcheries and Rearing

- Hatchery
- Rearing Facility

FishTraps

- Trap - Adult
- Trap - Juvenile
- Trap - Unknown Juvenile or Adult

Major Dams

- Major Dams

County Lines

Water Resource Inventory Area (WRIA)

Township & Range

- Township
- Section

ESA Listing Units

- Endangered, Accessible
- Endangered, Historical Watershed: Man-Made Blockage
- Threatened, Accessible
- Threatened, Historical Watershed: Man-Made Blockage
- Species of Concern, Accessible
- Species of Concern, Historical Watershed: Man-Made Blockage
- Not Warranted, Accessible
- Not Warranted, Historical Watershed: Man-Made Blockage

Fish Distribution

- Documented Presence
- Documented Spawning
- Documented Rearing
- Presumed Presence
- Modeled Presence
- Potential: Blocked
- Documented Historic Presence
- Transported Presence
- Transported Spawning
- Transported Rearing
- Documented-Artificial, Presence
- Documented-Artificial, Spawning
- Documented-Artificial, Rearing

Hydrography

NHD Water Courses

- Coastline
- Stream / Perennial
- Intermittent / Ephemeral
- Canal, Ditch

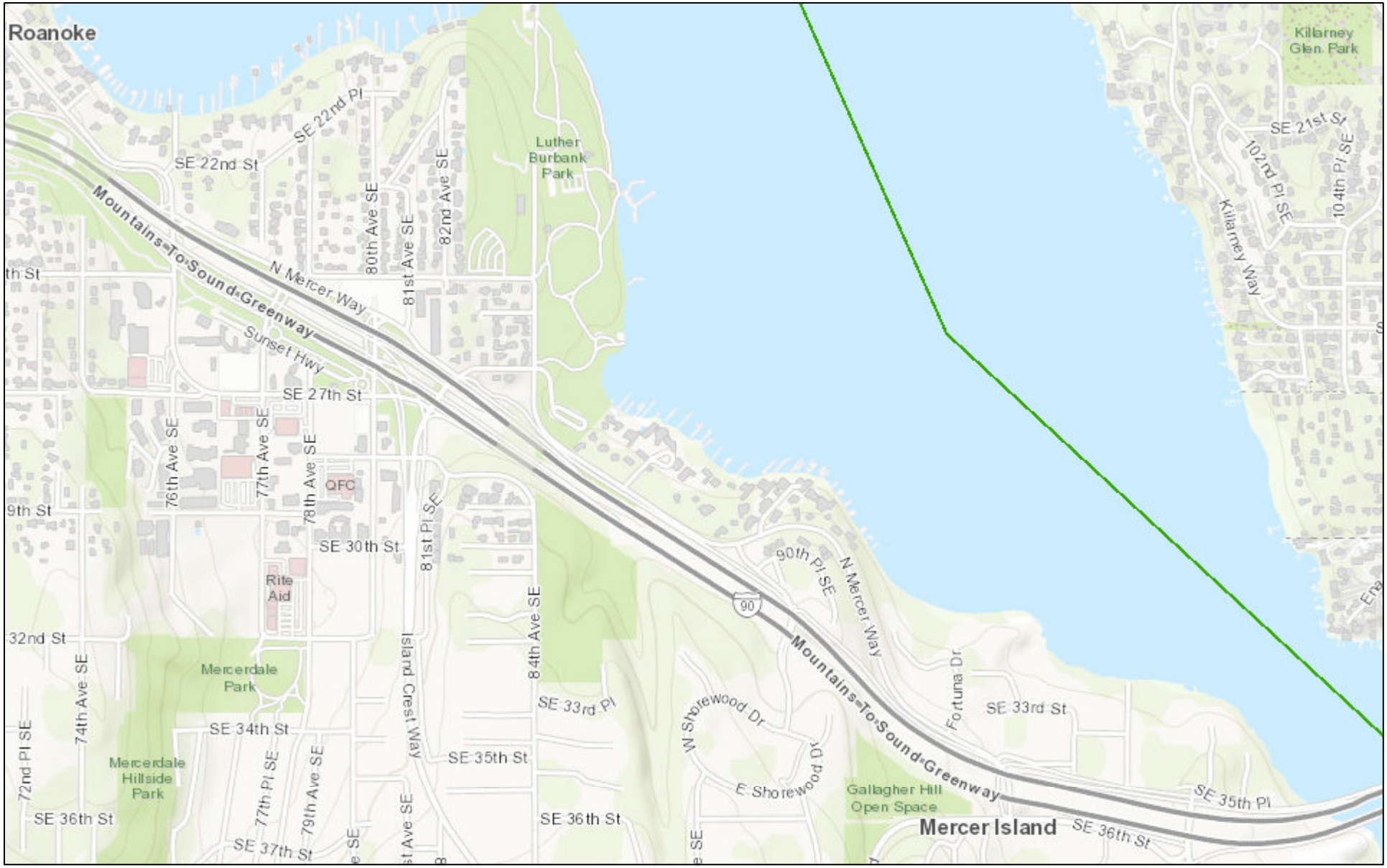
NHD Waterbodies

- Swamp, Marsh
- Lake, Pond, Reservoir
- Glacier

NHD Area Features

- Canal, Ditch
- Large Rivers
- Rapids

Bull Trout



July 2, 2019

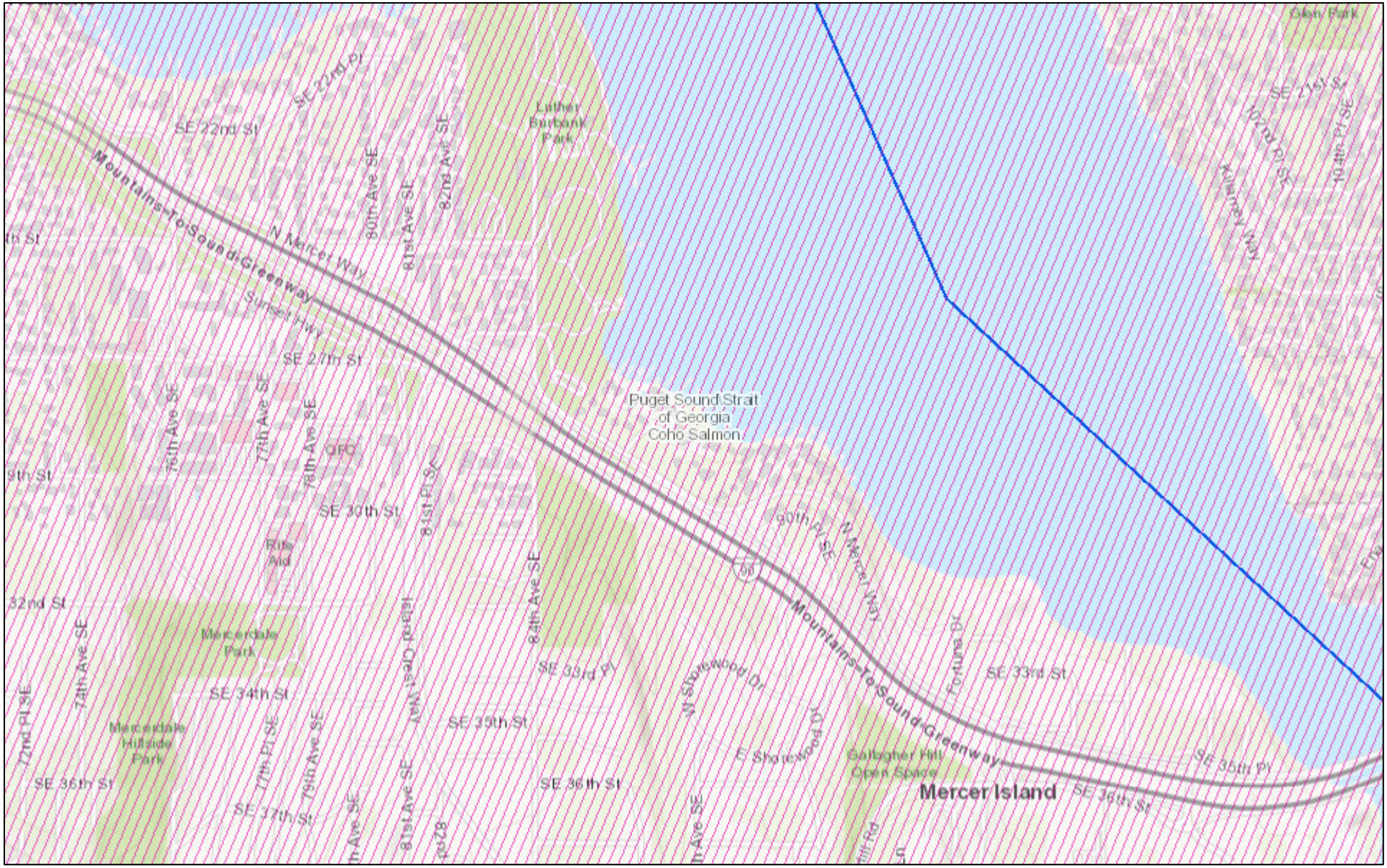
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0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Coho



July 2, 2019

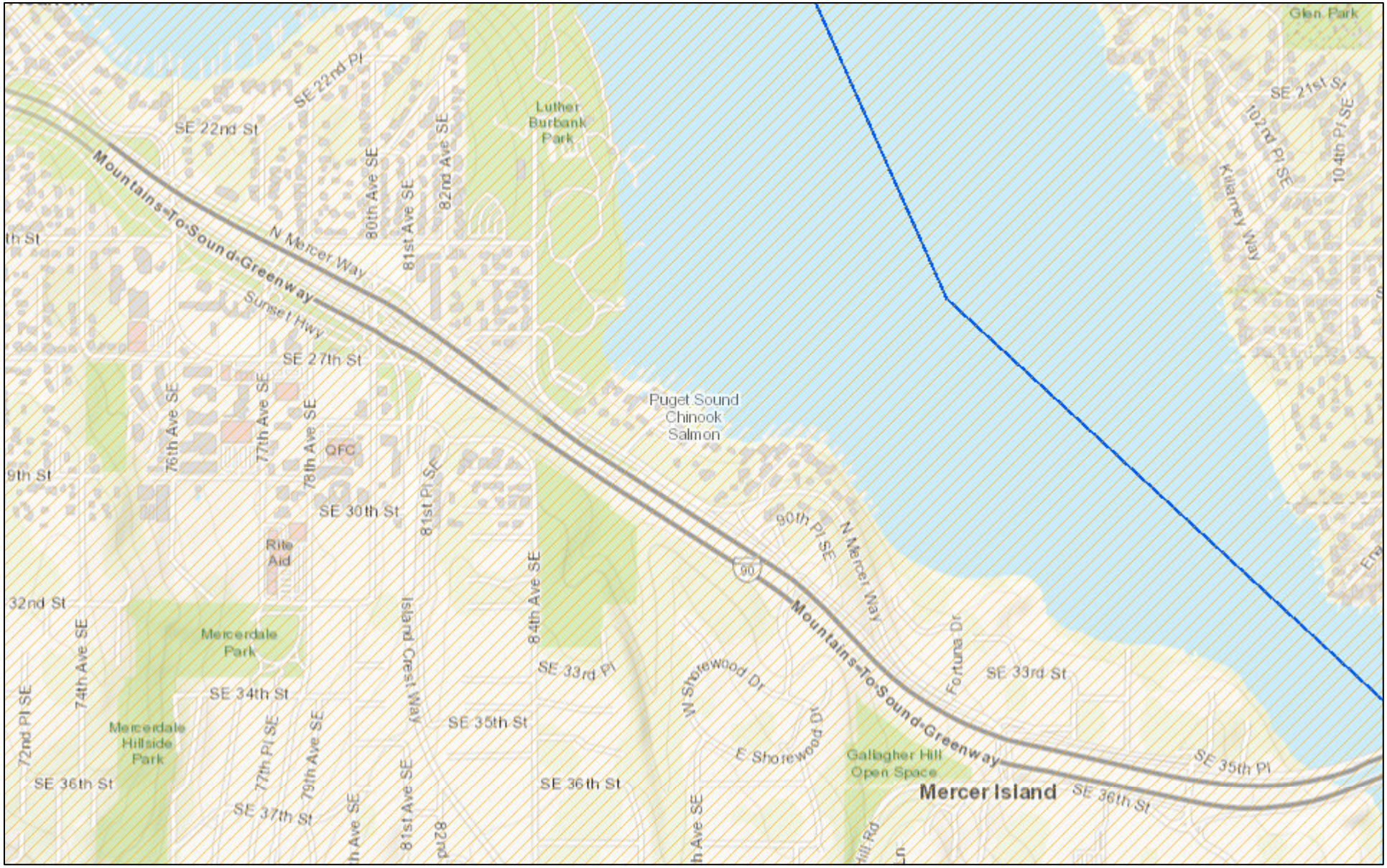
1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Fall Chinook



July 2, 2019

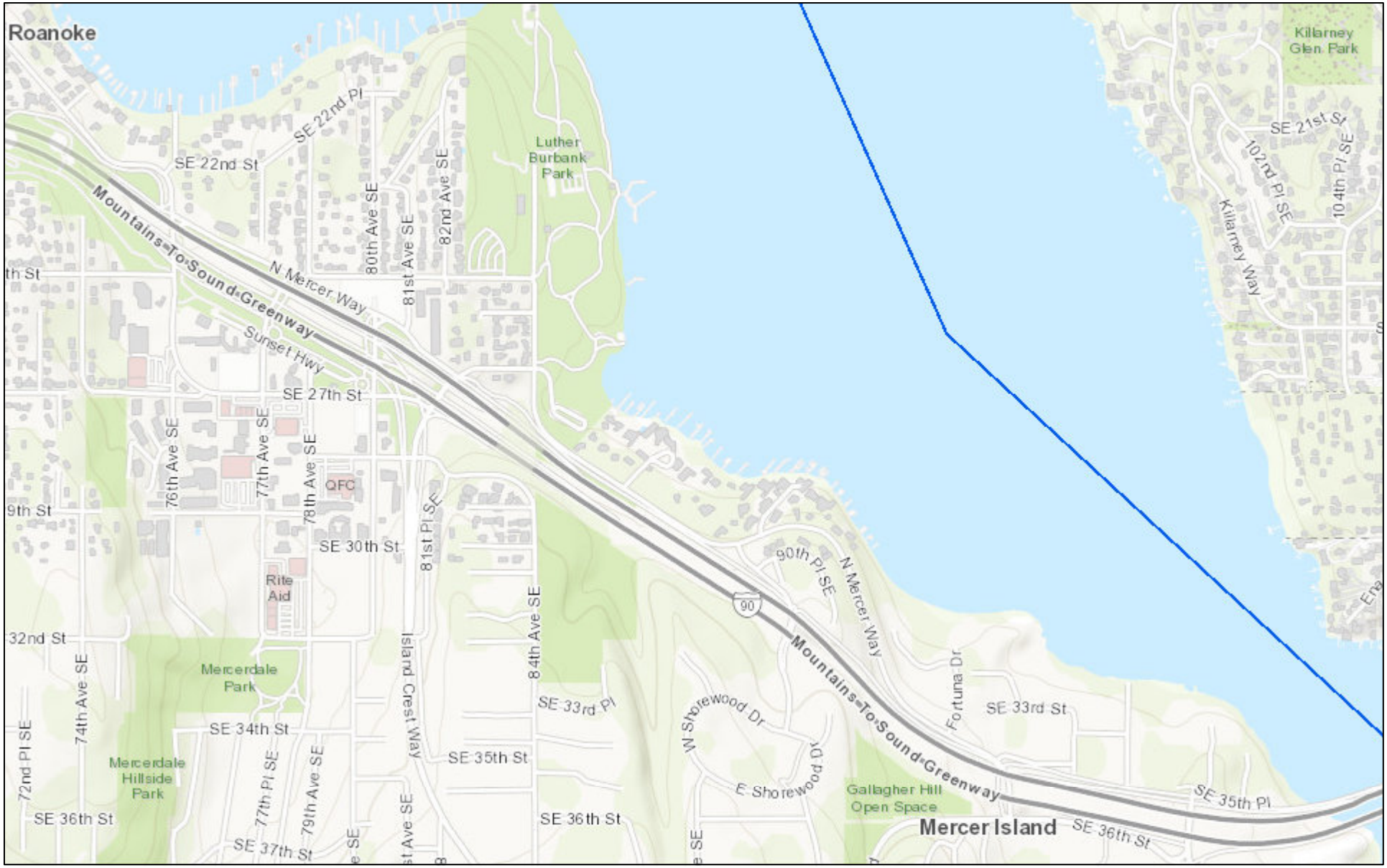
1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Kokanee



