

APPENDIX C

Biological Resources

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Biological Resources Technical Report

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November 2023
Harvey Field Runway Improvement Project



Biological Resources Technical Report

Prepared for Harvey Field

November 2023
Harvey Field Runway Improvement Project

Biological Resources Technical Report

Prepared for

Harvey Field
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ABBREVIATIONS

Airport	Harvey Field Airport
BA	biological assessment
BMP	best management practice
BNSF	Burlington Northern Santa Fe Railway
CWA	Clean Water Act
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
PGIS	pollution-generating impervious surface
PHS	Priority Habitats and Species
Project	Harvey Field Runway Improvement Project
RCW	Revised Code of Washington
TMDL	Total Maximum Daily Load
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WSDOT	Washington Department of Transportation

1 Introduction and Project Description

This Biological Resources Technical Report has been prepared for the Harvey Field Runway Improvement Project (Project). The Project proposes to safely and efficiently accommodate current and projected aviation activity at Harvey Field Airport (Airport) in Snohomish, Washington, by meeting current Federal Aviation Administration (FAA) design standards (Figure 1). Key elements of the Project include the following:

- Construction of a new 2,400-foot asphalt Runway 15-33
- Removal of the existing asphalt Runway 15L-33R
- Construction of a new parallel taxiway with three runway connections while reusing much of the existing partial parallel taxiway pavement
- Removal of about 300 linear feet of taxiway pavement
- Relocation of Airport Way to the south
- Removal of approximately 600 linear feet of existing Airport Way
- Removal of trees from approach and departure surfaces of both runway ends
- Installation of new runway/taxiway lighting
- Installation of a retaining wall with water passage infrastructure (i.e., culverts) on the Runway 33 end to minimize the amount of fill required and to allow water to pass from one side of the runway to the other in a flood event

During construction, access to the Project site would be via the Airport Service Road, accessed from the public parking lot at the main entrance to the Airport. The construction staging area for the airfield Project components would be located on an existing vehicle parking lot at the end of the Airport Service Road. The construction staging area for the relocation of Airport Way project component will be in the field south of existing Airport Way with the exact location to be determined at the time of construction.

This technical report describes the existing conditions within the Study Area and potential impacts of the Project and its alternatives on biological resources, including terrestrial and aquatic species and habitats that occur or potentially occur in the vicinity of the Study Area. Aquatic habitats include the Snohomish River and surface waters and wetlands that drain to the Snohomish River. The analysis focuses on federal and state special status species and their habitats under the following regulatory context:

- Endangered Species Act (ESA), including aquatic and wildlife species and their habitat as listed by the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Association (NOAA) Fisheries
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Washington State Threatened, Endangered, and Sensitive Species

Evaluation of federally listed species and their habitat under the ESA, and Essential Fish Habitat (EFH) is provided in the Biological Assessment (BA; Anchor QEA 2023a).

This report considers species and habitat associated with the following terrestrial, aquatic, and wetland habitats:

- **Terrestrial species.** Terrestrial species are defined as plants or wildlife that live on land. Examples of terrestrial plants include trees, shrubs, and herbs that are adapted to upland or riparian habitats. Examples of terrestrial wildlife include mammals, birds, reptiles, and insects.
- **Aquatic species.** Aquatic species are defined as plants or wildlife that must live in water all or most of the time, including semiaquatic species such as amphibians and some mammals such as otters and beaver. Examples of aquatic wildlife include fish, shellfish, and frogs. Examples of aquatic plants include plants that grow partially or entirely submerged in marine or freshwater habitats.
- **Wetlands.** Wetlands are transitional zones between upland and aquatic areas and include habitats such as swamps, marshes, and bogs. Examples of wetland plants include those species that are adapted to grow in or on the water, or where soils are flooded or seasonally or permanently saturated. Wildlife species that use wetland habitats include a variety of terrestrial and semiaquatic wildlife. Wetland species and habitats are present in the Study Area and are discussed in this technical report primarily in terms of plant species and wildlife use. Additional details on wetland habitats are addressed in the Wetlands Report for the Project (Anchor QEA 2023b).

This technical report, along with the BA, will be used to support environmental review of the Project by the state and federal agencies with funding, jurisdictional, or permitting authority. This technical report will also be used as supporting documentation for future permitting efforts.

1.1 Study Area

The Study Area is located at Harvey Field, a privately owned airport in Snohomish County, Washington, and includes approximately 213 acres bordered by Washington State Route 9 (Woodinville-Snohomish Road) to the west, an active BNSF rail line to the north, and Airport Way a disused BNSF rail line to the east, and Springhetti Road and 111th Street SE to the south. Land use within the Study Area includes aviation hangars, taxiways, and runways; open fields; and commercial and residential properties (Figure 2).

Although habitat within the Study Area is largely disturbed, limited areas of undisturbed natural habitat and wildlife areas include a small, forested area on Washington Department of Transportation (WSDOT)-owned parcels located adjacent to and northwest of the Study Area. The Study Area topography is relatively flat and low in elevation, with site elevations that range between 8 and 25 feet above sea level (Snohomish County 2023). The portion of the Study Area north of

Airport Way is flat around the Airport and runways, but gently slopes down to the west to a ditch that drains towards State Route 9. The portion of the Study Area south of Airport Way contains low areas in association with a historical oxbow of the Snohomish River and a slightly higher centrally located hill.

The Snohomish River flows northward east of the Study Area, then bends and flows westward north of the Study Area. The Study Area has been drained via a ditch system on both sides of Airport Way; the ditch in the northern portion flows west under State Route 9 and the ditch in the southern portion flows from north to south, and then east through a culvert under the disused BNSF rail line (Figure 3).

2 Regulatory Context

Federal, state, and local regulations, statutes, and guidelines related to terrestrial and aquatic species and habitat are identified in Tables 1, 2, and 3. These guiding regulations will be followed throughout the design and construction of the Project.

Table 1
Federal Regulations, Statutes, and Guidelines

Regulation, Statute, or Guideline	Description
Clean Water Act (CWA; 33 United States Code [USC] 1251 et seq.)	The CWA establishes the basic structure for the U.S. Environmental Protection Agency to regulate discharges of pollutants into the waters of the United States and regulates water quality standards for surface waters. Section 303(d) includes a requirement for states to identify and list waters where current water pollution control regulations and controls alone cannot meet the water quality standards set for those waters. Section 401 (water quality certification) requires Water Quality Certification from the state for activities requiring a federal permit or license to discharge pollutants into a water of the United States. Certification attests the state has reasonable assurance the proposed activity will meet state water quality standards. Section 402 (33 USC 1342) establishes the National Pollutant Discharge Elimination System program, under which certain discharges of pollutants into waters of the United States are regulated. Section 404 regulates the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands.
Protection of Wetlands, Presidential Executive Order 11990	Requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.
Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (Code of Federal Regulations Parts 325 and 332)	Provides regulations governing compensatory mitigation for activities authorized by permits issued by the Department of the Army.
<i>Corps of Engineers Wetlands Delineation Manual</i> (Environmental Laboratory 1987)	Provides guidelines and methods to determine whether an area qualifies as a wetland, which may be subject to regulatory jurisdiction under Section 404 of the CWA.
<i>Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)</i> (USACE 2010)	Provides technical guidance and procedures for identifying and delineating wetlands in the western mountains, valleys, and coast region that may be subject to regulatory jurisdiction under Section 404 of the CWA.

Regulation, Statute, or Guideline	Description
National Environmental Policy Act (42 USC 4321 et seq.)	The National Environmental Policy Act (NEPA) establishes a national policy for the environment. It requires federal agencies to assess the environmental effects of proposed major federal actions prior to making decisions. Section 101 sets forth a national policy to use all practicable means in a manner that fosters and promotes the general welfare and to create and maintain conditions under which man and nature can exist in ways that fulfill social, economic, and other requirements. Section 102 establishes procedural requirements for major federal actions significantly affecting the quality of the human environment by requiring federal agencies to prepare a detailed statement on: 1) the environmental impact of the proposed action; 2) any adverse effects that cannot be avoided; 3) alternatives to the proposed action; 4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and 5) any irreversible and irretrievable commitments of resources that would be involved in the proposed action.
Endangered Species Act (16 USC 1531 to 1544)	Provides for the conservation of species listed as threatened or endangered and the habitats upon which they depend. Section 7 of the ESA requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and/or USFWS and/or to ensure a federal action is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267)	Requires fishery management councils to include descriptions of EFH and potential threats to EFH in all federal fishery management plans. Also requires federal agencies to consult with NMFS on activities that may adversely affect EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" and is designated for groundfish, Pacific salmon, and coastal pelagic composites. EFH includes coral reefs, kelp forests, bays, wetlands, rivers, and areas of the deep ocean that are necessary for fish reproduction, growth, feeding, and shelter (NOAA 2023a). Federal standards and guidelines for anadromous salmonid passage facility design are described in NMFS 2011.
Migratory Bird Treaty Act of 1918, as amended (16 USC 703 to 713)	Makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Under the regulatory authority of USFWS.
Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668 to 668c)	Prohibits the taking of bald and golden eagles, including their parts, nests, or eggs, without a permit issued by USFWS, and provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

Table 2
State Regulations, Statutes, and Guidelines

Regulation, Statute, or Guideline	Description
Washington State Hydraulic Code (Revised Code of Washington [RCW] 77.55; Washington Administrative Code [WAC] 220-660)	Issued by the Washington Department of Fish and Wildlife (WDFW) for projects with elements that may affect the bed, bank, or flow of a water of the state or productive capacity of fish habitat. Considers effects on riparian and shoreline/bank vegetation in issuance and conditions of the permit, including for the installation of piers, docks, piling, and bank armoring and crossings of streams and rivers (including culverts).
Washington State Water Pollution Control Act (RCW 90.48)	Grants the Washington State Department of Ecology (Ecology) the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, saltwaters, water courses, and other surface and groundwater in the state, including those that are not considered to be waters of the United States (i.e., non-jurisdictional) under Section 404 of the CWA.
Protection of Wetlands, Governor's Executive Order 89-10	Adopts a statewide goal of no overall net loss in acreage and function of Washington's remaining wetlands; directs state agencies to consider the benefits provided by wetlands, avoid activities that would adversely affect wetlands, and adequately mitigate when wetland impacts are unavoidable.
Protection of Wetlands, Governor's Executive Order 90-04	Directs state agencies "to the extent legally permissible" to take various actions to protect wetlands.
Wetland Mitigation in Washington State (Ecology et al. 2021)	Provides guidance to comply with environmental laws and policies and to improve the quality and effectiveness of wetland mitigation in Washington State.
Washington State Department of Ecology Code (WAC 173)	Chapter 201A: Establishes water quality standards for surface waters, implementing RCW 90.48, Water Pollution Control Act. Freshwater designated uses and associated criteria are specifically identified in WAC 173-201A-200. Chapter 204: Establishes sediment management standards to reduce and ultimately eliminate adverse effects on biological resources and significant threats to human health from surface sediment contamination.
Water Resources Act of 1971 (RCW 90.54)	Sets forth fundamental policies for the state to ensure that waters of the state are protected and fully utilized for the greatest benefit.
Washington State Fishways, Flow, and Screening Code (RCW 77.57; WAC 220-660-190 through 220-660-250)	Establishes requirements for fishways in dams, diversion of water, fish guards on diversion devices, and water flow policy. Promotes removal of fish passage barriers, unimpeded passage of fish at all life stages, and maintenance of natural channel processes and function. Establishes design requirements for permanent and temporary fish passage improvement structures if barrier removal is infeasible. State standards and guidelines for anadromous passage facility design are described in WDFW 2013.
Washington State Growth Management Act (RCW 36.70A)	Defines a variety of critical areas, which are designated and regulated at the local level under city and county critical areas ordinances. These critical areas may include shorelines or portions of fish habitat.

Regulation, Statute, or Guideline	Description
Washington State Wildlife Action Plan Fish and Wildlife (RCW 77)	Plan to help guide implementation of policies and goals related to Washington State wildlife, fish, and wildlife and fish habitat as set forth by RCW 77, Fish and Wildlife.
Washington Department of Fish and Wildlife State Protected Species (WAC 220-610)	Provides lists of species classified as endangered and threatened in Washington State. Provides legislation that prohibits fishing for or possessing fish that are federally listed as threatened or endangered. Provides rules for the protection of bald eagles. Identifies and classifies native wildlife species. Defines the processes for listing, management, recovery, and delisting a species and the criteria for classifying wildlife as endangered, threatened, or sensitive.
Washington Department of Natural Resources (WDNR) Natural Heritage Program	The Natural Heritage Program has no direct regulatory authority and is advisory only. Conservation status assigned to species and habitats is used to support federal, state, and local land management policies and listing decisions.
Shoreline Management Act (RCW 90.58)	Regulates and manages the use, environmental protection, and public access of the state's shorelines. The Shoreline Management Act was passed by the Washington State Legislature in 1971 and adopted in 1972. Ecology is the agency responsible for enforcing the Shoreline Management Act.
Invasive/Non-Native Species (WAC 220-640)	Washington State legislation on invasive and non-native species applies to all non-native aquatic animal species except those in ballast water. This legislation requires the state to define standards for invasive risk levels and criteria for determining environmental impacts, list prohibited and regulated species, and require a permit for possession of listed species.
Rivers and Habitat Open Space Program (WAC 222-223)	The Rivers and Habitat Open Space Program allows Washington State Departments to acquire conservation easements on forest lands within unconfined channel migration zones and forest lands containing a critical habitat for threatened or endangered species.

Table 3
Local Regulations

Regulation	Description
Snohomish County Shoreline Master Program	Snohomish County planning document that outlines the goals and policies for shorelines.
Snohomish County Code Chapter 30.62, Critical Area Regulations	Snohomish County Code Chapter 30.62 provides guidance to protect critical areas and their functions and values.

3 Methods

This report was prepared by completing a field review of the Study Area, conducting background research of existing information, summarizing existing conditions, and identifying potential impacts to biological resources. The field review and background research approach are described in this section and results are presented Section 4, Affected Environment and Section 5, Impact Analysis.

3.1 Field Review

This report describes plants, wildlife, and their habitats in the Study Area and identifies potential impacts on these resources. Analyses included reviewing existing information, performing an aerial photograph assessment, and conducting a site visit over several days in June 2023.

During site visits, Anchor QEA biologists documented general information regarding habitats and dominant plant species and communities within the Study Area. All wildlife species, tracks, and other signs observed during the site visit were recorded. All observations were qualitative; no quantitative wildlife surveys were performed. Three wetlands, Wetland A, Wetland B, and Wetland D were delineated as part of the site visits (Figure 3). In addition, one wetland, Wetland C, was observed off site to the west of the northwest portion of the Study Area (Figure 3). The results of the delineations and observations are presented in the *Wetlands Report* (Anchor QEA 2023b).

A BA was also prepared as part of the Project and provides an analysis of potential Project impacts to ESA-listed species (Anchor QEA 2023a). A summary of information from the *Wetlands Report* and BA is provided in this technical study. Photographs were also taken to document vegetation and habitat conditions of the Study Area (Attachment A).

The Study Area includes the Project as well as a 2,000-foot extent around the Project that was established for the biological resources analysis to identify any critical areas or critical area protective buffers that may be located within or near the footprint of proposed construction activities. As described in Section 1.2, nearly all of the Study Area has been disturbed or developed. Undisturbed vegetation communities and wildlife habitat are limited to the WSDOT-owned parcels located to the west of the northwest portion of the Study Area, where habitat exists for a variety of plant and wildlife species.