July 2, 2019

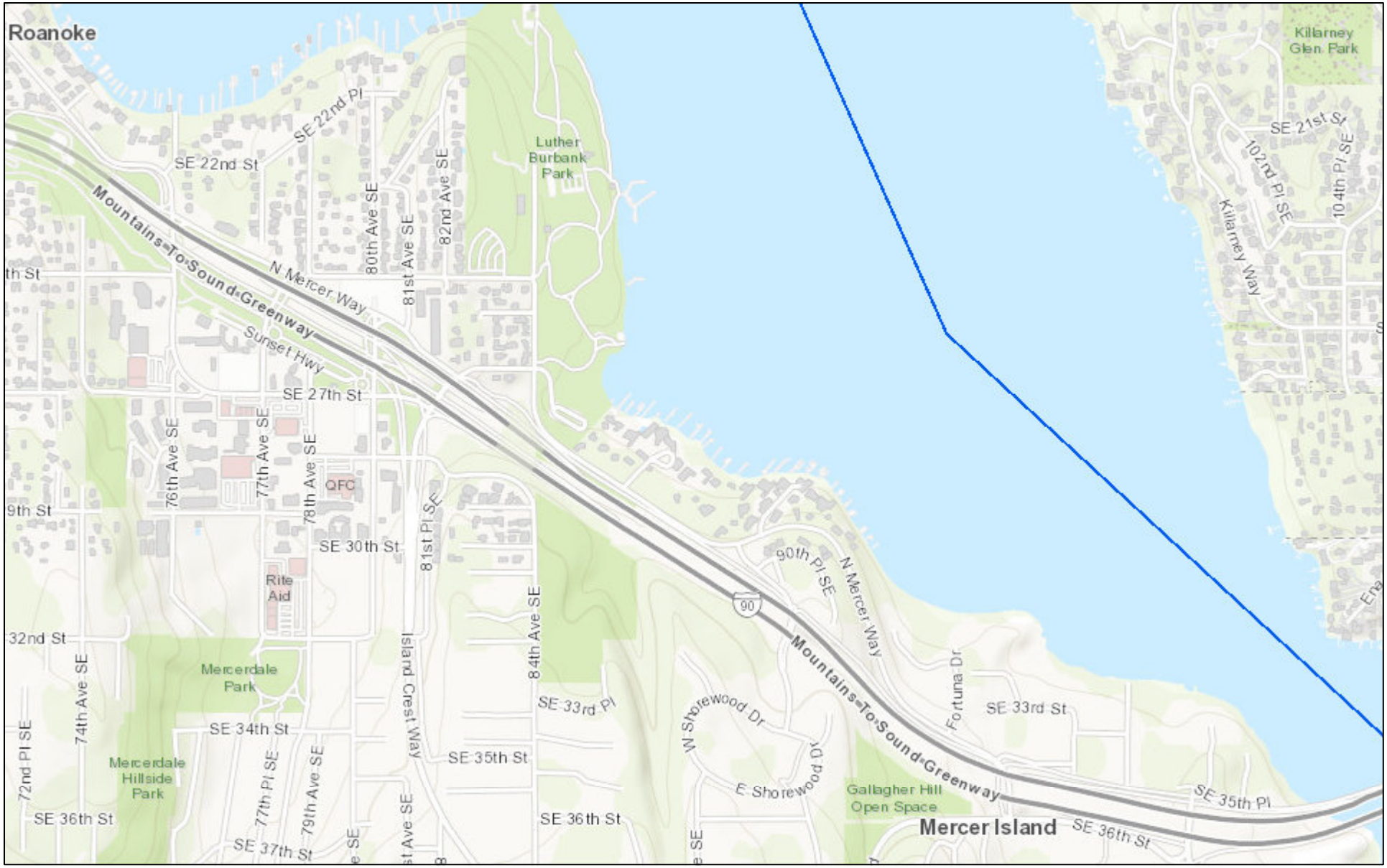
1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Sockeye



July 2, 2019

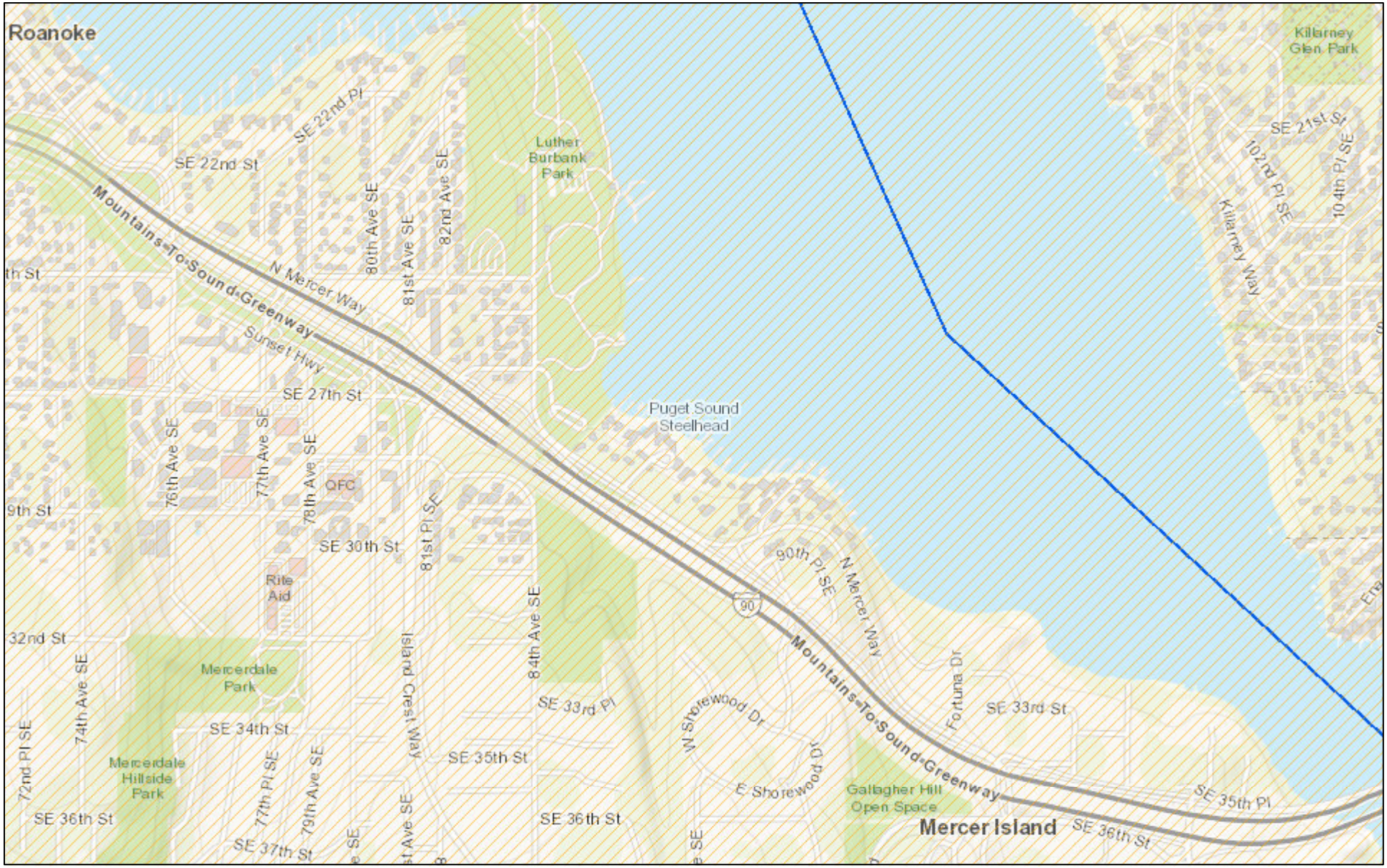
1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Winter Steelhead



July 2, 2019

1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: July 02, 2019
Consultation Code: 01EWFW00-2019-SLI-1250
Event Code: 01EWFW00-2019-E-02530
Project Name: North Mercer Island Interceptor Upgrade Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: http://wdfw.wa.gov/mapping/phs/ or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at http://www.fws.gov/pacific/eagle/for information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: http://www.nmfs.noaa.gov/pr/laws/mmpa/.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:
National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

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

Project Summary

Consultation Code: 01EWFW00-2019-SLI-1250

Event Code: 01EWFW00-2019-E-02530

Project Name: North Mercer Island Interceptor Upgrade Project

Project Type: WASTEWATER PIPELINE

Project Description: The purpose of the Project is to improve reliability and increase the capacity of an existing facility and pipeline, which are components of the regional wastewater system. The Project proposes several upgrades within the service areas in North Mercer Island and the southwest portion of Bellevue. The design for the pipeline route prioritized avoidance of sensitive habitats, including constructing a new pipeline route in upland habitat and decommissioning a large portion of the degraded existing pipeline currently located in Lake Washington. Construction for the Project is expected to extend from May 2020 to February 2023.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/47.585007078493334N122.22429892140681W



Counties: King, WA

Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: Western Distinct Population Segment No critical habitat has been designated for this species.	Proposed Endangered
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Streaked Horned Lark *Eremophila alpestris strigata* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Bull Trout *Salvelinus confluentus* https://ecos.fws.gov/ecp/species/8212#crithab	Final

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

King County, Washington



NOT FOR CONSULTATION

Local office

Washington Fish And Wildlife Office

(360) 753-9440
(360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

http://www.fws.gov/wafwo/

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Gray Wolf Canis lupus No critical habitat has been designated for this species.	Proposed Endangered
North American Wolverine Gulo gulo luscus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Streaked Horned Lark Eremophila alpestris strigata There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

NOT FOR CONSULTATION

Fishes

NAME	STATUS
Bull Trout Salvelinus confluentus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Bull Trout Salvelinus confluentus https://ecos.fws.gov/ecp/species/8212#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

NOT FOR CONSULTATION

- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/
conservation-measures.php
- Nationwide conservation measures for birds
http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

NOT FOR CONSULTATION

Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Sep 30
Black Turnstone Arenaria melanocephala This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Great Blue Heron Ardea herodias fannini This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 15 to Aug 15
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Olive-sided Flycatcher Contopus cooperi This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Red-throated Loon Gavia stellata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

NOT FOR CONSULTATION

Rufous Hummingbird selasphorus rufus — Breeds Apr 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Western Screech-owl Megascops kennicottii kennicottii — Breeds Mar 1 to Jun 30
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

NOT FOR CONSULTATION

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

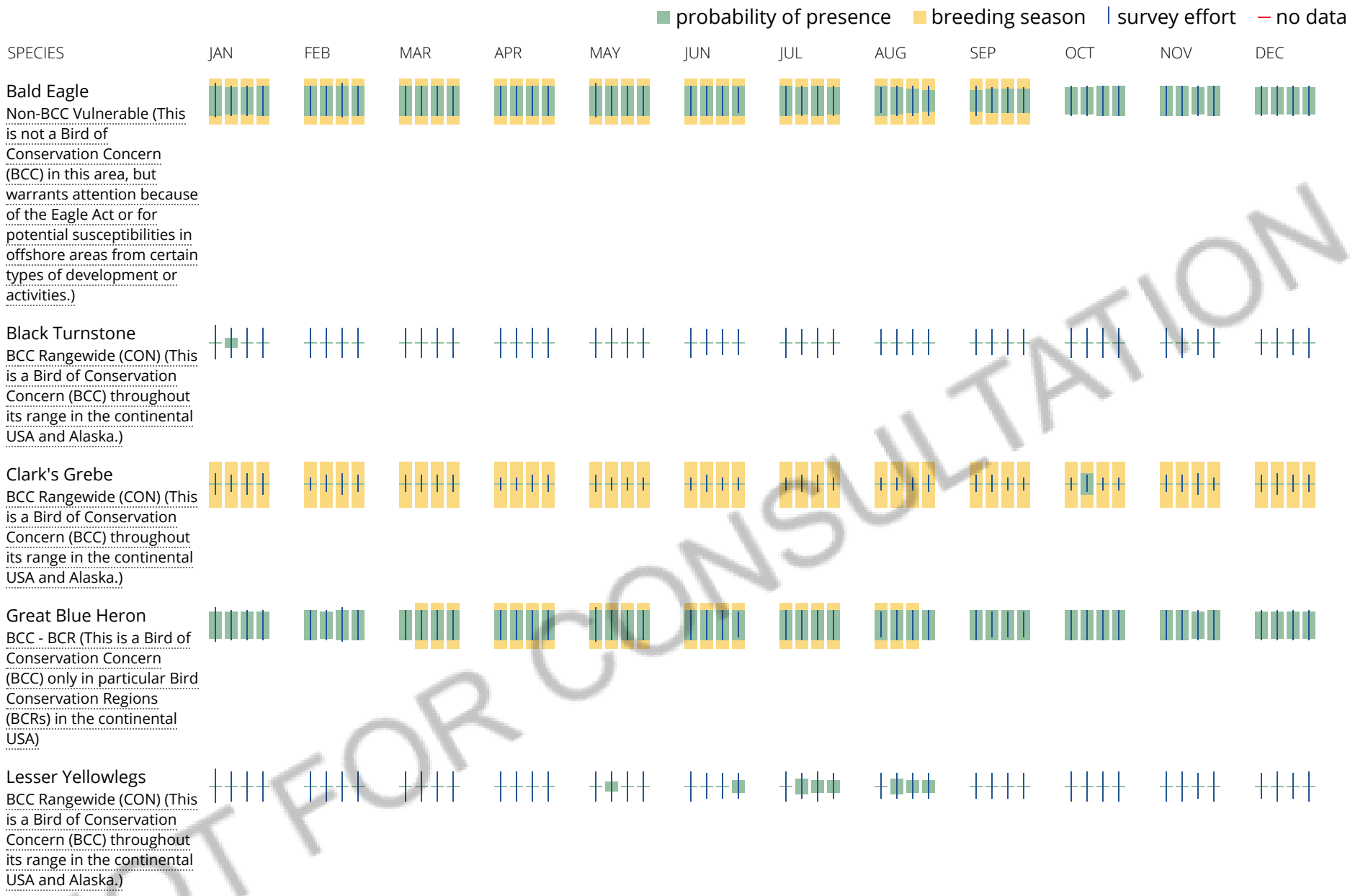
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

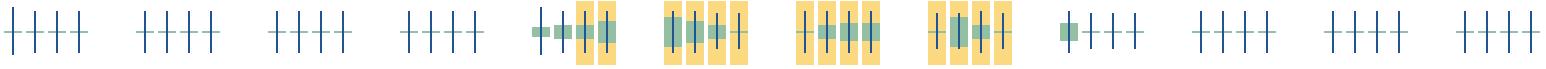
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Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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Olive-sided Flycatcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Red-throated Loon
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Semipalmated Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Western Screech-owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

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What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In

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contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

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

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

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

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

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Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND

PSSC

LAKE

L1UBHh
L2ABH

RIVERINE

R4SBC
R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

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

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

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

Data exclusions

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

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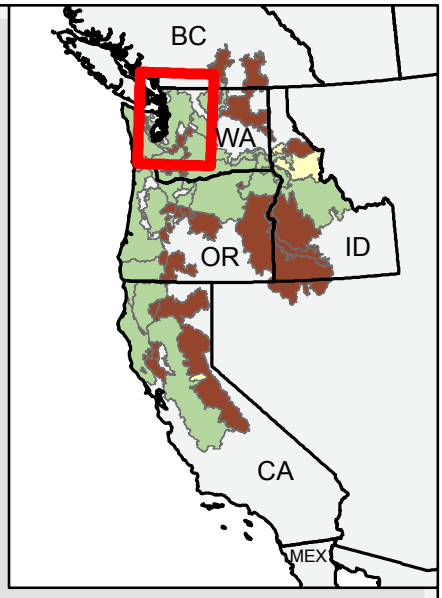
Data precautions

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

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Puget Sound Chinook Salmon Evolutionarily Significant Unit

Current as of January 2015



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

County Boundary

Class

ESU Boundary

Historical Watershed: Anthropogenically Blocked

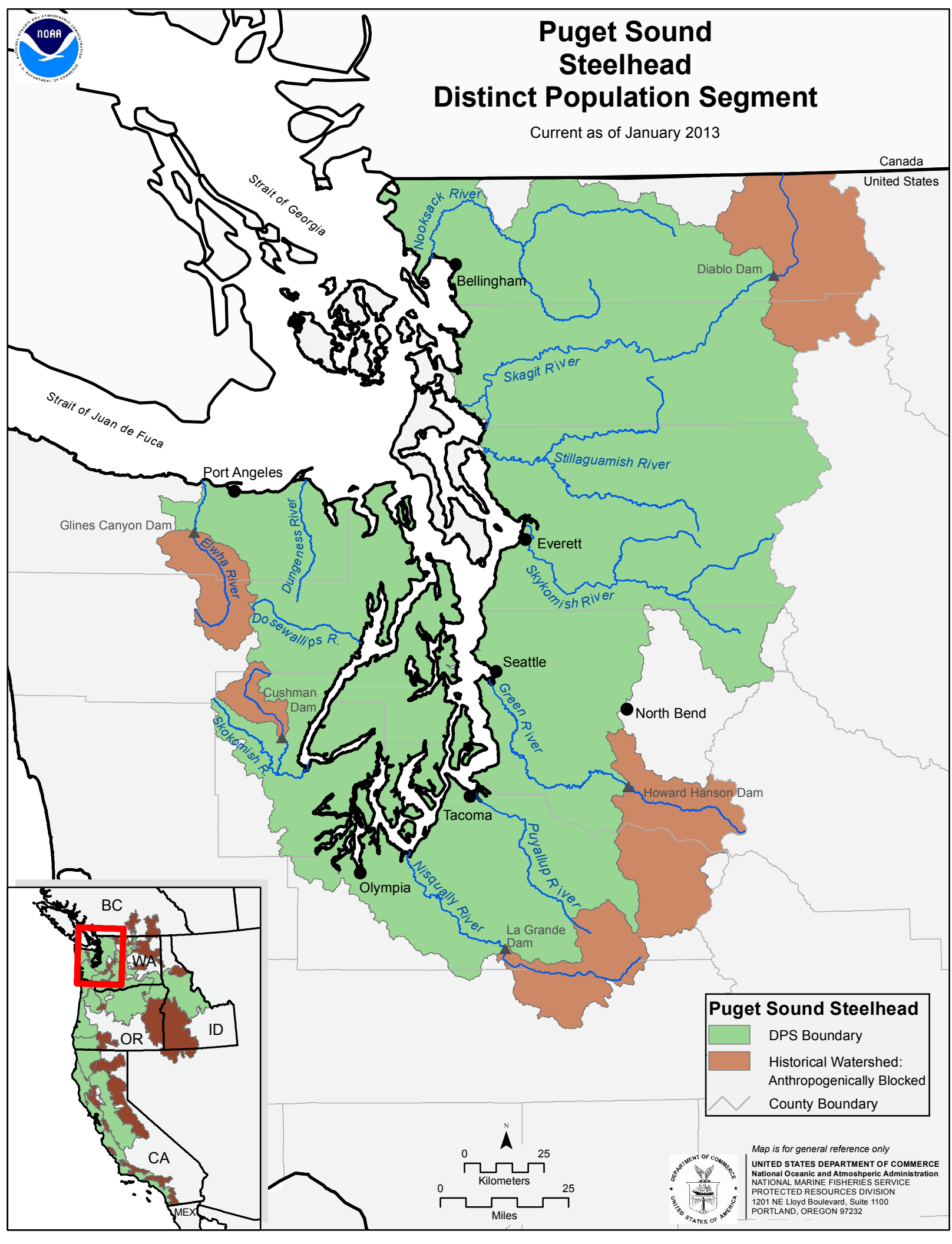
N

0 22.5 Kilometers

0 22.5 Miles

Map is for general reference only

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmosphere Administration
NATIONAL MARINE FISHERIES SERVICE
PROTECTED RESOURCES DIVISION
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232


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

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates

How do I?