3.2 Review of Existing Information

Anchor QEA biologists reviewed the following sources of information as part of the analysis for this report:

- *Harvey Field Airport Master Plan* (Jviation 2018)
- *Biological Assessment*, Harvey Field Runway Improvement Project (Anchor QEA 2023a)
- *Wetlands Report*, Harvey Field Runway Improvement Project (Anchor QEA 2023b)

- *Delineation Study - Harvey Field Master Plan* (The Watershed Company 2015)
- Cornell Lab of Ornithology eBird Database for Snohomish, Washington (Cornell Lab of Ornithology 2023)
- iNaturalist Research-Grade Observations (iNaturalist 2023)
- Natural Resource Conservation Service Web Soil Survey (NRCS 2023)
- Pilchuck Audubon Society, Snohomish County Bird Checklist (Audubon Society 2023)
- *Salmonid Habitat Limiting Factors Analysis, Snohomish River Watershed (Water Resource Inventory Area 7)* (Haring 2002)
- Snohomish County Code Chapter 30.62A, Wetlands and Fish & Wildlife Habitat Conservation Areas
- Snohomish County Planning and Development Services Map Portal (Snohomish County 2023)
- USFWS Wetlands Mapper for National Wetlands Inventory Map Information (USFWS 2023a)
- USFWS Information for Planning and Consultation (USFWS 2023b)
- U.S. Geological Survey National Hydrography Dataset (USGS 2023)
- Ecology Water Quality Atlas Map (Ecology 2023a)
- Ecology Water Quality Assessment & 303(d) List (Ecology 2023b)
- WDFW Priority Habitats and Species (PHS) Maps (WDFW 2023a)
- WDFW SalmonScape Mapper (WDFW 2023b)
- Washington State Endangered, Threatened, Sensitive, and Candidate Species List (WDFW 2023c)
- WDFW Fish Passage and Diversion Screening Inventory Database (WDFW 2023d)
- WDNR Ecological Systems of Washington State Guide to Identification (WDNR 2015)
- Washington Lidar Portal (WDNR 2023a)
- WDNR Heritage Program Online Map (WDNR 2023b)
- WDNR Forest Practices Application Mapping Tool (WDNR 2023c)
- Washington Geospatial Open Data Portal Statewide Washington Integrated Fish Distribution (WGODP 2023)
- Aerial photographs publicly available via Google Earth

4 Affected Environment

4.1 Terrestrial Wildlife Habitat and Species

4.1.1 Terrestrial Wildlife Habitat

Wildlife rely on vegetation for food, shelter, and cover from predators. Wildlife diversity is generally related to the structure and composition of plant species within vegetative communities. In general, vegetation communities that contain few species or vegetative layers (herbaceous vegetation, shrubs, or trees) support a low diversity of wildlife, whereas vegetation communities that are more

complex and contain a wide variety of plant species and vegetative layers can support a greater diversity of wildlife.

The Study Area is composed of previously disturbed and developed areas including landscaped fields, existing roadways, ditches, and Airport infrastructure. The only undisturbed features within the vicinity of the Study Area include forested WSDOT-owned parcels to the northwest. Three wetlands are located within the Study Area, identified as Wetland A, Wetland B, and Wetland D. Wetland B is located north of existing Airport Way and west of the existing runways, and Wetlands A and D are located south of existing Airport Way (Figures 3, 4, and 5). Wetland C, located outside to the northwest of the Study Area, has been identified as a forested palustrine depressional wetland (The Watershed Company 2015). Wetland C is entirely off site, but portions of the Wetland C buffer extend into the Study Area. Disturbed vegetated areas within the Study Area include mowed areas and landscape vegetation associated with residential, commercial, and Airport land uses.

The following subsections provide a general description of wildlife habitat in the Study Area based on existing vegetation communities. A list of plant species in the Study Area identified during the June 2023 site visits is provided in Attachment B. Aerial photographs of disturbed and undisturbed vegetated areas in the Study Area vicinity are shown in Figures 2 and 3.

4.1.1.1 Vegetation

Dominant vegetation within the Study Area includes black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), Pacific willow (*Salix lasiandra*), Himalayan blackberry (*Rubus armeniacus*), colonial bentgrass (*Agrostis capillaris*), Kentucky bluegrass (*Poa pratensis*), and reed canarygrass (*Phalaris arundinacea*). Grass fields within the Study Area are composed of a mixture of native and nonnative grass and herbaceous species. Specific vegetation communities are described in the following subsections.

Vegetation on in the Study Area is limited to mowed grass areas, wetland areas, and landscape trees and shrubs. Small patches of mowed lawn and landscape vegetation associated with residential, commercial, and Airport land use are also present. Dominant herbaceous species at the Airport include colonial bentgrass, Kentucky bluegrass, velvet grass (*Holcus lanatus*), common cat's ear (*Hypochaeris radicata*), reed canary grass, creeping buttercup (*Ranunculus repens*), Himalayan blackberry, common dandelion (*Taraxacum officinale*), and white clover (*Trifolium repens*). Few trees or shrubs are located within the Study Area, but species represented include western redcedar (*Thuja plicata*), Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), black cottonwood, red alder, common hawthorn (*Crataegus monogyna*), and red elderberry (*Sambucus racemosa*).

4.1.1.2 Forest Habitat Vegetation

Forest habitat in the vicinity of the Study Area is confined to portions of the WSDOT-owned parcels northwest of the Study Area. The forest habitat has a tree canopy dominated by black cottonwood, red alder, and understory species such as Pacific willow and Himalayan blackberry.

4.1.1.3 Wetlands and Ditches

Three wetlands (Wetlands A, B, and D) were delineated within the Project Area (Figure 3). Wetlands B and D are Category III wetlands, and Wetland A is a Category III wetland under the Snohomish County (2023a) and Ecology wetland rating system (Hruby 2014). Wetland B is located in the northern portion of the Project Area and includes an emergent vegetation community. Wetlands A and D are located in the southern portion of the Project Area and include emergent vegetation communities. Dominant vegetation species within these emergent wetlands include colonial bentgrass, Kentucky bluegrass, reed canary grass, and soft rush (*Juncus effuses*). Other species found along the surrounding edges of the wetlands include common cat's ear, creeping buttercup, red elderberry, white clover, and yellow-flag iris (*Iris pseudacorus*). Wetland C, identified in the forested area in the northwest portion of the Study Area, includes forested, shrub, and emergent vegetation communities. Dominant vegetation species within this wetland include black cottonwood, red alder, and understory species such as Pacific willow, reed canary grass, and Himalayan blackberry.

At the time of the site visits in June 2023, no standing water was observed in any of the wetland areas other than water ranging in depth from a few inches to several feet deep present in the ditches associated with Wetlands A and B. The depressions within Wetlands A, B, and D have silt and sand soil substrates and are filled with emergent vegetation with no evidence of flowing water (scouring). The source of water within all of the wetlands includes groundwater, precipitation, and surface water runoff. An off-site, approximately 1,100-foot-long culvert located to the east of the Study Area connects the ditch associated with Wetland A to Batt Slough, which drains through culverts and open channel segments to the Snohomish River. Another ditch that runs underneath Highway 9 and then to the north connects Wetland B to the main channel of the Snohomish River. Off-site Wetland C and Wetland D are not directly connected to other surface waters.

All four wetlands are located more than 1,000 feet from the Snohomish River and the ditches within the Study Area do not appear to provide potential fish habitat. An earlier Wetland Delineation Report (The Watershed Company 2015) describes a one-way flap valve that was historically located at the end of the lowermost Batt Slough culvert outlet, where it discharged into the Snohomish River. According to the report, fish cannot access the ditch associated with Wetland A due to an impassible fish screen located beneath the railroad tracks at the opening of the 1,100-foot-long culvert. On-site observations of potential wetland fish habitat are supported by Washington State mapping efforts (WDFW 2023b; WDNR 2023c; WGodp 2023). Wetland A, B, C, and D buffer vegetation is mostly grass and herbaceous vegetation with trees and shrubs occurring north of the Wetland C boundary.

The results of the Study Area wetland delineations are described in the *Wetlands Report* (Anchor QEA 2023b).

4.1.2 *Wildlife Species*

Vegetation communities within the Study Area provide habitat for a variety of wildlife species common to populated communities in Snohomish County and western Washington. Vegetated areas within the Study Area provide habitat for native and nonnative bird, amphibian, reptile, insect, and small and large mammal species to breed, forage, and rest.

Although formal wildlife surveys were not performed as part of the Project analysis, a variety of native and nonnative bird species were observed during the June 2023 site visits, including red-winged blackbird (*Agelaius phoeniceus*), great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), barn swallow (*Hirundo rustica*), black-capped chickadee (*Parus atricapillus*), house sparrow (*Passer domesticus*), and European starling (*Sturnus vulgaris*). Predatory bird species including red-tailed hawk (*Buteo jamaicensis*) and osprey (*Pandion haliaetus*) were observed during the June 2023 site visits. Osprey nests were also observed near the Snohomish River and outside the Study Area boundary. Snags and trees in forested habitats provide perch sites for these species.

In addition, the local community has performed annual Christmas Day bird surveys for several years in association with the Pilchuck Audubon Society (Audubon Society 2023). Data from the annual surveys are entered into the Cornell Lab of Ornithology eBird database (Cornell Lab of Ornithology 2023). The local community is also active on social media platforms providing descriptions and photographs of wildlife observations in the Snohomish County area. A list of wildlife species in the Study Area identified during the June 2023 site visits is provided in Attachment B. Attachment B also includes bird species commonly identified during Audubon surveys and research-grade observations recorded in the region (iNaturalist 2023).

The Study Area habitats likely provide foraging and nesting habitat for a wide variety of songbird species such as song sparrow (*Melospiza melodia*), bushtit (*Psaltiriparus minimus*), Bewick's wren (*Thryomanes bewickii*), Steller's jay (*Cyanocitta stelleri*), spotted towhee (*Pipilo erythrophthalmus*), Swainson's thrush (*Catharus ustulatus*), varied thrush (*Ixoreus naevius*), dark-eyed junco (*Junco hyemalis*), chestnut-backed chickadee (*Parus rufescens*), golden-crowned kinglet (*Regulus satrapa*), willow flycatcher (*Empidonax traillii*), and red-breasted nuthatch (*Sitta canadensis*). Snags in forested habitats also provide potential nest sites for cavity-nesting birds such as great horned owl (*Bubo virginianus*) and species of woodpeckers including downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), and pileated woodpecker (*Dryocopus pileatus*).

Because the Study Area wetlands do not regularly contain open water area, they provide little habitat for wintering and migratory waterfowl, such as gadwall (*Anas strepera*), mallard (*Anas platyrhynchos*),

ring-necked duck (*Aythya collaris*), greater scaup (*Aythya marila*), lesser scaup (*A. affinis*), Canada goose (*Branta canadensis*), American coot (*Fulica americana*), and green-winged teal (*Anas crecca*). Study Area wetlands provide a limited variety of habitat for terrestrial birds. Areas of Wetlands A, B, and D with grass and herbaceous vegetation provide habitat for red-winged blackbird, song sparrow, and marsh wren (*Cistothorus palustris*), among other species. Wetland C forested and scrub-shrub wetland habitats are commonly used by similar species, as well as waterbird species such as great blue heron and wood duck (*Aix sponsa*) that may make occasional use of wooded areas for nesting.

Wildlife use of the developed portions of the Study Area habitat is likely limited to disturbance-tolerant species like American crow (*Corvus brachyrhynchos*) and American robin (*Turdus migratorius*) and non-native species such as European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), and house sparrow.

The Study Area ditches and wetlands provide habitat for still-water breeding, and upland breeding amphibian species. Reptiles are likely to occur in Wetlands A, B, C, and D and within the upland habitats of the Study Area. A single common garter snake (*Thamnophis sirtalis*) was observed in the Study Area near the gravel roadway in the upland area to the east of Wetland C during the June 2023 site visit.

Small mammal species associated with forested habitat and disturbed portions of the Study Area include shrew mole (*Neurotrichus gibbsii*), Townsend's vole (*Microtus townsendii*), masked shrew (*Sorex cinereus*), and striped skunk (*Mephitis mephitis*). Raccoon (*Procyon lotor*) and the non-native species Virginia opossum (*Didelphis virginiana*) also occur in these habitat types. Larger mammals such as mule deer (*Odocoileus hemionus*) and coyote (*Canis latrans*) have been observed in the Study Area vicinity (iNaturalist 2023).

The Study Area is surrounded by development, so vegetated corridors connecting habitat to undisturbed habitats outside the Study Area are limited to narrow patches of vegetation along roadways, and the perimeters of parcels used for residential and agricultural purposes.

4.1.2.1 WDFW Priority Habitats and Species

The WDFW PHS database (WDFW 2023a) identifies portions of the Study Area as having listed occurrence of little brown bat (*Myotis lucifugus*) and Yuma myotis (*Myotis yumanensis*). These small, closely related bat species are best distinguished by in-hand inspection. Both species are generalist insectivorous bats that hunt prey species by echolocation. Both bat species diet consists mainly of aquatic, soft-bodied insects such as gnats, mosquitoes, and crane flies (*Diptera*), wasps (*Hymenoptera*), and moths (*Lepidoptera*) that are found near the wide range of habitats and human-made structures the bats use for resting and maternity sites (Barbour and Davis 1969; USFWS 2023c). Neither species is currently listed as threatened or endangered under the ESA. No evidence of either species or inhabited roosts were observed during Anchor QEA site visits in June 2023.

4.2 Aquatic Habitat and Species

4.2.1 *Aquatic Habitat*

The Study Area is located less than 1/4 mile from the Snohomish River. Two of the wetlands within the Study Area, Wetland A and Wetland B, are connected to the river by ditches. The Snohomish River provides shallow and slow-moving aquatic habitat.

Within the Study Area, the ditches associated with Wetland A and Wetland B include sand and silt substrate material. At the time of the June 2023 wetland delineations, water in the ditches had a maximum depth of approximately 3 feet and an average depth of approximately 1.5 feet. Based on water mark observations, water elevations are 2 to 3 feet higher during the wet winter months. However, the ditches do not appear to provide potential fish habitat because they lack defined bed and banks and provide water quality too poor to support salmonids. Furthermore, fish passage to the ditch associated with Wetland A is blocked due to a fish screen located beneath the railroad tracks at the opening of the 1,100-foot-long culvert to Batt Slough (The Watershed Company 2015). The WDFW Fish Passage & Diversion Inventory Database maps two blockages to fish passage to the ditch associated with Wetland B (WDFW 2023d). One blockage is a non-culvert crossing beneath State Route 9 (Site ID 934980) and the other is a buried culvert (Site ID 934981). On-site observations of potential wetland fish habitat are supported by Washington State mapping efforts (WDFW 2023b; WDNR 2023c; WGODP 2023).

Wetland habitats within the Study Area are isolated and fragmented depressions that do not regularly collect standing water but may occasionally accumulate some surface water during heavy rain or flooding.

No waters within the Study Area are listed as impaired waterbodies (Ecology 2023a, 2023b). However, the Snohomish River, which is within the vicinity of the Study Area, is listed on the Ecology Water Quality Assessment for a variety of parameters, shown in Table 4. The Snohomish River is listed as a Category 5 water for temperature, Category 2 water for pH, and Category 1 water for fecal coliform bacteria and Ammonia-N (Ecology 2023a, 2023b). The Water Quality Assessment represents the results of regular state water quality assessments that are designed to identify and clean up polluted waters. The assessments meet the requirements of Section 303(d) of the CWA, which requires that all states restore their waters to be “fishable and swimmable.” The water quality assessments are a process of collecting and assessing the quality of surface waters in the state in order to satisfy the CWA.