Salmon & Steelhead

Salmon and steelhead start their lives in freshwater streams and tributaries. They then migrate downstream, rearing and maturing, before they reach the ocean. They live in the ocean for 2 to 5 years, migrating thousands of miles, before beginning the journey upstream to their natal streams where they spawn to produce the next generation of fish. This remarkable life cycle is what makes salmon and steelhead truly unique. NOAA Fisheries West Coast Region works to protect, conserve, and recover the region's 28 listed salmon and steelhead species.

Information & Programs

Salmon & Steelhead Listings

Recovery Planning & Implementation

Habitat Conservation

Critical Habitat

Publications & Resources

Southern Resident Killer Whale Priority Chinook Stocks Report

- Questions & Answers about the Southern Resident Killer Whale Priority Chinook Stocks Report

Regulations & Laws

Endangered Species Act

National Environmental Policy Act

Federal Power Act

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

Salmon & Hydropower

Salmon Hatcheries

Reintroduction Efforts

Columbia Basin Partnership Task Force

West Coast Drought Activities

- Overview
- 2014 Voluntary Drought Initiative
- 2015 Interagency Drought Strategy
- VIDEO - California Drought: Protecting Salmon
- VIDEO - California Drought: A Changing Landscape
- VIDEO - California Drought: A Shared Vision for Salmon Recovery
- VIDEO - California Drought: The Voluntary Drought Initiative *Official Selection: River Restoration Northwest- Stories of our Watersheds Film Event*

Southern Resident Killer Whales and the Snake River Dams

Endangered Species Act Consultations

Salmon & Steelhead Trends

- Salmon Population Trends Summaries
- Salmon Population Summary Database
- 5-Year Salmon Status Reviews

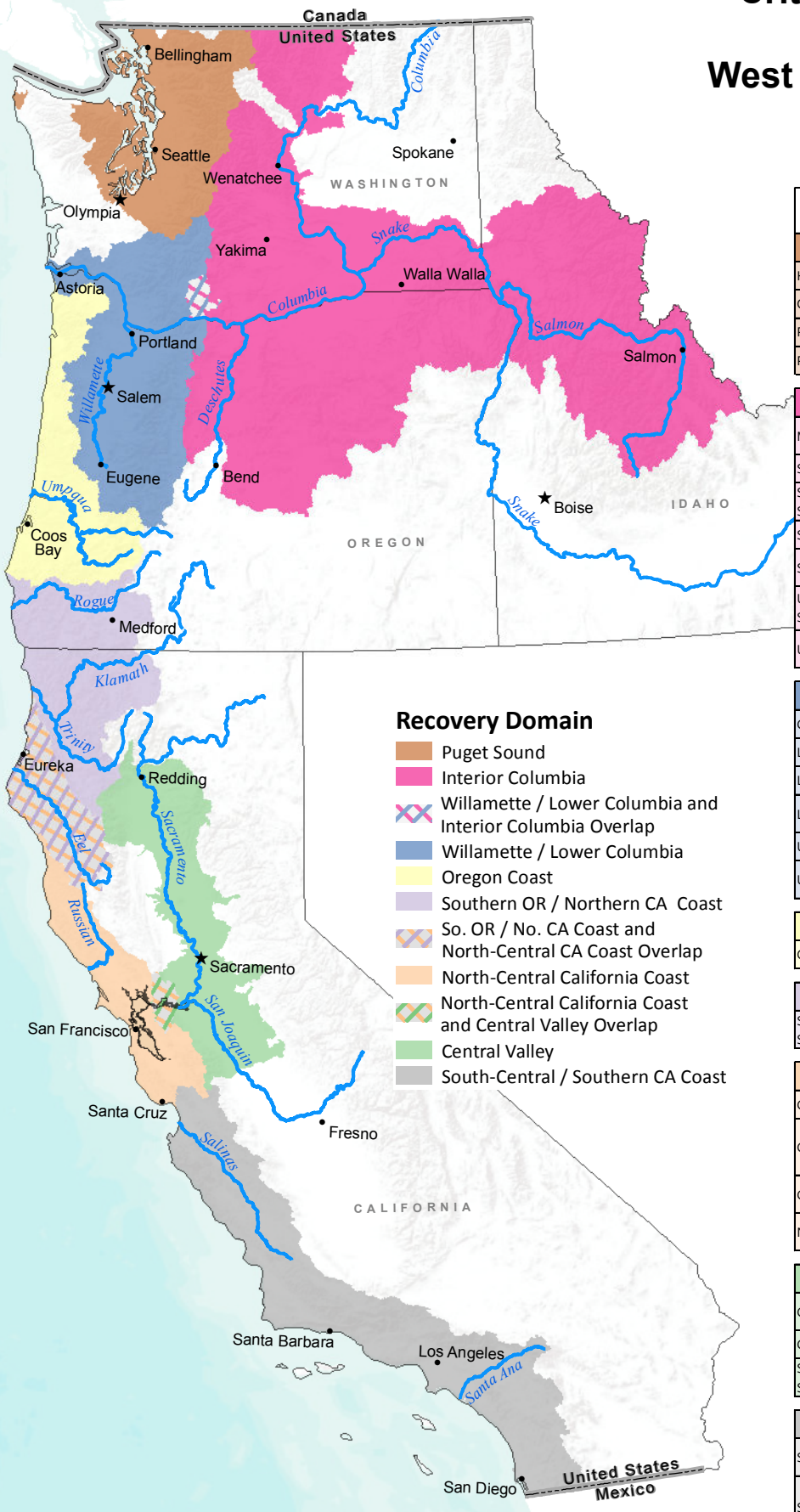
Endangered Species Act Salmon & Steelhead Definitions & Policies

Federal Register Notices

Ryan Creek Watershed letter FAQs

NOAA FISHERIES

Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead



Updated July 2016

Evolutionarily Significant Unit / Distinct Population Segment	ESA Status	Date of ESA Listing	Date of CH Designation
Puget Sound Recovery Domain			
Hood Canal Summer-run Chum Salmon	T	3/25/1999	9/2/2005
Ozette Lake Sockeye Salmon	T	3/25/1999	9/2/2005
Puget Sound Chinook Salmon	T	3/24/1999	9/2/2005
Puget Sound Steelhead	T	5/11/2007	2/24/2016
Interior Columbia Recovery Domain			
Middle Columbia River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Snake River Fall-run Chinook Salmon	T	4/22/1992	12/28/1993
Snake River Spring / Summer-run Chinook Salmon	T	4/22/1992	10/25/1999
Snake River Sockeye Salmon	E	11/20/1991	12/28/1993
Snake River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Upper Columbia River Spring-run Chinook Salmon	E	3/24/1999	9/2/2005
Upper Columbia River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Willamette / Lower Columbia Recovery Domain			
Columbia River Chum Salmon	T	3/25/1999	9/2/2005
Lower Columbia River Chinook Salmon	T	3/24/1999	9/2/2005
Lower Columbia River Coho Salmon	T	6/28/2005	2/24/2016
Lower Columbia River Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Upper Willamette River Chinook Salmon	T	3/24/1999	9/2/2005
Upper Willamette River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Oregon Coast Recovery Domain			
Oregon Coast Coho Salmon	T	2/11/2008	2/11/2008
Southern Oregon / Northern California Coast Recovery Domain			
Southern OR / Northern CA Coasts Coho Salmon	T	5/6/1997	5/5/1999
North-Central California Coast Recovery Domain			
California Coastal Chinook Salmon	T	9/16/1999	9/2/2005
Central California Coast Coho Salmon	E	10/31/1996 (T) 6/28/2005 (E) 4/2/2012 (RE)	5/5/1999
Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Northern California Steelhead	T	6/7/2000 1/5/2006	9/2/2005
Central Valley Recovery Domain			
California Central Valley Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Central Valley Spring-run Chinook Salmon	T	9/16/1999	9/2/2005
Sacramento River Winter-run Chinook Salmon	E	11/5/1990 (T) 1/4/1994 (E)	6/16/1993
South-Central / Southern California Coast Recovery Domain			
South-Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Southern California Steelhead	E	8/18/1997 5/1/2002 (RE) 1/5/2006	9/2/2005

ESA = Endangered Species Act, CH = Critical Habitat, RE = Range Extension
E = Endangered, T = Threatened,

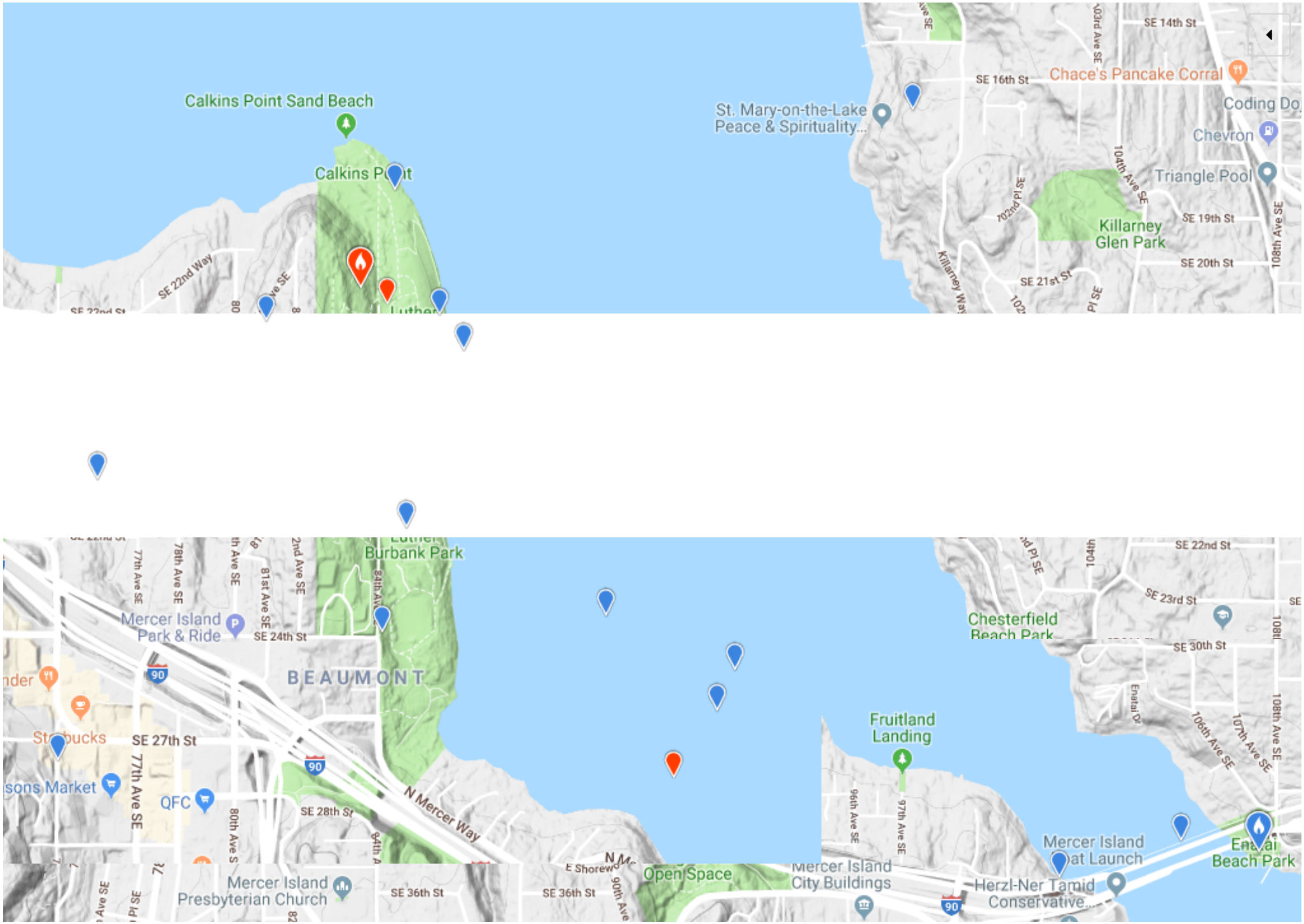
Critical Habitat Rules Cited

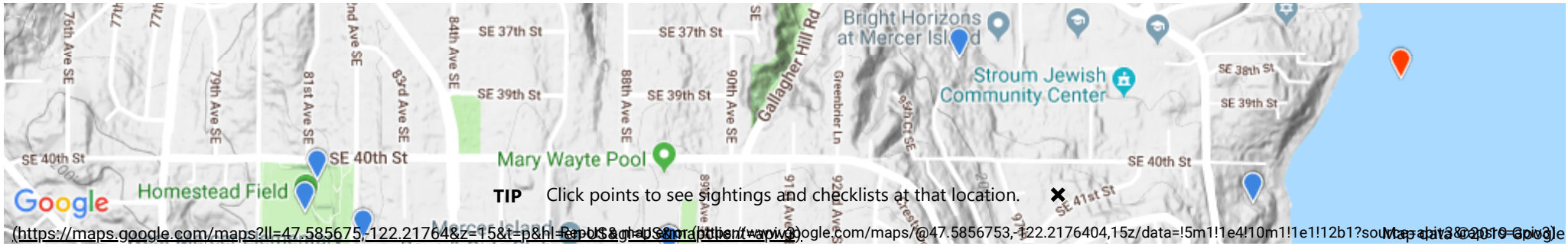
- 2/24/2016 (81 FR 9252) Final Critical Habitat Designation for Puget Sound Steelhead and Lower Columbia River Coho Salmon
- 2/11/2008 (73 FR 7816) Final Critical Habitat Designation for Oregon Coast Coho Salmon
- 9/2/2005 (70 FR 52630) Final Critical Habitat Designation for 12 ESU's of Salmon and Steelhead in WA, OR, and ID
- 9/2/2005 (70 FR 52488) Final Critical Habitat Designation for 7 ESU's of Salmon and Steelhead in CA
- 10/25/1999 (64 FR 57399) Revised Critical Habitat Designation for Snake River Spring/Summer-run Chinook Salmon
- 5/5/1999 (64 FR 24049) Final Critical Habitat Designation for Central CA Coast and Southern OR/Northern CA Coast Coho Salmon
- 12/28/1993 (58 FR 68543) Final Critical Habitat Designation for Snake River Chinook and Sockeye Salmon
- 6/16/1993 (58 FR 33212) Final Critical Habitat Designation for Sacramento River Winter-run Chinook Salmon