Table 4
Water Quality Assessment Categories for the Snohomish River in the Study Area Vicinity

Category	Meaning	Listings in Area of the Project
None	Not included in Ecology 303(d) impairment assessment	Study Area ditches
Category 1	Meets tested standards for clean water. Category 1 means a waterbody meets the state water quality standards. Being placed in this category does not necessarily mean that a waterbody is free of all pollutants.	Snohomish River: fecal coliform bacteria and Ammonia-N
Category 2	Waters of concern. Waters in this category have some evidence of a water quality problem, but not enough to show persistent impairment. These are waters where testing should continue.	Snohomish River: pH
Category 3	Insufficient data. There is insufficient data to place these waters in any of the other categories.	Snohomish River: none
Category 4	Impaired waters that do not require a Total Maximum Daily Load (TMDL). Waters that have impairment problems that are being resolved in one of three ways: • Category 4a: already has an EPA-approved TMDL plan in place and implemented. • Category 4b: has a pollution control program, similar to a TMDL plan, that is expected to solve the pollution problems. • Category 4c: is impaired by causes that cannot be addressed through a TMDL plan. Impairments in these waterbodies include low water flow, stream channelization, and dams. These problems, while not pollutants, require complex solutions to help restore waterbodies to more natural conditions.	Snohomish River: none
Category 5	Polluted waters that require a water improvement project. This is the list of impaired waterbodies traditionally known as the 303(d) list. Starting with the 2004 Water Quality Assessment, Washington's 303(d) list of polluted waters were placed under Category 5 in the approved assessment. TMDLs or other approved water quality improvement projects are required for the waterbodies in this category. If a waterbody is in this category it means that there are data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL—or pollution control program—in place.	Snohomish River: temperature

4.2.2 Aquatic Species

ESA-listed species and other species of native and nonnative fish are found in the Snohomish River but are not documented within the ditches in the Study Area. The ESA-listed species identified in the Snohomish River are discussed in Section 4.3.

The WDFW PHS database (2023a) and Statewide Integrated Fish Distribution (WDFW 2023b) identify the lower reaches of the Snohomish River as habitat for salmonids, native fishes, and nonnative fishes. Fish use the mainstem of the Snohomish River year-round for rearing and migration, and salmonids spawning occurs upstream and outside of the Study Area. The Snohomish River contains slow-moving pool habitat that supports additional species that are within 1/4 mile of the Study Area. In addition to the ESA-listed evolutionarily significant units (ESUs) and distinct population segments (DPSs) of spring-run Chinook salmon, steelhead, and bull trout, Table 5 lists the fish species documented to occur within the vicinity of the Study Area, specifically in the Snohomish River (Rice et al. 2014; WDFW 2023a and 2023b; Wydoski and Whitney 2003).

Table 5
Aquatic Species Known to Occur in the Vicinity of the Study Area (Snohomish River)

Common Name	Species Name
Black crappie	<i>Pomoxis nigromaculatus</i>
Brook trout	<i>Salvelinus fontinalis</i>
Bull trout	<i>S. confluentus</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Chum salmon	<i>O. keta</i>
Coho salmon	<i>O. kisutch</i>
Fatfin minnow	<i>Pimephales promelas</i>
Largescale sucker	<i>Catostomus macrocheilus</i>
Longfin smelt	<i>Spirinchus thaleichthys</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Largemouth bass	<i>Micropterus salmoides</i>
Mountain whitefish	<i>Prosopium williamsoni</i>
Starry flounder	<i>Platichthys stellatus</i>
Pacific lamprey	<i>Entosphenus tridentatus</i>
Peamouth chub	<i>Mylocheilus caurinus</i>
Pikeminnow	<i>Ptychocheilus oregonensis</i>
Prickly sculpin	<i>Cottus asper</i>
Rainbow trout	<i>O. mykiss</i>
Redside shiner	<i>Richardsonius balteatus</i>
Rifle sculpin	<i>Cottus gulosus</i>
Speckled dace	<i>Rhinichthys osculus</i>
Steelhead	<i>O. mykiss</i>
Three finned stickleback	<i>Gasterosteus aculeatus</i>
Western brook lamprey	<i>Lampetra richardsoni</i>

4.3 ESA-Listed Species and Critical Habitat

A BA was prepared for the Project to evaluate the potential effects on ESA-listed species and critical habitat in compliance with Section 7(a)(2) and Section 3(5)(A) of the ESA (Anchor QEA 2023a).

Information from the BA is summarized in this report. Consultation with USFWS and NMFS has not yet been initiated, but it is anticipated that these agencies will issue Letters of Concurrence following future consultation. Four ESA-listed threatened wildlife and aquatic species and critical habitats under the jurisdiction of the NOAA Fisheries (2023b) and USFWS (2023b) may occur in the Study Area and are addressed in the BA. Table 6 presents the ESA-listed species and designated critical habitats identified in the BA as potentially occurring in the Study Area.

Table 6

Endangered Species Act-Listed Species and Critical Habitats that May Occur in the Vicinity of the Study Area

Species and Scientific Name	Listing Status	Agency	Critical Habitat
Chinook salmon, Puget Sound ESU <i>Oncorhynchus tshawytscha</i>	Threatened	NMFS	Designated in vicinity of Study Area
Steelhead, Puget Sound DPS <i>Oncorhynchus mykiss</i>	Threatened	NMFS	Designated in vicinity of Study Area
Bull trout, Coastal-Puget Sound DPS <i>Salvelinus confluentus</i>	Threatened	USFWS	Designated in vicinity of Study Area
Marbled murrelet <i>Brachyrhampus marmoratus</i>	Threatened	USFWS	Not designated in vicinity of Study Area

Three of the four species are aquatic species documented within the Snohomish River, outside of the Study Area: Puget Sound ESU Chinook salmon, Puget Sound DPS steelhead, and coastal Puget Sound bull trout. One of the four species, marbled murrelet (*Brachyrhampus marmoratus*), is a terrestrial species identified by USFWS (2023a) as potentially occurring in the Study Area. As described in the BA, suitable foraging and nesting habitat for marbled murrelet is not present in the Study Area; however, marbled murrelet may be present when flying between foraging and nesting sites.

Two additional ESA-listed species under the USFWS jurisdiction occur in Washington and are considered by USFWS to potentially occur in the Study Area, but are not addressed further in this report, because they are extremely unlikely to occur within the Study Area. These two species are listed as follows with the rationale for eliminating them from this analysis.

- North American wolverine (*Gulo gulo luscus*)—Proposed threatened
 - Rationale: does not occur in Study Area and suitable habitat does not exist in the Study Area. The North American wolverine typically lives in boreal forest, taiga, and tundra ecosystems. In Washington, they occupy alpine and subalpine forest habitats, especially

within North Cascades National Park and the wilderness areas of Okanogan-Wenatchee National Forest (WDFW 2023). Wolverines require a snowy habitat for their young, and a large range to roam.

- Yellow-billed cuckoo (*Coccyzus americanus*), Western DPS—Threatened
 - Rationale: does not occur in Study Area; location is also outside of proposed critical habitat (USFWS 2023a), and suitable habitat does not exist in the Study Area. Yellow-billed cuckoos are migratory birds that breed in North America and winter in Central and South America. They nest within and use willow and cottonwood riparian forests with a dense closed canopy (Csuti et al. 2001).

The effect of the Project on these species and critical habitats was determined by documenting environmental baseline conditions and evaluating effects of the Project on the species and environmental baseline. The analysis of potential impacts is described in Section 5.

5 Impacts Analysis

5.1 Construction Impacts

5.1.1 Direct Impacts

Potential direct impacts on wildlife, aquatic, and ESA-listed habitat and species that could occur from temporary construction actions and the presence of Project features are removal and loss of habitat during demolition of the existing Airport taxiway, runways, and Airport Way and construction of the new taxiway, runways, and Airport Way. Potential construction impacts could occur from land clearing, excavation, grading, and fill placement activities that permanently remove, fill, or otherwise change existing upland and wetland habitats.

Specific temporary effects could occur from in-air noise disturbance from construction activities, demolition of the existing Airport infrastructure and Airport Way, loss of food resources and habitat, turbidity, and stormwater runoff. Proposed construction activities are localized and temporary. Long-term effects could occur from permanent wetland impacts and disturbances to wetland buffer vegetation.

5.1.1.1 Terrestrial Wildlife Habitat and Species

In general, the severity of direct construction impacts to wildlife species and habitat varies, depending on the type and quantity of affected vegetation. For example, losing plant communities that offer limited wildlife value or losing fragmented ornamental vegetation habitat in park-like settings results in less of an adverse effect than losing more complex vegetation associations, such as forested riparian areas and wetlands. Most of the Project footprint is composed of previously disturbed and developed areas including existing roadways, and residential, commercial, and Airport

development. While undisturbed vegetated areas comprise a relatively small portion of the overall Study Area, some permanent impacts to Wetland A and to Wetland A buffers is likely unavoidable and would occur.

Potential construction impacts on wildlife habitat and species include temporary and permanent removal or disturbance of vegetation or habitats during construction activities. Permanent impacts include vegetation removal during Project construction activities including the construction of permanent Project features.

Temporary impacts to Wetland A buffers and wetland D buffers have also been avoided or minimized where possible; however, some temporary impacts would occur. Temporary impacts to wetland buffers include vegetation removal during Project construction activities that would not result in permanent Project features, such as access routes within and adjacent to these mowed grass areas. Temporarily disturbed wetland and wetland buffer would be replanted on site following construction.

Wildlife habitat within the Project footprint includes upland, wetland, and wetland buffer (see Figures 2 and 3). The majority of the upland habitat is mowed grass and is primarily colonial bentgrass and Kentucky bluegrass. Wetland A exists within the Project footprint (see Figure 5) and includes emergent vegetation communities. Wetland A buffer vegetation is mostly grass and herbaceous vegetation with trees and shrubs occurring near the southern Wetland A boundary. These vegetation communities would be disturbed within the Project footprint. Permanent and temporary impacts to Wetland A and Wetland A buffer within the Project footprint based on the current Project design have been identified (see Figure 5).

Demolition of the existing Airport Way and construction of the relocated Airport Way roadway would include the clearing of herbaceous vegetation and fill in portions of Wetland A, Wetland A buffers, and Wetland D buffers. Vegetation clearing and fill would also be required as part of the Airport taxiway and runway improvements but would not impact any wetlands or wetland buffers. This area includes a combination of existing developed areas and mowed grass vegetated areas. Potential wildlife corridor movement in the Study Area is currently inhibited by existing roadways and development, in addition to existing BNSF tracks, and residential and agricultural land use.

Permanent construction impacts to Wetland B, Wetland C, Wetland D, and associated buffers have been avoided. Permanent construction impacts to Wetland A and Wetland A buffers have been avoided and minimized where possible. Tables 7 summarizes the permanent and temporary impacts to the Study Area wetlands and vegetated buffers.

Table 7**Summary of Permanent and Temporary Impacts Wetlands and Wetland Buffers**

Wetland	Permanent Wetland Impacts (acre)	Temporary Wetland Impacts (acre)	Permanent Buffer Impacts (acre)	Temporary Buffer Impacts (acre)
Wetland A	0.12	0.17	0.14	0.24
Wetland D	0	0	0	0.08
Total	0.12	0.17	0.14	0.32

Temporarily disturbed wetland and wetland buffer would be replanted with native species following construction. Permanent wetland impacts identified based on the conceptual design would require compensatory mitigation. Mitigation for unavoidable permanent impacts to wetlands and wetland buffer associated with the Project would be in accordance with the Snohomish County critical areas ordinance requirements (Snohomish County Code 30.62A). Mitigation for temporary and permanent impacts to Wetland A and Wetland A buffers are described in the *Wetlands Report* (Anchor QEA 2023b).

Clearing native vegetation for construction would eliminate and modify existing wildlife habitat of native wildlife species that use these areas to breed, forage, and rest. Such impacts to habitats would displace or eliminate wildlife that currently depend on this vegetation. Wildlife habitat within the Project footprint is located within a developed and populated area of Snohomish County. Most wildlife species (e.g., birds, raccoons, and coyotes) are able to move away from areas of disturbance. Displaced animals could potentially occupy nearby habitats, although impacts up to mortality could occur if nearby habitats are at carrying capacity or suitable alternative habitat is unavailable or inaccessible. Small mammals, amphibians, and reptiles, however, could be directly affected by construction because of their limited mobility. Individuals of such species could perish during clearing and grading activities.

For more transient construction disturbances, such as increased noise levels from construction machinery and vehicle usage, some wildlife species would adapt to these disruptions (e.g., birds and mammals that are habituated to human disturbance), and some species would successfully relocate to other suitable habitat (e.g., larger mammals and birds). Some less mobile wildlife species (e.g., small mammals, amphibians, and reptiles) would be unsuccessful in adapting or relocating, and their ability to find adequate shelter and foraging and breeding habitat would be constrained. Elevated noise levels can cause a variety of stressors to wildlife including acoustic masking of vocalizations, reduced transmission distance of vocalizations, reduced ability to find prey or increased predation, and increased stress response. Heavy equipment used during road construction and Airport infrastructure construction is expected to cause the greatest audible and visual disturbance to wildlife.

Emissions from construction equipment may also cause direct effects to wildlife species. Air emissions generated by Project construction activities would consist of exhaust emissions from the operation of construction equipment and construction vehicles and fugitive dust particles from ground disturbance associated with construction of the Project. Given the landscape and openness of the Study Area, emissions are anticipated to dissipate into the lower atmosphere relatively quickly. The Project would be constructed in accordance with the Federal Clean Air Act, Emission Standards for Non-Road Diesel Engines, Washington Clean Air Act, and Washington Ambient Air Quality Standards to minimize the potential direct effects of emissions on wildlife.

The BA analysis determined that marbled murrelet is the only ESA-listed wildlife species that could potentially occur in the vicinity of the Study Area. The proposed Project effect determination for marbled murrelet is *no effect* (Anchor QEA 2023a).

5.1.1.2 Aquatic Habitat and Species

Potential direct construction impacts to aquatic habitat and species could occur around the Study Area ditches and wetlands from construction activities including loss of food resources and habitat, turbidity, and stormwater runoff. Construction of the new Airport Way would permanently impact portions of Wetland A and associated buffers.

Exposing soil and removing vegetation could result in an increase in turbid runoff, with the possibility of allowing pollutants to enter the aquatic habitat Study Area ditches. Greater runoff could have adverse effects on water quality in aquatic resources within the Study Area and downstream aquatic habitats depending on the effectiveness of best management practices (BMPs).

Aquatic species present within the Study Area could be subject to behavioral disturbance and injury during Airport Way demolition and construction. Turbidity would temporarily increase during construction due to substrate disturbance from earthwork activities. Appropriate conservation measures and BMPs would be used to minimize substrate disturbance, turbidity, and stormwater runoff, including measures such as using silt fencing or other barriers to prevent the spread of turbid water. Additionally, water quality would be monitored during construction to comply with the Ecology 401 Water Quality Certification and other permit requirements. Once construction is complete, there should be no further causes of elevated turbidity associated with the Project.

Although the Project is intended to be constructed during the time of year when the ESA-listed aquatic species Chinook salmon, steelhead, and bull trout are largely absent from the Study Area vicinity, there could still be late migrating juveniles rearing in areas and adult fish present in the Snohomish River. The Project effect determination for the aquatic species addressed in the BA is that this Project *may affect but is not likely to adversely affect* ESA-listed aquatic species (Anchor QEA 2023a).

The BA analysis determined that the effect determination for Chinook salmon, steelhead, and bull trout critical habitat located in the vicinity of the Study Area is that this Project *may affect, but is not likely to adversely affect* critical habitat for these species.

5.1.2 Indirect Impacts

5.1.2.1 Terrestrial Wildlife Habitat and Species

Indirect impacts are potential effects that would be caused by the Project at a later time or farther distance but are still reasonably foreseeable to occur. Indirect impacts may also occur through the implementation of mitigation measures for environmental impacts from other resources as part of this Project or through supporting projects that are not yet defined or considered part of the Project. The Project includes Airport improvements and road construction within a developed and populated area of Snohomish County. No significant indirect impacts associated with the movement or migration of wildlife are identified. There are very limited potential migratory corridors from the Study Area to undeveloped vegetated areas in the riparian habitat of the Snohomish River. The Snohomish River vegetated riparian habitat is relatively narrow, ranging from about 200 feet wide to less than 50 feet wide. In addition, the shoreline both downstream and upstream of the Study Area vicinity includes residential and agricultural land uses. No potential indirect impacts to wildlife habitat and species or ESA-listed wildlife species are identified.

5.1.2.2 Aquatic Habitat and Species

Indirect impacts from potential leaks or spills during hazardous material storage or use or due to fluid leaks from construction machinery during the construction process could travel downstream in the ditches to the Snohomish River beyond the Study Area and could potentially impact aquatic habitats and species. These potential impacts would be minimized with conservation measures and BMPs such as implementation of a spill plan and a Temporary Erosion and Sediment Control plan.