ESA Listing Rules Cited

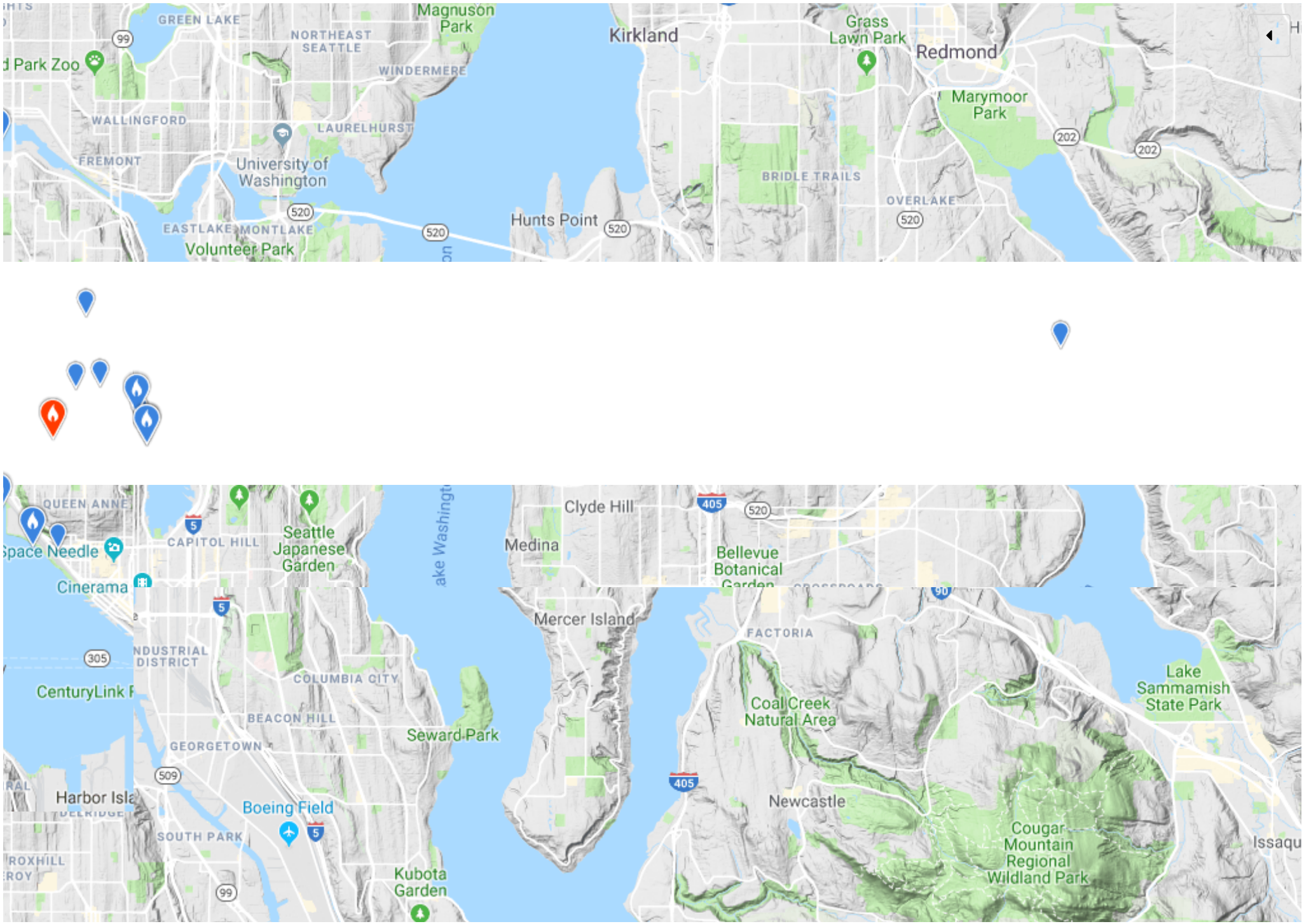
- 4/2/2012 (77 FR 19552) Final Range Extension for Endangered Central California Coast Coho Salmon
- 2/11/2008 (73 FR 7816) Final ESA Listing for Oregon Coast Coho Salmon
- 5/11/2007 (72 FR 26722) Final ESA Listing for Puget Sound Steelhead
- 1/5/2006 (71 FR 5248) Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead
- 6/28/2005 (70 FR 37160) Final ESA Listing for 16 ESU's of West Coast Salmon
- 5/1/2002 (67 FR 21586) Range Extension for Endangered Steelhead in Southern California
- 6/7/2000 (65 FR 36074) Final ESA Listing for Northern California Steelhead
- 9/16/1999 (64 FR 50394) Final ESA Listing for Two Chinook Salmon ESUs in California
- 3/25/1999 (64 FR 14508) Final ESA Listing for Hood River Canal Summer-run and Columbia River Chum Salmon
- 3/25/1999 (64 FR 14517) Final ESA Listing for Middle Columbia River and Upper Willamette River Steelhead
- 3/25/1999 (64 FR 14528) Final ESA Listing for Ozette Lake Sockeye Salmon
- 3/24/1999 (64 FR 14308) Final ESA Listing for 4 ESU's of Chinook Salmon
- 3/19/1998 (63 FR 13347) Final ESA Listing for Lower Columbia River and Central Valley Steelhead
- 8/18/1997 (62 FR 43937) Final ESA Listing for 5 ESU's of Steelhead
- 5/6/1997 (62 FR 24588) Final ESA Listing for Southern Oregon / Northern California Coast Coho Salmon
- 10/31/1996 (61 FR 56138) Final ESA Listing for Central California Coast Coho Salmon
- 1/4/1994 (59 FR 222) Final ESA Listing for Sacramento River Winter-run Chinook Salmon
- 4/22/1992 (57 FR 14653) Final ESA Listing for Snake River Spring/summer-run and Snake River Fall Chinook Salmon
- 11/20/1991 (56 FR 58619) Final ESA Listing for Snake River Sockeye Salmon
- 11/5/1990 (55 FR 46515) Final ESA Listing for Sacramento River Winter-run Chinook Salmon

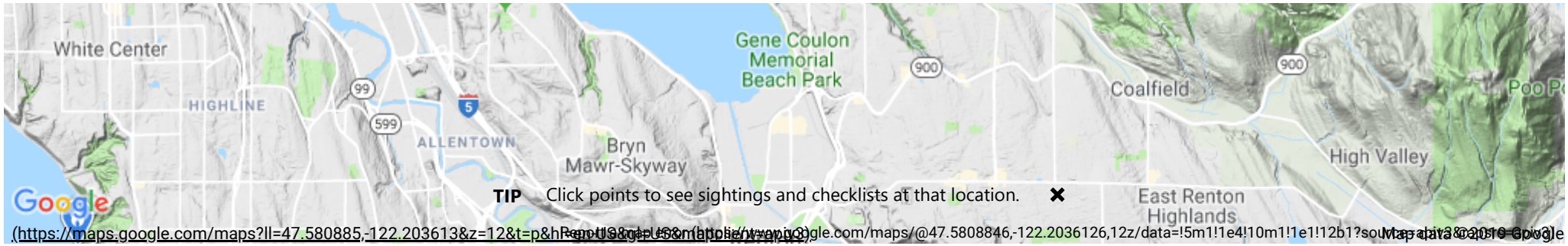
Bald Eagle


Calkins Point Sand Beach
St. Mary-on-the-Lake Peace & Spirituality...
Chace's Pancake Corral
Chevron
Triangle Pool
Killarney Glen Park
SE 14th St
SE 16th St
SE 19th St
SE 20th St
SE 21st St
SE 22nd Way
104th Ave SE
108th Ave SE
Burbank Park
Mercer Island Park & Ride
SE 24th St
BEAUMONT
SE 27th St
SE 28th St
N Mercer Way
77th Ave SE
QFC
Mercer Island Presbyterian Church
SE 36th St
Open Space
Mercer Island City Buildings
Herzl-Ner Tamid Conservative...
Fruitland Landing
Chesterfield Beach Park
SE 22nd St
SE 23rd St
SE 30th St
106th Ave SE
107th Ave SE
108th Ave SE
Enatai Beach Park

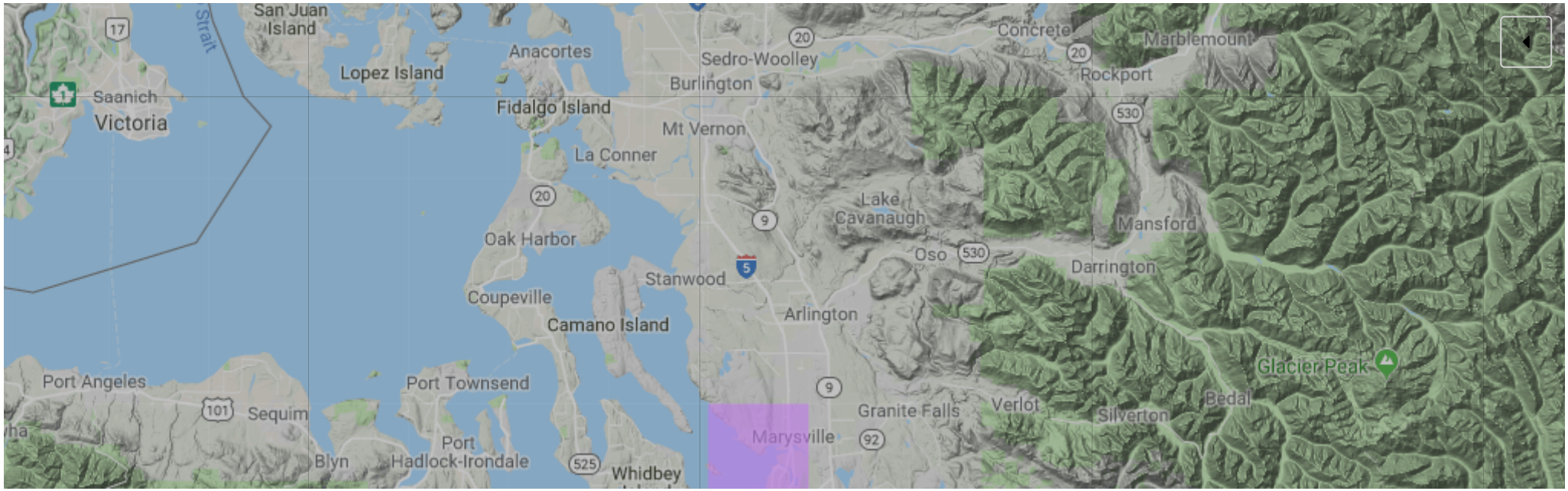

Bright Horizons at Mercer Island
Stroum Jewish Community Center
Mary Wayte Pool
Homestead Field
SE 40th St
SE 37th St
SE 39th St
SE 38th St
SE 41st St
Gallagher Hill Rd
76th Ave SE
79th Ave SE
81st Ave SE
83rd Ave SE
84th Ave SE
88th Ave SE
90th Ave SE
Greenbrier Ln
95th Ct SE
Google
TIP Click points to see sightings and checklists at that location.
(https://maps.google.com/maps?ll=47.585675,-122.21764&z=15&t=p&hl=en-US&gl=US&mapclient=apiv3)
Map data ©2019 Google

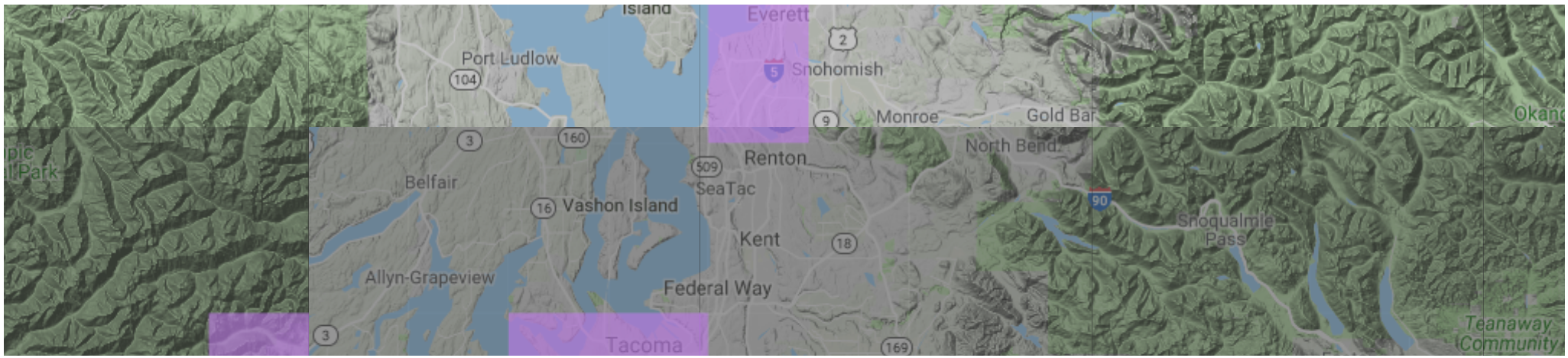
Marbled Murrelet

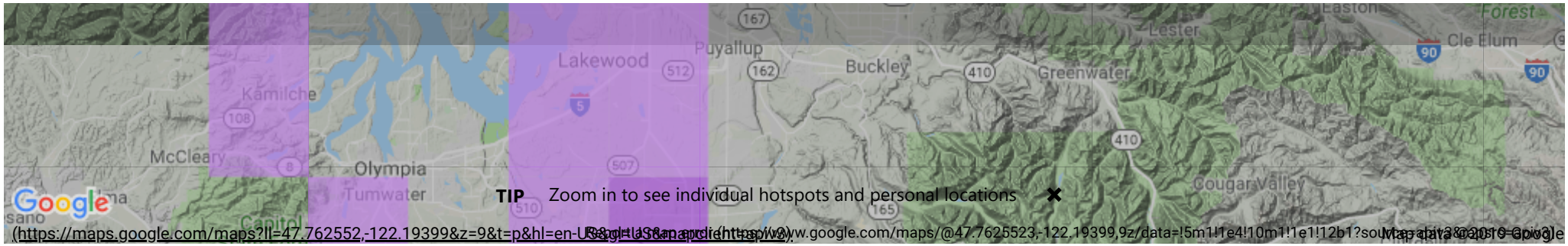



White Center
HIGHLINE
99
599
5
ALLENTOWN
Bryn
Mawr-Skyway
Gene Coulon
Memorial
Beach Park
900
Coalfield
900
High Valley
East Renton
Highlands
TIP Click points to see sightings and checklists at that location.
Google
Map data ©2019 Google

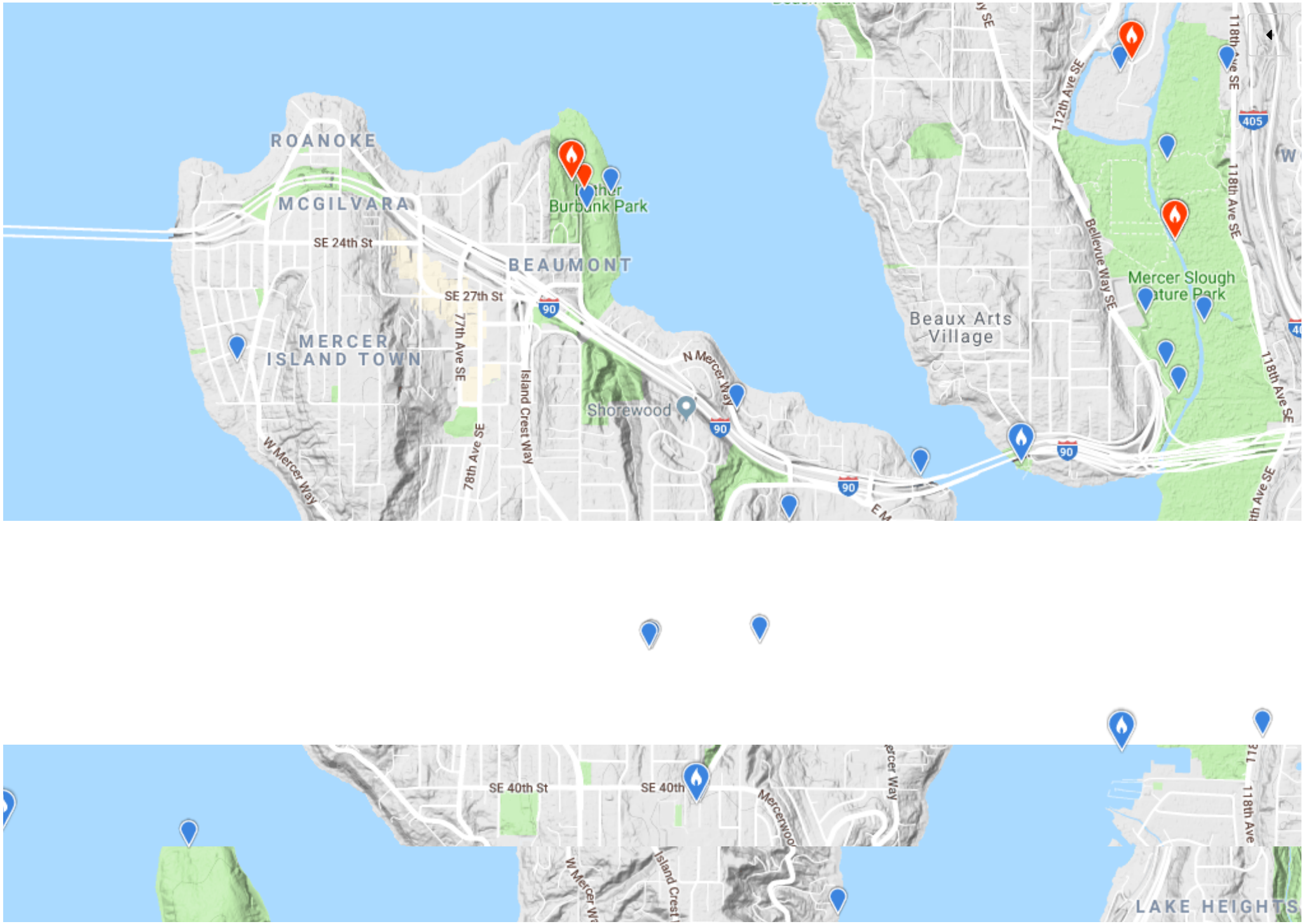
Horned Lark (Western rufous Group)






Lakewood
Puyallup
Buckley
Greenwater
Lester
Easton
Forest
Cle Elum
Kamilche
McCleary
Olympia
Tumwater
Capitol
Cougar Valley
TIP Zoom in to see individual hotspots and personal locations
Google
Map data ©2019 Google

Great Blue Heron





TIP Click points to see sightings and checklists at that location. ✖

(https://maps.google.com/maps?ll=47.574641,-122.222005&z=14&t=p&hl=en-US&gl=US&mapclient=apiv3)

Environmental Sensitivity Index: Resources at Risk

Background and Instructions

Species listed in **Red** are either listed as Threatened (T) or Endangered (E) by the State (S) or Federal government (F)

Summary Results

Puget Sound Fish Lines

3 unique species: Chinook salmon (fall), **Coho salmon**, **Native char**

Layer Results

Puget Sound Fish Lines

Details:

3 unique species: Chinook salmon (fall), **Coho salmon**, **Native char**

Displaying all months

Sources:

- WASHINGTON DEPARTMENT OF FISH AND W: WASHINGTON LAKES AND RIVERS INFORMATION SYSTEM (WLRIS), 2005

Download features in these formats: Excel (.xls) | Text (.csv) |

Name		Fed/State	Status	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	Spawning	Adults
Coho salmon | More info >	*	**F**	**C**	**X**						**X**	**X**	**X**	**X**	**X**	**X**	**SEP-JAN**	**JUL-JAN**
Chinook salmon (fall) | More info >	*	**S/F**	**C/T**							**X**	**X**	**X**	**X**	**X**	**X**	**SEP-DEC**	**JUL-DEC**
Native char | More info >	*	**S/F**	**C/T**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**AUG-NOV**	**JAN-DEC**
Sockeye salmon | More info >								X	X	X	X	X				-	MAY-SEP
Steelhead (winter) | More info >				X	X	X	X	X	X					X	X	FEB-JUN	NOV-JUN

Summarized from 5 total records

Forest Practices Activity Map

Application #_____

Legal Description

S18 T24.0N R05.0E, S08 T24.0N R05.0E
S13 T24.0N R04.0E, S05 T24.0N R05.0E
S17 T24.0N R05.0E, S07 T24.0N R05.0E
S06 T24.0N R05.0E, S01 T24.0N R04.0E
S12 T24.0N R04.0E, S11 T24.0N R04.0E
S02 T24.0N R04.0E

Map Symbols

- Harvest Boundary
- Road Construction
- Stream
- RMZ / WMZ Buffers
- Rock Pit
- Landing
- Waste Area
- Clumped WRTS/GRTS
- Existing Structure

Additional Information

0 0.25 Miles

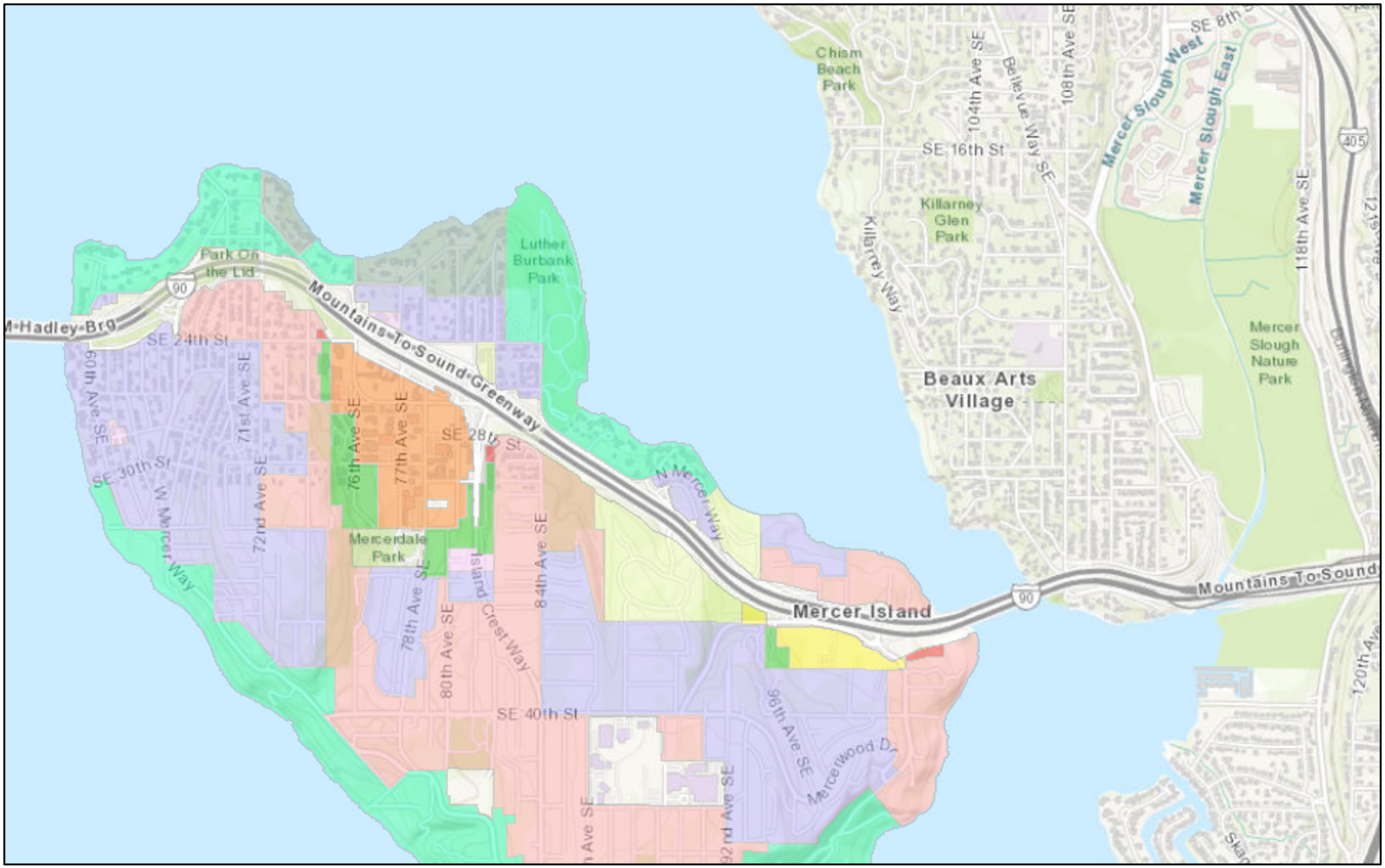
Date: 7/2/2019 Time: 12:43:12 PM

Extreme care was used during the compilation of this map to ensure its accuracy. However, due to changes in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Mercer Island Zoning



7/2/2019, 12:13:30 PM

Zoning

B	C-O	R-12	MF-2	MF-3	R-9.6	P	
	PBZ	R-15	MF-2L	R-8.4	TC		

1:34,927

0 1,000 2,000 4,000 ft

0 325 650 1,300 m

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

Web AppBuilder for ArcGIS

City of Bellevue, WA, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA | Mercer Island GIS |

U.S. Fish and Wildlife Service
National Wetlands Inventory

NWI - Mercer Island



July 2, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

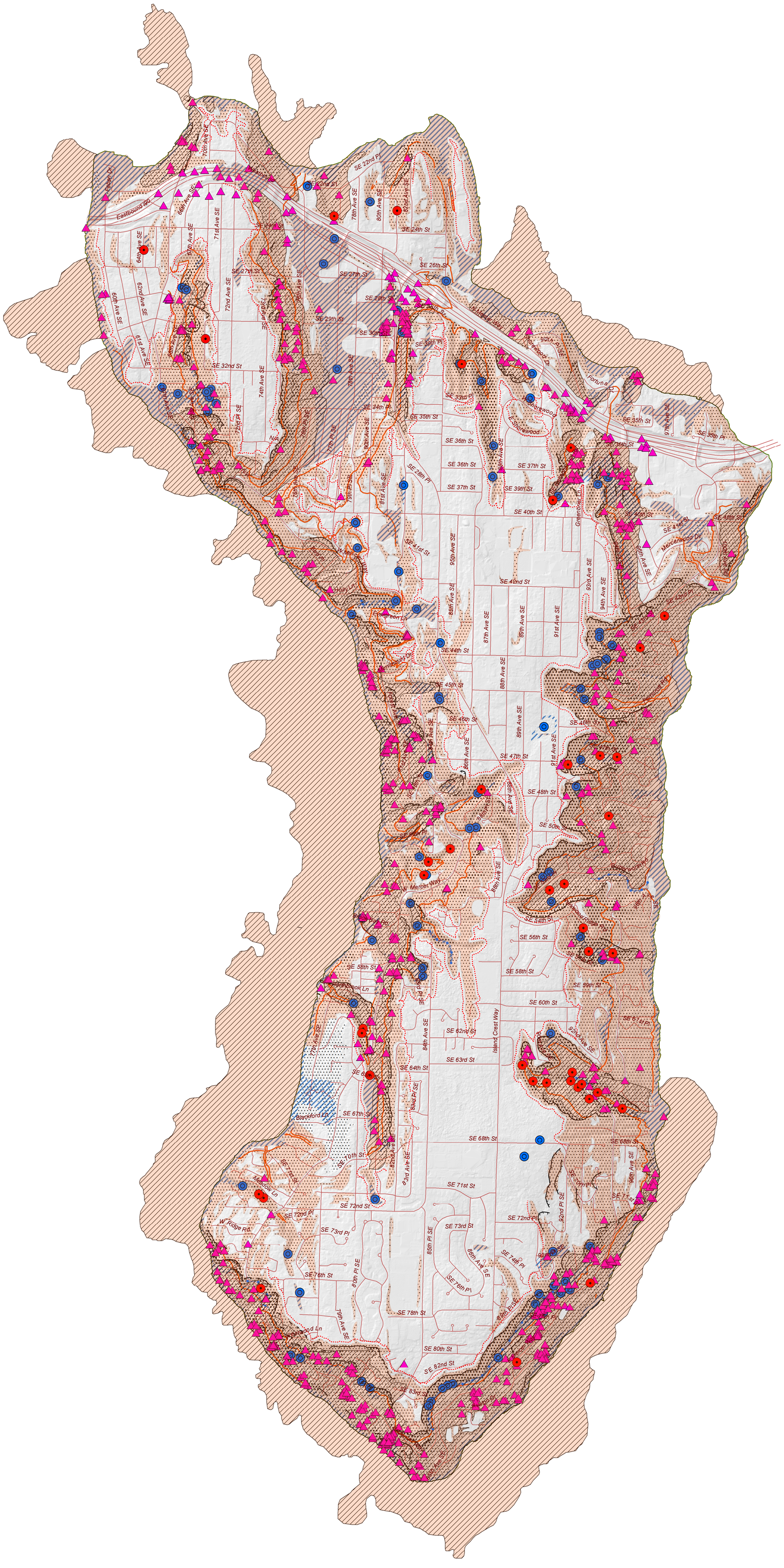
Mercer Island Landslide Hazard Assessment

by Kathy G. Troos & Aaron P. Wisher
April 2009

geomapnw.ess.washington.edu

0 0.5 1 Kilometers 1:12,000
0 0.5 1 Miles

N



LANDSLIDE HAZARD AREAS
(WAC 365-190-080 4d and MICC 19.16.010)

Landslide hazard areas include areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors.

Areas susceptible to landsliding on Mercer Island include:

i. Areas of historic failure or that have been documented on published maps; *See mapped known landslides below*;
ii. Slopes steeper than 15%, intersecting a geologic contact of relatively permeable deposits over relatively impermeable deposits, and with springs or groundwater seepage; *See mapped potential slide areas below*;
iii. Areas that have shown movement during the Holocene epoch (last 10,000 years) or which are covered by Holocene-age mass wasting deposits; *See mapped known landslides below*;
iv. Slopes parallel or sub-parallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials; *None identified on map, but may be locally present;*
v. Slopes having gradients steeper than 80% subject to rockfall during seismic shaking; *See slope classification below*;
vi. Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action; *See mapped erosion locations below*;
vii. Areas that show evidence of, or are at risk from snow avalanche; *None identified on Mercer Island*;
viii. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding; *None identified on Mercer Island*;
ix. Any area with a slope of 40% or steeper and with a vertical relief of ten or more feet except where composed of consolidated rock; *See slope classification below*.

Landslide hazard areas include the following mapped areas:

Landslide Hazard
- Landslide Hazard Area (Known or Suspect)
- Landslide Hazard Assessment Setback

For all other areas hazard is unknown or unquantified

Supplemental Data

Known Landslides (i,iii)
- Identified Landslide Location
- Scarp
- Landslide and Mass Wasting Deposits; subaerial and subaqueous

Slope (v) Class (ix)
- Slope 80% and higher
- Slope 40-79%

Potential Slide Area (ii)
- Slope 15% and higher, and
- Geologic contact of coarse-grained deposits over fine-grained deposits where slope >= 15%, and
- Area where water less than 10 feet below ground surface based on limited data set (other areas of shallow water present), or
- Spring Locations, or
- Spring lines.

Areas of Rapid Stream Incision (vi)
- Areas of moderate to rapid stream incision/erosion; may result in unstable slopes and/or stream banks

GENERAL NOTES FOR GEOLOGICAL HAZARDS MAPS

This map is one of a suite of revised Geological Hazard Maps for the City of Mercer Island. This suite includes maps showing Seismic Hazards, Landslide Hazards, and Erosion Hazards.

Other geological and/or natural hazards may exist and geological events may occur on Mercer Island that are not specifically identified on these maps. Examples of geologic hazards and hazardous events that are not identified on these maps include, but are not limited to, tsunamis and seiches in Lake Washington.

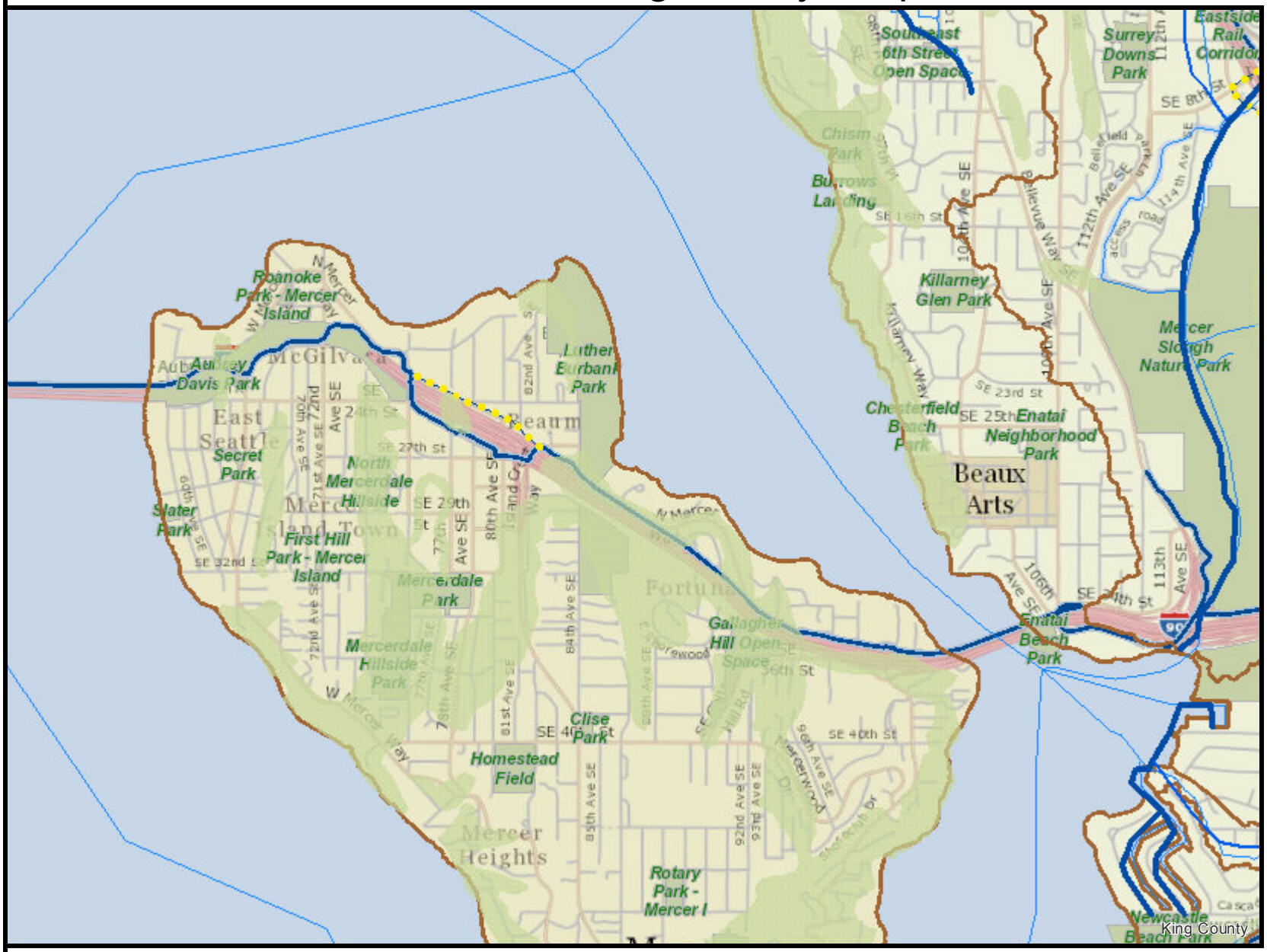
These maps are for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. These maps provide DSG staff a general assessment of known or suspect geological hazard areas for which the City will require site and project-specific evaluation by a Washington State-licensed engineer, geologist or engineering geologist prior to issuing a permit for site development. All areas have not been specifically evaluated for geologic hazards and there may be locations that are not correctly represented on these maps. It is the responsibility of individual property owners and map users to evaluate the risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island by these maps.

The City of Mercer Island is using guidance provided by the State of Washington regarding the definition of geologically hazardous areas in accordance with WAC 365-190-080 and the Growth Management Act. "Geologically hazardous areas", by State definition, "include areas susceptible to erosion, sliding, earthquake, or other geological events. They pose a threat to the health and safety of citizens when incompatible commercial, residential, or industrial development is sited in areas of significant hazard."