5.2 Operational Impacts

5.2.1 Direct Impacts

5.2.1.1 Terrestrial Wildlife Habitat and Species

Potential operational impacts on wildlife habitat and species associated with the Project are not expected to change as a result of the new roadway and aircraft use, because no increase in surface or air traffic volume is expected. Noise levels associated with Airport operation after construction are expected to be consistent with current ambient noise levels. The Study Area is in proximity to BNSF rail tracks and Hwy 9 is located about 300 feet from the Study Area.

Periodic maintenance activities associated with the Airport, such as mowing adjacent to the runways and on-site gravel roadways, would be consistent with existing current conditions.

No potential impacts on ESA-listed wildlife species associated with operation of the Project are anticipated.

5.2.1.2 Aquatic Habitat and Species

Operational impacts on aquatic habitat and species could occur due to stormwater impacts from the increase in impervious surfaces associated with the Project. Water quantity is not expected to significantly change due to the Project, and BMPs will be incorporated to ensure that the Project does not lead to an increase in peak flows. Stormwater runoff generated by the Project would enter surface waters and potentially cause deleterious effects on aquatic species receiving runoff. An increase of pollution-generating impervious surfaces (PGIS) could cause an increase in pollutants in stormwater runoff, which could affect water quality in the Snohomish River. These impacts would be minimized using an existing infiltration trench and a bioswale as well as the construction of new stormwater BMPs that will be installed to provide additional capacity to treat stormwater runoff from PGIS using technology to remove sediments and associated pollutants. Runoff from all new PGIS will be treated, which will reduce water quality impacts to ESA-listed species.

5.2.2 Indirect Impacts

No indirect impacts to wildlife habitat and species, aquatic habitat and species, or ESA-listed wildlife and aquatic species associated with operation of the Project are anticipated.

5.3 Cumulative Impacts

Cumulative impacts on wildlife habitat and species, and aquatic habitat and species, from the Project were determined by combining the Project's impacts with other past, present, and reasonably foreseeable future actions. As transportation corridors improve, access to occupied and vacant areas may increase per local land use plans and policies. This increase in access can lead to further development and concurrent impacts on wildlife and aquatic habitats as land is cleared for development of residential, industrial, and commercial properties. The Project is located within a developed area of Snohomish County, and future development in the vicinity of the Study Area is likely to occur without the Airport improvements proposed for this Project. Potential cumulative impacts are expected to be similar to those described in previous sections.

5.4 Mitigation

The following conservation measures and BMPs would be employed during construction of the Project that would minimize and mitigate for impacts to wildlife habitat and species and aquatic habitat and species:

- All applicable permits for the Project would be obtained prior to construction. All work would be performed according to the requirements and conditions of these permits.
- The contractor would be responsible for the preparation and implementation of a spill plan to be used for the duration of the Project. The plan would be submitted to the Project engineer prior to the commencement of any construction activities. A copy of the plan with any updates would be maintained at the work site by the contractor.
 - The spill plan would identify construction planning elements and recognize potential spill sources at the site. The plan would outline responsive actions in the event of a spill or release and would identify notification and reporting procedures. The plan would also outline contractor management elements such as personnel responsibilities, Project site security, site inspections, and training.
 - The spill plan would outline which measures the contractor would take to prevent the release or spread of hazardous materials either found on site or encountered during construction but not identified in contract documents, or any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. These items include, but are not limited to, gasoline, oils, and chemicals. Hazardous materials are defined in the RCW 70.105.010 under “hazardous substance.”
 - The contractor would maintain at the Project site the applicable equipment and materials designated in the spill plan.
- Excess or waste materials would not be disposed of or abandoned waterward of the ordinary high water mark or allowed to enter waters of the state.
- No petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials would be allowed to enter surface waters.
- Erosion control measures would be addressed in a Temporary Erosion and Sediment Control plan prepared by the contractor and adhered to during construction activities.
- Demolition and construction materials would not be stored where upland runoff can cause materials to enter surface waters.
- Wetland and wetland buffer areas temporarily impacted by construction activities would be restored by replanting the areas with appropriate native herbaceous and woody species, as practicable.
- Clearing limits would be demarcated with orange barrier fencing wherever clearing is proposed in or near critical areas.

- All engine-powered equipment would be required to have mufflers that were installed according to the manufacturer's specifications.
- All equipment would be required to comply with pertinent U.S. Environmental Protection Agency equipment noise standards.
- All staging areas would be located at least 150 feet outside of rivers, wetlands, and their buffers.
- Impacts to Wetland A, Wetland A buffers, and Wetland D buffers would be mitigated as described in the *Wetlands Report* (Anchor QEA 2023b).

6 References

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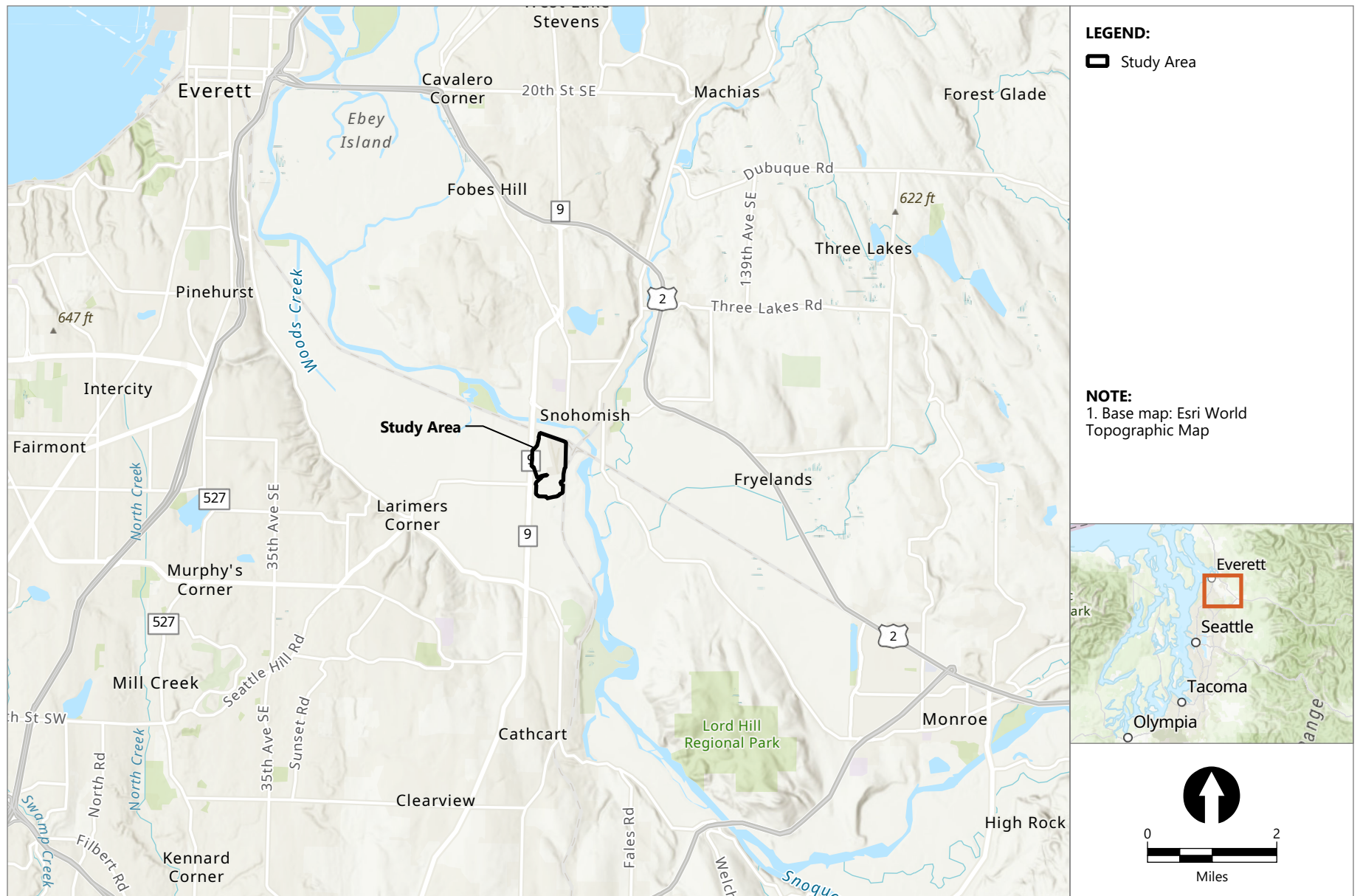
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Figures