This new set of maps represents an update of the 2002 Geologic Hazard Map Series and is based on a review of Best Available Science for the Seattle Fault and related events, a new Geological Map of Mercer Island by Troost and Wisher (2006), and a geologic database of Mercer Island compiled by GeoMapNW at the University of Washington. Information about data used for the maps, references, and data limitations are all described in an associated "Read Me" document. The digital version of these maps is accompanied by a meta data file containing pertinent information about map construction. These data and maps are all available on the City of Mercer Island website.



King County iMap



Legend

- Potential landslide hazard areas (2016, see explanation--->)
- Erosion hazard (1990 SAO)
- Seismic hazard (1990 SAO)
- Coal mine hazard (1990 SAO)

Stream (1990 SAO)

- class 1
- class 2 perennial
- class 2 salmonid
- class 3
- unclassified
- Wetland (1990 SAO)
- Sensitive area notice on title
- Streams
- Drainage basins
- Study Limits
- Historical Landslides
- Lowland fans
- Alpine fans less likely subject to debris flows
- Alpine fans more likely subject to debris flows
- Rock fall

The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

Date: 7/2/2019 Notes:

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King County

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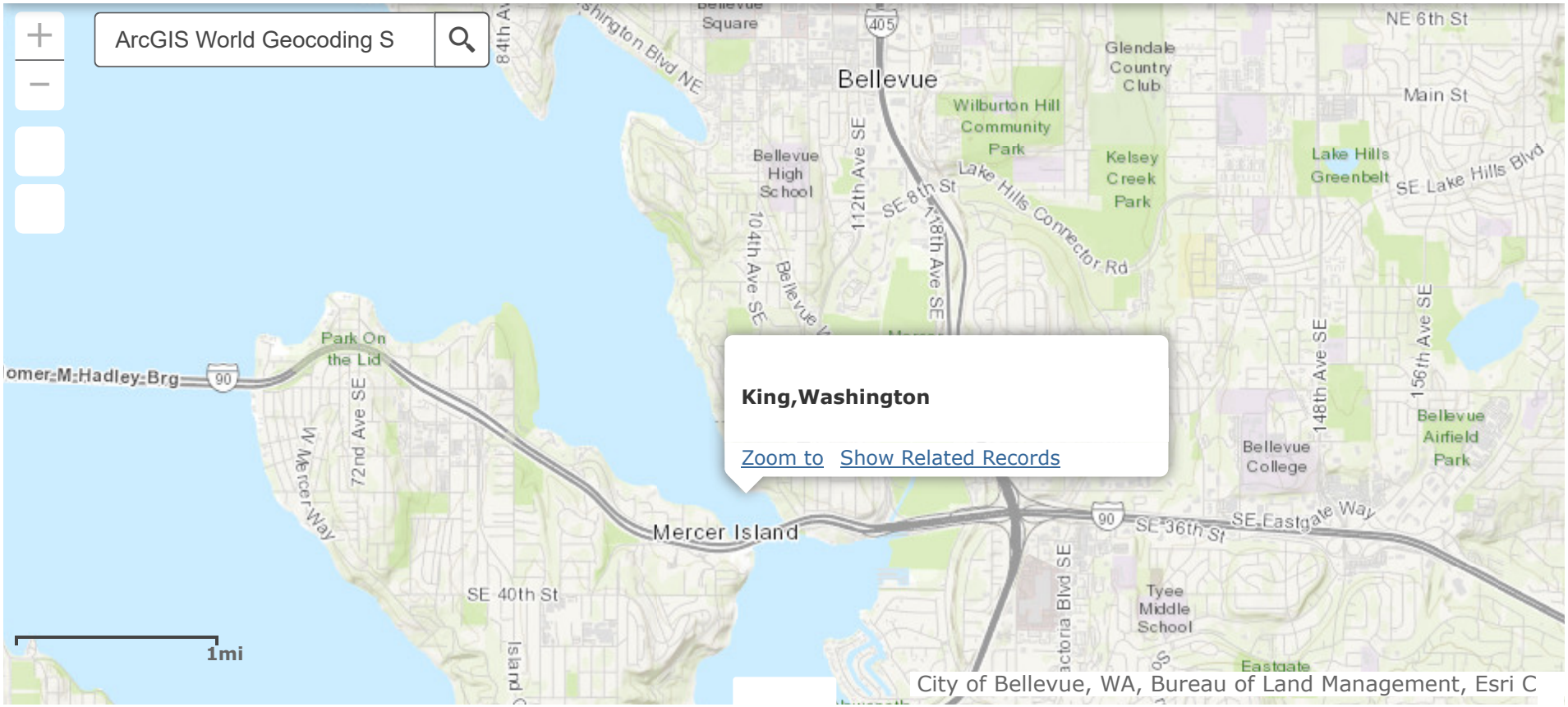
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MAP: U.S. THREATENED AND ENDANGERED SPECIES BY COUNTY

Click on a point in the map below — then click on "Show Related Records" — to get information on all the animals and plants protected under the Endangered Species Act as "threatened" or "endangered" found in any county in the United States.

Species by county

with Web AppBuilder for ArcGIS



Options | **Filter by Map Extent** | Zoom to | Clear Selection | Refresh

SpeciesByCounty

Group Name	Scientific Name	Common Name	County	State	Status	Link
Mammals	Orcinus orca	Killer whale	King	Washington	Endangered	More info
Mammals	Ursus arctos horribilis	Grizzly bear	King	Washington	Threatened	More info
Mammals	Ursus arctos horribilis	Grizzly bear	King	Washington	Under Review	More info

18 features 0 selected

Appendix C. Project Photos

Appendix C. Project Photos

C. SITE PHOTOGRAPHS

North Mercer Pump Station

Photo 1. North Mercer Pump Station (right) and the riparian area (left).

Photo 2. North Mercer Pump Station stream and riparian corridor. Note invasive English ivy.

North Mercer Pump Station



Photo 3. North Mercer Pump Station stream. Note armored channel, and invasive Himalayan blackberry and English ivy.



Photo 4. North Mercer Pump Station stream culvert entrance and existing stormwater pipe (red arrow).

North Mercer Pump Station



Photo 5. North Mercer Pump Station stream culvert discharge to Lake Washington. Note lack of substrate and light penetration.

North Mercer Interceptor

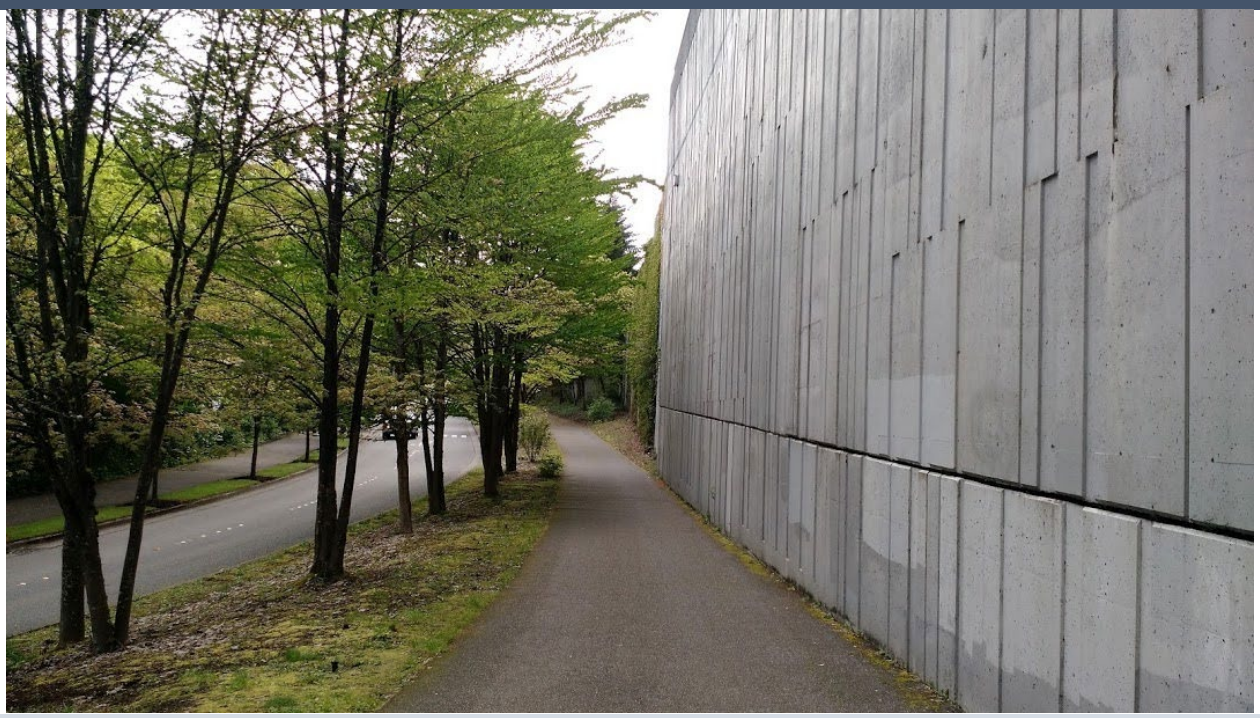


Photo 6. North Mercer Interceptor Route, adjacent to I-90, including the I-90 Bike Trail. (8243 SE 26th St.)



Photo 7. North Mercer Interceptor Route, near piped stream crossing of I-90 trail (8243 SE 26th St.)

North Mercer Interceptor



Photo 8. North Mercer Interceptor Route, adjacent to I-90, above the I-90 Bike Trail. (2712 84th Ave SE)



Photo 9. North Mercer Interceptor Route, adjacent to I-90, near piped stream crossing. (8446 N Mercer Way)

North Mercer Interceptor



Photo 10. North Mercer Interceptor Route, along the I-90 trail. (2 Fortuna Dr SE)

North Mercer Interceptor



Photo 11. North Mercer Interceptor Route, near location identified as a steep slope along the I-90 trail (3240 90th Pl SE)

North Mercer Interceptor



Photo 12. N Mercer Way, looking towards temporary diversion for 96th Ave Siphon work. (9411 SE 33rd St.)



Photo 13. Existing conditions of the perennial stream buffer along the North Mercer Interceptor route near SE 35th Pl and E Mercer Way.

Offsite Staging



Photo 14. Entrance to parking lot at Luther Burbank Park to be used as offsite staging. Perennial stream runs perpendicular to driveway.

96th Ave Siphon



Photo 15. 96th Ave Siphon Location



Photo 16. Existing conditions of the perennial stream buffer adjacent to the 96th Ave Siphon.

Lift Station 11



Photo 17. Lift Station 11 adjacent to Lake Washington. Note vault and maintenance hole access; odor control vent.



Photo 18. Lift Station 11 existing structures.

Lift Station 11

Photo 19. Lift Station 11 stream leading into Lake Washington.

Mercer Island Boat Launch



Photo 20. Mercer Island Boat Launch from the East Channel of Lake Washington. Pipeline alignment will intersect the failing bulkhead at the approximate location of the tree on the shoreline.



Photo 21. Mercer Island Boat Launch from the East Channel of Lake Washington. Pipeline alignment will intersect the failing bulkhead at the approximate location of the tree on the shoreline.

Mercer Island Boat Launch



Photo 22. Mercer Island Boat Launch – behind the failing bulkhead. Erosion has severely damaged and weakened the bulkhead.

Mercer Island Boat Launch

Photo 23. Mercer Island Boat Launch – Rip-rap placed into Lake Washington, presumed as support for failing bulkhead.

East Channel



Photo 24. Sand and relict clam shells along bottom of Lake Washington at East Channel crossing.



Photo 25. Dense elodea with some milfoil in Lake Washington at East Channel crossing.

Appendix D. North Mercer Pump Station Stream Buffer Public Agency Exception

Appendix D. North Mercer Pump Station Stream Buffer Public Agency Exception

North Mercer Island Interceptor and Enatai Interceptor Upgrade Project: North Mercer Pump Station Stream Buffer Public Agency Exception

September 2019

PREPARED FOR

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

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201 South Jackson Street, MS KSC-NR-0507
Seattle, WA 98104

Tetra Tech

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Seattle, WA 98101-2357
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PREPARED BY

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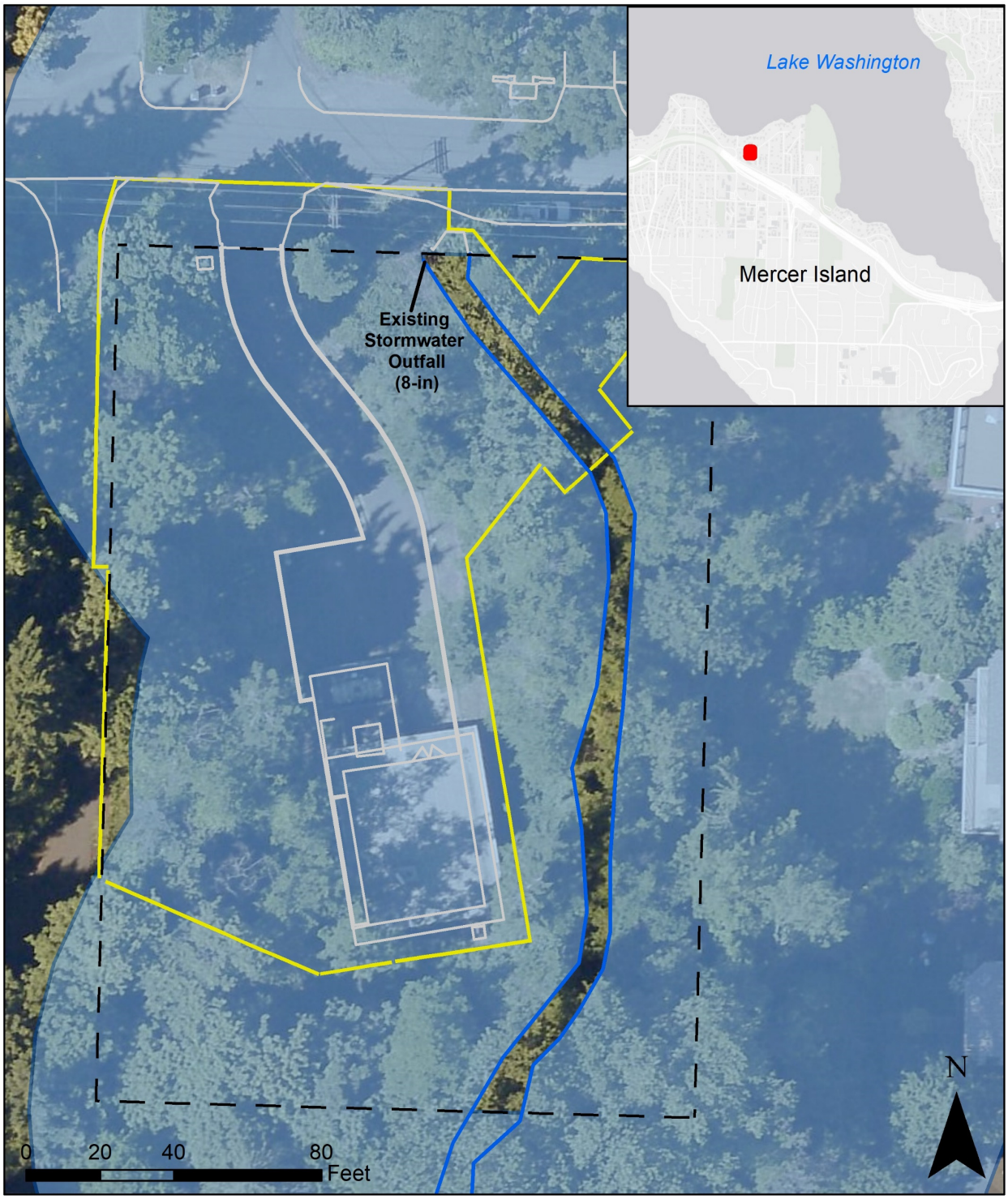
1. PROJECT OVERVIEW

King County Wastewater Treatment Division (WTD) is applying for various environmental and construction permits from the City of Mercer Island (Mercer Island). King County's Conveyance System Improvements Program identified a need for capacity upgrades for the North Mercer Island and Enatai interceptors. The North Mercer Island Interceptor and Enatai Interceptor Upgrade Project (NME Project) is intended to improve reliability and increase the capacity of the existing facility and pipeline components of the regional wastewater system to convey the 20-year peak wastewater flows projected through the year 2060 from service areas in North Mercer Island, the southwest portion of Bellevue, and the Town of Beaux Arts Village.

NME Project construction will include approximately 11,900 linear feet of new sewer pipeline and related features starting at King County's North Mercer Pump Station (NMPS) in Mercer Island and proceeding through an upland alignment on a portion of Mercer Island mostly following street right-of-ways (ROWs) and the Interstate 90 greenway trail/park (I-90 Trail). The pipeline will then enter Lake Washington and run several feet under the lakebed from North Mercer Island, across the East Channel of Lake Washington, to Enatai Beach Park in Bellevue. From Enatai Beach Park, a new sewer pipeline will be installed using horizontal directional drilling technology under the Enatai hillside to King County's Sweyolocken Pump Station (Sweyolocken PS) adjacent to Mercer Slough. The NME Project will also rehabilitate the existing Enatai Interceptor pipeline that is located in Lake Washington, from Enatai Beach Park, through Mercer Slough, to the Sweyolocken PS. To support the new pipeline capacity, the NMPS facility, Mercer Island's Lift Station 11, and some Mercer Island-owned local sewer lines will be upgraded or modified to continue to convey flows from Mercer Island's sewer system.

This report specifically addresses the upgrades to the King County NMPS facility in relation to critical areas and buffers on the property (Figure 1). The existing NMPS facility will be upgraded and expanded, including the addition of a new building to house a standby generator, electrical service equipment, and a restroom. Exterior modification will relocate the electrical transformer and an odor control chemical storage tank. Other additions to the exterior will include adding a fuel tank and more odor control equipment. The access roadway will be modified to improve vehicle access and turning. Impervious surface area from newly constructed structures and surfaces will total approximately 5,300 square feet (SF) – see below for additional details. A temporary pump station will be built to manage flows during construction.

A portion of these upgrades will occur within the buffer associated with an unnamed stream, identified in this report as the "NMPS stream." On July 29, 2019, the revised Critical Area Ordinance (CAO) took effect for Mercer Island. The revised CAO expanded the buffer for the NMPS stream from 75 feet to 120 feet. In addition, there are revised criteria for projects within watercourse buffers. Below is a description of the existing buffer conditions and proposed exceptions necessary to complete the proposed development at NMPS. Permanent impacts were avoided and minimized to the extent practicable, and the NME Project will enhance the existing buffer habitat for the NMPS stream to provide a no-net-loss of functions and values.



CONFLUENCE ENVIRONMENTAL COMPANY

Figure 1 – North Mercer Pump Station (NMPS) and NMPS Stream Location

2. NMPS Project Description

The NMPS is an existing facility, located on King County property, that will be expanded and upgraded as part of the NME Project. Existing features include an access driveway, building, and several accessory structures. Figure 2 shows the existing features on the site and the proposed upgrades. The existing structures are shown in gray and the proposed upgrades are shown in orange. Facility improvements for the existing pump station include:

- New dual force main pipe to convey wastewater;
- New generator building to house standby generator and restroom facility;
- New retaining walls and courtyard area to house mechanical equipment;
- Expanded driveway and parking area to allow for safe turnaround on-site; and
- Modified storm drainage, outfall location, and pipe size.

Construction methods for the NMPS portion of the NME Project include:

- **Site Preparation:** Existing infrastructure (paved pump station access road and parking area) will be used, which will minimize site preparation. However, several trees will be removed during site preparation for the new generator building and retaining wall (see the Arborist Report – Tree Solutions 2019).
- **Access and Staging:** Existing infrastructure will be used, but additional access and staging will be provided during construction of the new access road and parking area proposed. Off-site staging will likely be required but will not require additional clearing and grubbing.
- **Site Restoration and Cleanup**: Temporarily affected areas will be restored in-kind to existing conditions or better. Additional ecological enhancements and mitigation will be provided within the NMPS stream buffer, including mitigation for tree removal, removal of invasive species, and planting native species.

The pump station will be upgraded to accommodate the increased flow and pumping head that it will experience with the proposed pipeline improvements. Preventing nuisance odor impacts is also a major goal for the operation of the NME Project. The existing odor control system at the NMPS will be replaced with a more reliable carbon scrubber system. The carbon scrubber system, combined with the existing injection of inorganic salt solution into the wastewater at the NMPS, will control and treat odors at the pump station site and downstream.

Other improvements to the NMPS facility will be carried out at the same time, including upgrades to the electrical service; heating, ventilation, and air conditioning; water system; stormwater management; and site access. A new building and concrete pad will be constructed to the west of the existing structure to house a standby generator, electrical service equipment, and restroom. Exterior modification will relocate the electrical transformer and an odor control chemical storage tank. The NME Project will also add a fuel tank and more odor control equipment. A temporary pump station will be built to manage flows during construction.

A portion of the construction at NMPS includes crossing the NMPS stream and riparian habitat along the stream banks to construct the new dual force main pipes. The NMPS stream receives stormwater flows from residential properties and the Mercer Island downtown core. Based on available geographic information system (GIS) data (Mercer Island 2019) and field surveys, the NMPS stream is a potential fish-bearing stream (Mercer Island City Code [MICC] Type F, State Type F). However, the stream is not used by any salmonids (WDFW 2019).



Figure 2 – NMPS Site Plan

The NMPS stream crossing will include site restoration of the existing stabilization in the area where the pipe will cross the stream, which will be similar to the existing condition of rip-rapped streambed conditions. Although the majority of the existing streambed material is composed of gravels and cobbles, the substrate ranges in size from silt (<0.002 inch) to large cobbles (7 inches). The proposed replacement of streambed material will be a 1.5-feet-thick layer of Washington Department of Transportation (WSDOT) 10-inch cobbles[1] on top of standard WSDOT streambed sediment (grain size up to 2.5 inches). The substrate material mix matches the smaller 80% of the existing grain size present in the streambed. The larger materials will be used to stabilize the channel and protect against scour. The site-specific hydraulic assessment identified a need for larger cobble at the top layer for scour protection from larger infrequent flood events, up to the 100-year event. Materials up to 2.5 inches are stable up to a velocity of 3 to 4 feet per second (ft/s) and materials up to 8 inches are stable up to a velocity of 5 to 8 ft/s.

The NMPS stream receives stormwater flows from the NMPS facility, surrounding residential properties, and the Mercer Island downtown core. The pollution-generating surface on the King County property consists of the access road. This area is expected to increase by approximately 1,370 SF during NMPS facility upgrades. Existing outfalls that service the pump station yard drains and roof drains will be combined with the existing outfall near the SE 22nd Street box culvert. This outfall will be moved up the bank by approximately 5 feet way from the edge of the stream and a new apron in upland habitat will be constructed to dissipate energy before entering the stream. The existing pipe is an 8-inch ductile iron pipe (Figure 3). The replacement pipe will be a 12-inch high-density polyethylene (HDPE) pipe. Although some existing rip-rap surrounding the pipe may need to get replaced, the work below OHWM will be minimized to the extent possible. The revised stormwater outfall will follow the 2019 Stormwater Management Manual for Western Washington (Ecology 2019) and other standard practices.

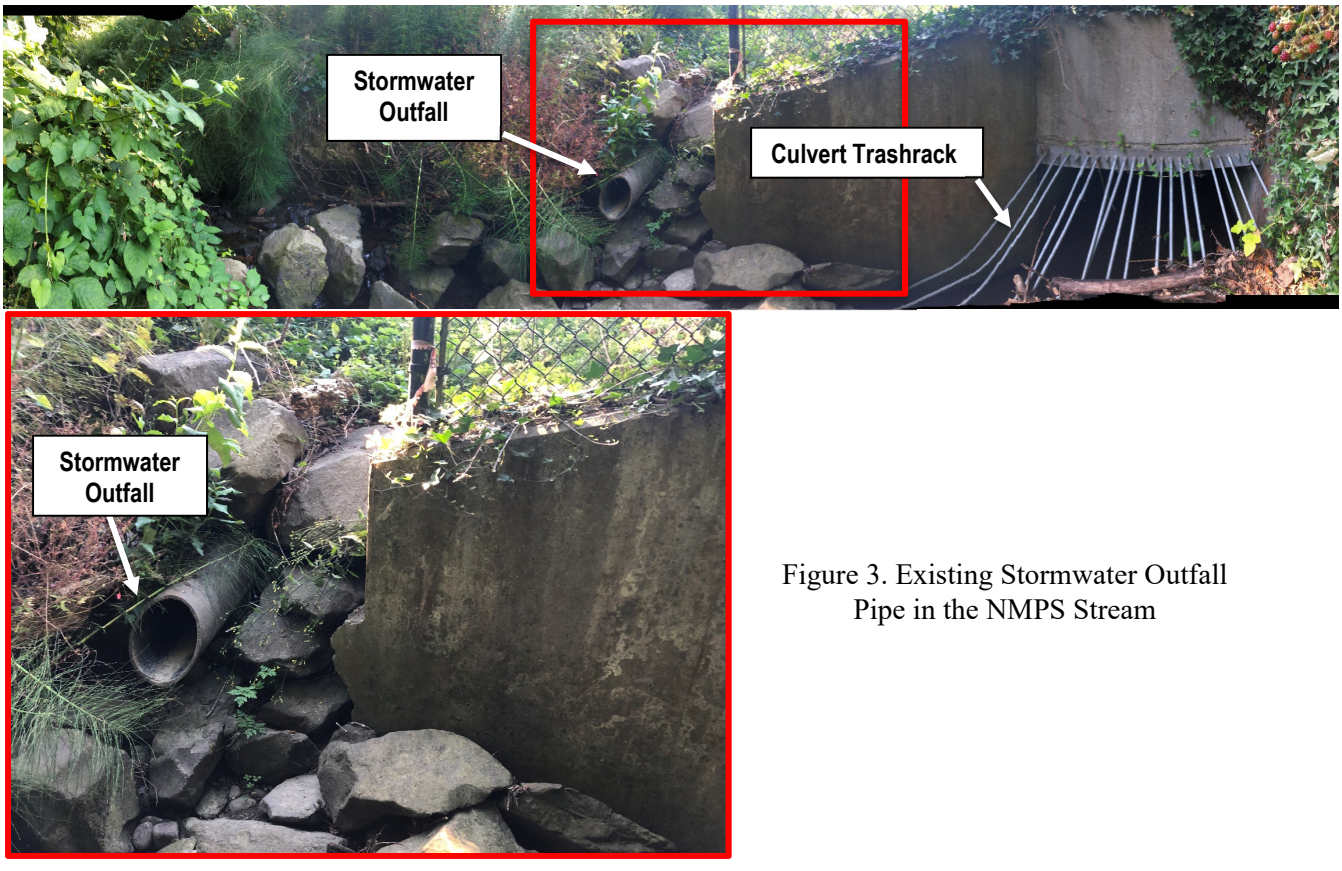


Figure 3. Existing Stormwater Outfall Pipe in the NMPS Stream

[1] *Note that 10 inches is the maximum size of the existing material, and this material includes smaller sediment – about 50% is smaller than 4 inches.*

3. CRITICAL AREAS

Critical areas are defined in the MICC under 19.07, as adopted under the revised CAO. Critical areas within the NMPS portion of the NME Project include an unnamed, Type F stream. Under MICC 19.07.180(C)(1), Type F streams have a standard 120-foot buffer (refer to Figure 1). Within the King County property, the standard 120-foot stream buffer encompasses almost the entirety of the King County property (34,760 SF), including 5,800 SF of existing impervious surface. Impervious surfaces provide no buffer functions; thus, the only functioning buffer on-site is the vegetated portion. The functional vegetated buffer on the King County property, assuming a 120-foot buffer, is approximately 28,960 SF.

The vegetated portion of the NMPS stream buffer is currently mature forest, with a shrub understory. Several large coniferous and deciduous trees are present in the riparian corridor, including red alder (*Alnus rubra*), western red cedar (*Thuja plicata*), and Douglas fir (*Pseudotsuga menziesii*). However, the understory is dominated by invasive plant species present throughout the buffer, causing degraded buffer functions. Invasive species observed during a December 2016 site visit include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), Japanese knotweed (*Polygonum cuspidatum*), and hedge bindweed (*Calystegia sepium*).

Based on a review of the revised criteria for buffer averaging and buffer reduction (MICC 19.07.180(C)(4) and MICC 19.07.180(C)(5)), the proposed NMPS facility upgrades would not be able to avoid impacts based on the following restrictions:

- The proposed buffer width is not less than 75% of the standard buffer at any point; and
- The total area of the buffer is equal to the area required without averaging.

The configuration of utilities and critical areas within the King County property does not allow for buffer averaging because there is not enough space on the property. Even the existing structures are closer than 90 feet to the NMPS stream. For example, the proximity of the existing pump station is within 25 feet at its closest point. The proposed upgrades to the existing facility prioritize habitat that is located as far from the stream as possible, but will still be within buffer habitat. Therefore, the NME Project will need to apply for public agency exception, pursuant to MICC 19.07.150.

A public agency (i.e., King County WTD) may apply for an exception if the regulations within the CAO would otherwise prohibit a development proposal. The criteria for providing a public agency an exception include:

- The proposed development has been recognized and/or approved by the city;
- There is no other reasonable alternative to the proposed development that would result in a lesser impact to the critical area;
- The proposed development is designed to avoid or minimize and mitigate the impact;
- The proposal does not pose a threat to public health, safety, and welfare; and
- The proposal is consistent with other applicable regulations.

The NME Project complies with these criteria as described in subsequent sections of this document.

4. IMPACTS AND MITIGATION

The impacts summarized in this section are discussed in more detail within the final application materials for a land use permit through Mercer Island (please refer to the *Critical Area Study*). The proposed mitigation will be reviewed by Mercer Island prior to final submission of the permit application materials during a second pre-application meeting. In addition, King County has been working with Mercer Island on locating the proposed upgrades for the NMPS facility through the Design Review Board process. Therefore, following information is a result of close consultation with Mercer Island during development of the NME Project.

4.1 IMPACTS

Impacts associated with the NME Project within the NMPS stream and buffer include both permanent and temporary impacts (Table 1). Temporary impacts are associated with adding new force mains across the NMPS stream. Because the watercourse extends well beyond the limits of the property (both upstream and downstream), there was no way to connect to the rest of the proposed pipeline without crossing the stream. Permanent impacts are associated with the increase in impervious surface and changes to the stormwater outfall. Out of a total area of 37,253 SF, there would be an increase of 14% to the existing impervious surface area within the NMPS stream buffer post project. The impervious surface added within the 120-foot stream buffer will be approximately 5,300 SF (Figure 4). While there will be a reduction in the functional buffer, the area of buffer enhancement will greatly exceed the area of impervious surface added within the stream buffer. Additional details on how the proposed mitigation will balance impacts are provided in Section 4.2 below.

Table 1. Impacts to NMPS Stream and Buffer

Jurisdiction	Temporary Impacts (SF)		Permanent Impacts (SF)
	NMPS Stream	NMPS Stream Buffer	NMPS Stream Buffer
King County	680	8,560	5,300
Mercer Island	--	1,590	--
Private	--	500	--

NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

Construction methods for the modified location of the stormwater outfall will include removing the existing outfall pipe and rip-rap surrounding the pipe. A new outfall apron will be constructed above the OHWM, and new pipe installed using open cut-and-cover methods. As noted above, pump station yard drains and roof drains will be combined into one outfall area. The combination of increased impervious surface area and consolidation of stormwater flows will increase the flows directed to the NMPS stream. Based on a ¼ mile downstream analysis, Mercer Island accepted an in-lieu fee for the increased stormwater quantity. The flow increase is below 0.05 cubic feet per second (cfs) for the 100-year flow frequency using 1-hour times steps in Western Washington Hydrology Model (WWHM) and below 0.10 cfs for the 100-year flow frequency using the 15-minute time steps in WWHM. Due to the size of Lake Washington, the additional discharge would be imperceptible and would not result in additional impacts within Lake Washington.



Figure 4 – Proposed Upgrades and Mitigation at the NMPS Site

4.2 MITIGATION

Under MICC 19.07.150, a public agency exception can be granted if proposed development would be prohibited by the critical area regulations otherwise. There is no alternative that can support the capacity increases for the regional wastewater system without providing facility upgrades at NMPS. Therefore, the NME Project is seeking an exception for the work occurring adjacent to the NMPS stream.

In order to receive an exception, a development project must prove that it is avoiding impacts to the extent feasible and will provide mitigation according to mitigation sequencing (MICC 19.07.100). A mitigation sequencing approach involves: (1) avoidance, (2) minimization, and (3) mitigation. Further, the NME Project is working toward a no-net-loss of critical area functions and values based on the following purposes of the CAO enunciated in under MICC 19.07.010 (emphasis added):

- To maintain the **functions and values** of critical areas and enhance the quality of habitat to support the sustenance of native plants and animals;
- To protect the **functions and value** of fish and wildlife habitat conservation areas, including wetlands, watercourses and habitat for priority species and species of local importance, through the use of buffers;
- To establish tools to ensure that protection and mitigation measures are applied and maintain **ecological value and function** consistent with the provisions of this chapter; and
- To minimize negative impacts from the built environment on the **functions and values** of critical areas.

Significant impacts to the stream buffer were avoided by siting the generator building for the pump station as far west as feasible. This design prioritized impacts within the NMPS stream buffer that was already impacted from existing impervious surface. While there is vegetated habitat in this location, the functions of the buffer were reduced due to the interruption of the existing impervious surface located between the vegetation and stream. Additional avoidance and minimization measures included moving the new stormwater pipe as far out of the OHWM as possible and designing building footprints to be as small as possible. According to Mercer Island (2019), the NMPS site is in a location where infiltrating low impact development facilities are not permitted.

Below is a summary of other minimization measures during construction discussed in the *Critical Area Study*:

- A Temporary Erosion and Sediment Control (TESC) Plan and a Source Control Plan will be developed and implemented for all clearing, vegetation removal, grading, ditching, filling, soil compaction, and excavation.
- All temporary and permanent erosion and sedimentation control measures would be inspected, maintained, and repaired on a regular basis to assure continued performance of their intended function.
- Erosion control blankets would be installed where ground-disturbing activities have occurred. This will prevent erosion and assist with establishment of native vegetation.
- All exposed soils would be stabilized during the first available period, and no soils would remain without stabilization during wet seasons (e.g., October 1 to April 30).
- Disturbed areas would be returned to existing or improved conditions (e.g., replanting or repaving) as soon as practical after construction is completed.
- Turbidity monitoring will occur during trenching and filling of the pipeline alignment zone to ensure that water quality standards are met.
- Seasonal restrictions (i.e., in-water work windows) will be applied to the project to avoid or minimize potential impacts on fish species, following approval from the regulatory agencies.
- The contractor will be responsible for preparing and implementing the Construction Stormwater Pollution Prevention Plan.
- Additional BMPs for tree management (Tree Solutions 2019, Confluence and Tree Solutions 2019).

Finally, unavoidable impacts will be mitigated through onsite restoration and additional ecological enhancements. Onsite enhancements include removing invasive species and planting native species within the NMPS stream buffer. The conceptual restoration layout is provided in Figure 5 and plant schedule is provide in Figure 6. The proposed native species to be planted, and their benefits to wildlife, are summarized in Table 2. Compared to the existing plant community, the proposed species provide enhanced riparian functions such as pollutant-filtering, shelter, and food resources for wildlife.

Table 2. Proposed Planting Schedule for the NMPS Enhancement

Common Name	Scientific Name	Spacing	Plant Quantities	Wildlife Benefit*
Trees				
Cascara	*Rhamnus purshiana*	10-14 ft OC	21	The fruit is a food source for a variety of wildlife species.
Douglas fir	*Pseudotsuga menziesii*	10 ft OC	35	Cones are food source for wildlife.
Western hemlock	*Tsuga heterophylla*	10-14 ft OC	37	Provides habitat for numerous wildlife species.
Western red cedar	*Thuja plicata*	10-14 ft OC	58	Snags are valuable habitat for cavity nesting birds.
Large Shrubs				
Indian plum	*Oemleria cerasiformis*	5-7 ft OC	120	Fruits are eaten by birds.
Pacific wax myrtle	*Myrica californica*	5-7 ft OC	245	Fruits are eaten by some birds. Dense cover provides habitat for birds.
Tall Oregon grape	*Mahonia aquifolia*	7 ft OC	34	Fruits are eaten by numerous birds.
Vine maple	*Acer circinatum*	5-7 ft OC	172	Provides nesting habitat for small birds. Twigs, buds, and seeds are eaten by a variety of wildlife and bird species.
Evergreen huckleberry	*Vaccinium ovatum*	Per plan	14	Fruits and buds are eaten by upland game birds.
Small Shrubs/Ferns				
Baldhip rose	*Rosa gymnocarpa*	2.5 ft OC	230	Fruits eaten by herbivores and upland birds. Leaves and twigs eaten by browsers. Provides habitat for song birds.
Creeping mahonia	*Mahonia repens*	2 ft OC or 2 per spot	1,419	Leaves and twigs are browsed by deer. Fruits are eaten by birds.
Low Oregon grape	*Mahonia nervosa*	2 ft OC	392	Leaves and twigs are browsed by deer. Fruits are eaten by birds.
Salal	*Gaultheria shallon*	2 ft OC or 2 per spot	930	Fruits are eaten by wildlife including upland game birds. Leaves, buds, and twigs are browsed by deer and elk.
Western sword fern	*Polystichum munitum*	4 ft OC or 2 per spot	1,195	Provides cover for insects and small birds.
Shrubs (Live Stakes)				
Red-twig dogwood	*Cornus sericea*	3 ft OC	68	Fruit is eaten by birds.
Sitka willow	*Salix sitchensis*	3 ft OC	204	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Scouler's willow	*Salix scouleriana*	3 ft OC	68	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Groundcovers				
Slough sedge	*Carex obnupta*	1 ft OC	631	Seeds are eaten by a wide variety of waterfowl and wildlife. Provides nesting cover for ducks.
Common rush	*Juncus effuses*	1 ft OC	159	Provides food and shelter for small animals.

*Based on information presented in Cooke 1997, SAS U.D. (unknown date), and USDA 2008.
OC = on center

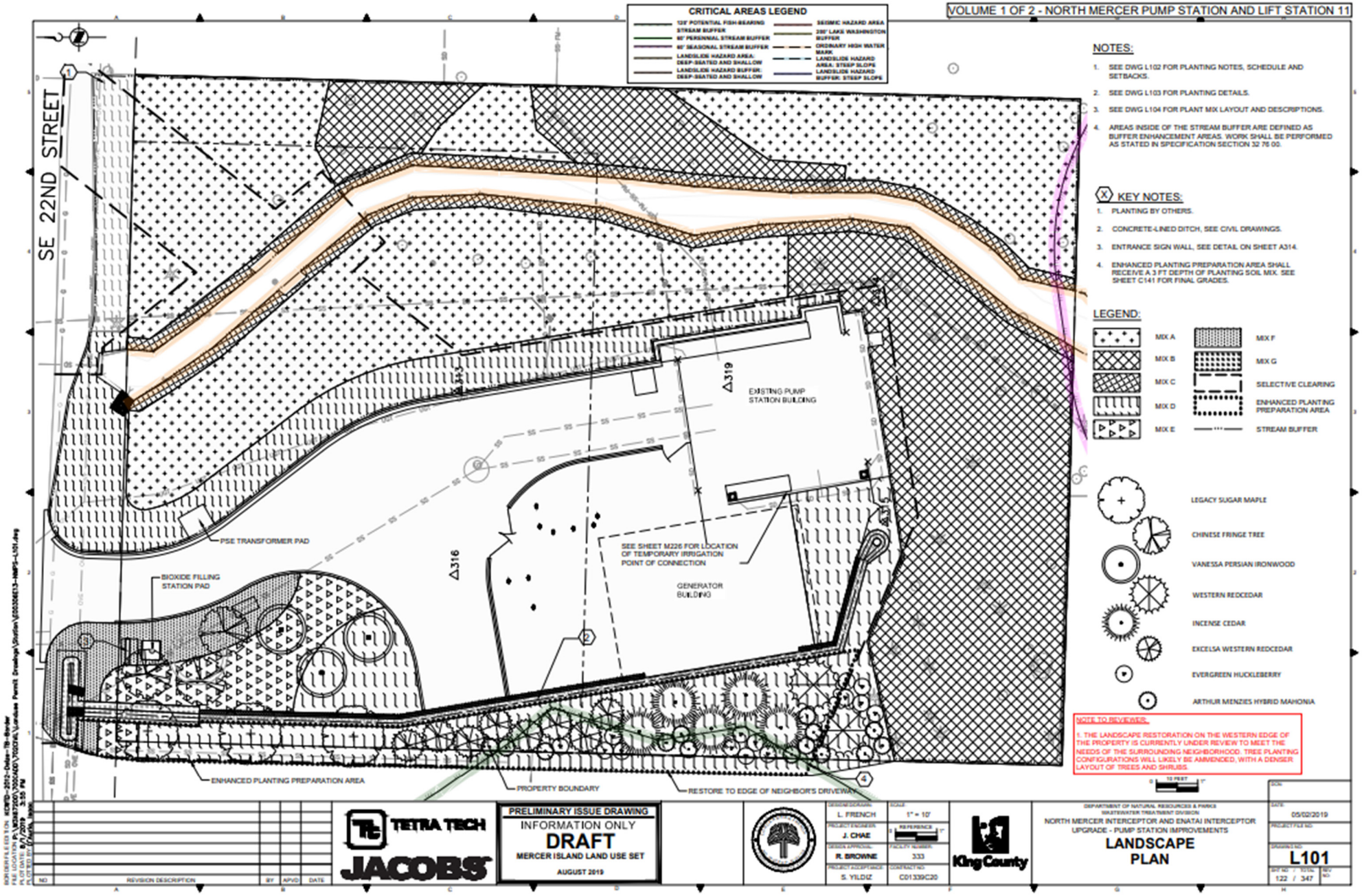
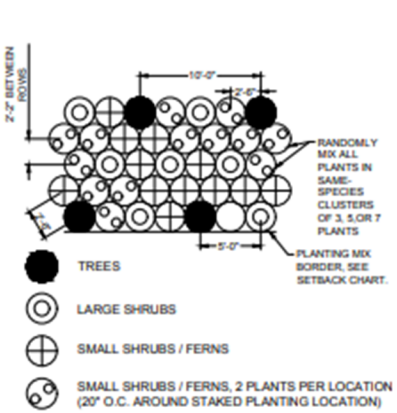


Figure 5 – NMPS Landscaping Plan

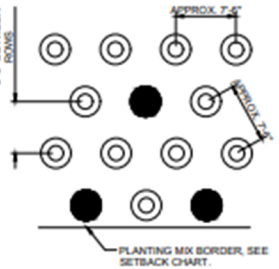


NOTES:

1. SEE SETBACK CHART ON L102 FOR MINIMUM SETBACK DISTANCE FROM EXISTING DESIRABLE VEGETATION.

PLANTING MIX A

COMMON NAME	SPACING	QTY.
TREES		
CASCARA	10 FT. O.C.	18
DOUGLAS-FIR	10 FT. O.C.	35
WESTERN HEMLOCK	10 FT. O.C.	18
WESTERN REDCEDAR	10 FT. O.C.	35
LARGE SHRUBS		
INDIAN PLUM	5 FT O.C.	89
PACIFIC WAX MYRTLE	5 FT. O.C.	212
VINE MAPLE	5 FT. O.C.	141
SMALL SHRUBS / FERNS- 2.5 FT. O.C.		
BALDHIP ROSE	2.5 FT. O.C.	230
CREEPING MAHONIA	2 PER SPOT	636
WESTERN SWORDFERN	2 PER SPOT	706
SALAL	2 PER SPOT	636



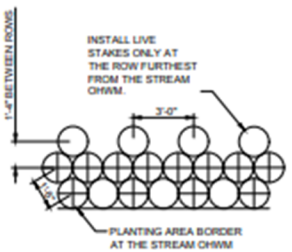
NOTES:

1. SEE SETBACK CHART ON L102 FOR MINIMUM SETBACK DISTANCE FROM EXISTING DESIRABLE VEGETATION.
2. BREAK FROM GRID WHEN NECESSARY TO ACCOMMODATE QUANTITIES INDICATED IN THE PLANS.

PLANTING MIX B

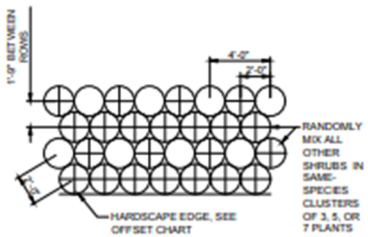
COMMON NAME	SPACING*	QTY.
TREES		
CASCARA	14 FT. O.C.	3
WESTERN HEMLOCK	14 FT. O.C.	19
WESTERN REDCEDAR	14 FT. O.C.	21
LARGE SHRUBS		
INDIAN PLUM	7 FT O.C.	31
PACIFIC WAX MYRTLE	7 FT O.C.	33
TALL OREGON-GRAPE	7 FT O.C.	34
VINE MAPLE	7 FT O.C.	31

* SPACING IS APPROXIMATE. ACTUAL SPACING WILL DEPEND ON THE DENSITY OF EXISTING VEGETATION WITHIN THE INFILL PLANTING AREA.



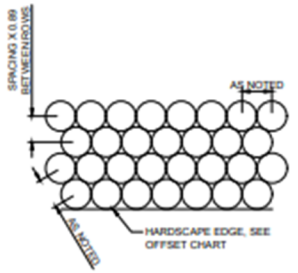
PLANTING MIX C

COMMON NAME	SPACING	QTY.
SHRUBS (LIVE STAKES)		
RED-TWIG DOGWOOD	3 FT O.C.	68
SCOULER'S WILLOW	3 FT. O.C.	68
SITKA WILLOW	3 FT O.C.	204
GROUNDCOVERS		
SLOUGH SEDGE	1.5 FT O.C.	525



PLANTING MIX D

COMMON NAME	SPACING	QTY.
LARGE SHRUBS		
EVERGREEN HUCKLEBERRY	PER PLAN	14
TALL OREGON-GRAPE	PER PLAN	14
SHRUBS / FERNS		
CREEPING MAHONIA	2 FT. O.C.	783
LOW OREGON-GRAPE	2 FT. O.C.	392
SALAL	2 FT. O.C.	294
WESTERN SWORDFERN	4 FT. O.C.	489



PLANTING MIX E

COMMON NAME	SPACING	QTY.
GROUNDCOVER		
BARRENWORT 'FROHNLEITEN'	1.5 FT. O.C.	532

PLANTING MIX F

COMMON NAME	SPACING	QTY.
GROUNDCOVER		
BIG BLUE LILYTURF	1.5 FT. O.C.	400

PLANTING MIX G

COMMON NAME	SPACING	QTY.
GROUNDCOVER		
COMMON RUSH	1 FT. O.C	159
SLOUGH SEDGE	1 FT. O.C.	106

FOR REFERENCE ONLY

NO	REVISION DESCRIPTION	BY	APVD	DATE

TETRA TECH JACOBS

PRELIMINARY ISSUE DRAWING
INFORMATION ONLY
DRAFT
MERCER ISLAND LAND USE SET
AUGUST 2019

DESIGNED	L. FRENCH
PROJECT ENGINEER	J. CHAE
DESIGN APPROVAL	R. BROWNE
PROJECT ACCEPTANCE	S. YILDIZ
SCALE	NTS
FACILITY NUMBER	333
CONTRACT NO	C01339C20

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WASTEWATER TREATMENT DIVISION
NORTH MERCER INTERCEPTOR AND ENATAI INTERCEPTOR UPGRADE - PUMP STATION IMPROVEMENTS

LANDSCAPE DETAILS

DATE: 05/02/2019
DRAWING NO: L104
SHT NO / TOTAL: 131 / 393

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PLOT DATE: 4/25/2019 4:31 PM
PLOTTED BY: CA Thornton

Figure 6 – Landscape Restoration Details (Planting Mixes A through G for NMPS)

Overall, there is a total of 26,592 SF of onsite enhancement available within King County's property. These enhancement measures will provide improved riparian functions, including shading, pollutant filtration, and organic material recruitment to the stream. Given the predominance of invasive species in the existing understory, as described above, the proposed enhancement actions will improve the habitat functions within the NMPS stream buffer over existing conditions.

There is no mitigation ratio outlined in the MICC for temporary or permanent impacts to streams or stream buffers. Temporary impacts from the NME Project will be fully mitigated at a minimum of a 1:1 ratio (Table 3). Once the stream buffer is planted with native vegetation, it will be monitored for 5 years, as required by MICC 19.07.080(C). Irrigation will be provided during plant establishment to ensure plant survival. A maintenance and monitoring plan for the stream buffer will be submitted along with permit application materials.

Table 3. Mitigation for Impacts to NMPS Stream and Buffer

Jurisdiction	Impacts (SF)		Mitigation (SF)	
	NMPS Stream	NMPS Stream Buffer	NMPS Stream	NMPS Stream Buffer
King County	680	19,050	62	25,360
Mercer Island	--	1,590	--	670
Private	--	500	--	500

NMPS = North Mercer Pump Station, ROW = right-of-way; SF = square feet

The NME Project at NMPS meets the criteria established under MICC 19.07.150. Unavoidable impacts will be mitigated by enhancing the existing conditions of the NMPS stream buffer through the removal of invasive species and native plantings. The project is compliant with all criteria established under the Public Agency Exception, including:

- **The proposed development has been recognized and/or approved by the city.** The NMPS facility design is being reviewed by the Design Review Board, and the land use and construction applications will be reviewed by the Community Planning & Development Department. The proposed development has been discussed with Mercer Island through pre-application meetings and during other design meetings to meet the needs of both the NME Project and the city.

- **There is no other reasonable alternative to the proposed development that would result in a lesser impact to the critical area.** Improvements to NMPS, along the proposed North Mercer Island Interceptor pipeline alignment and within the East Channel of Lake Washington, are necessary to accommodate the capacity increases that will be needed for the regional wastewater system. Because the watercourse buffer is within nearly the entire property (refer to Figure 1), there is no place to move the proposed upgrades outside of the buffer. Because the watercourse extends well beyond the limits of the property (both upstream and downstream), there was no way to connect to the rest of the proposed pipeline without crossing the stream.

  Upgrades were located as far west from the stream as possible and behind existing impervious surfaces. The stream was crossed at a perpendicular angle to reduce impacts. Additional BMPs will be used to reduce potential impacts. Construction will reduce the buffer from 28,960 SF to 23,180 SF of vegetated habitat (refer to Figure 4).

- **The proposed development is designed to avoid or minimize and mitigate the impact.** The NME Project will follow guidelines provided in MICC 19.07.100, Mitigation Sequencing. The design process

has included consideration of impacts to critical areas and shorelines. Where feasible, changes have been made to decrease the level of impact. For example, the generator building at NMPS is proposed as far west as feasible and in areas with limited function to limit stream buffer impacts. There is no other reasonable alternative to further avoid or minimize impacts to critical areas.

- **The proposal does not pose a threat to public health, safety, and welfare.** The underlying purpose of the entire NME Project is to improve the public health, safety, and welfare.

- **The proposal is consistent with other applicable regulations.** The NME Project will comply with all other local, state, and federal regulations.

The public agency exception will allow the NME project to conduct necessary improvements at NMPS. Within the 120-foot buffer, 15,950 SF of impacts will occur to currently vegetated areas, including an increase in impervious surface of approximately 5,300 SF. However, enhancement within the NMPS stream buffer will total approximately 26,592 SF within the NMPS parcel. The vegetated area within the buffer is proposed to be changed from 28,960 SF (not including existing impervious surface) to 23,180 SF. Thus, the functional buffer would be reduced by 20%. Note that this is a conservative estimate of the buffer reduction because there will be additional native plantings outside of the NMPS parcel that will also contribute to the functions of the riparian habitat along the stream. However, the proposed planting will result in a much higher level of ecosystem functions compared to existing conditions that are dominated by invasive species in the understory of the riparian habitat. Therefore, the proposed changes to the buffer, despite being smaller, will provide higher functions than existing conditions.

5. REFERENCES

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