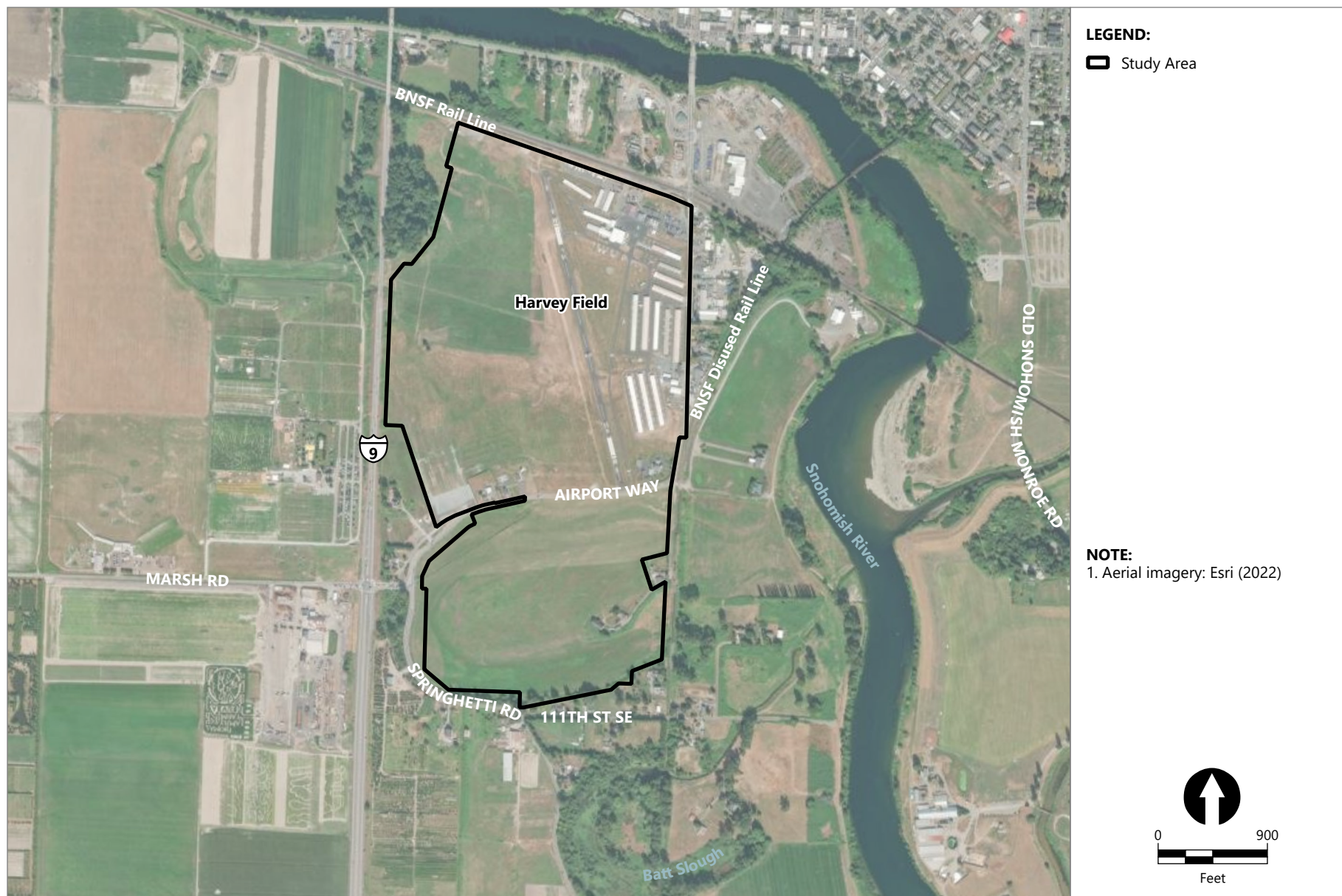


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Figure 1
Vicinity Map

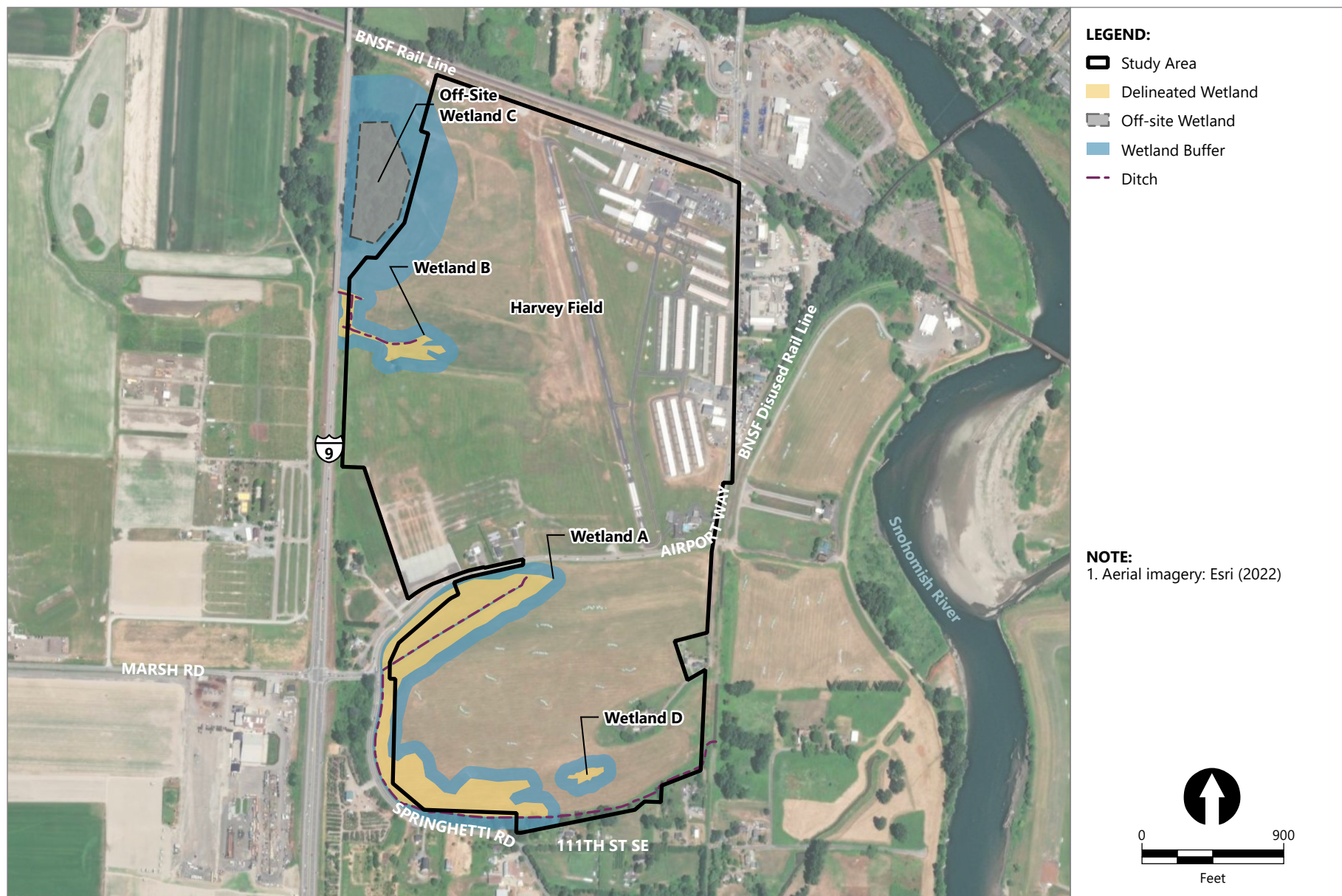
Biological Resources Technical Report
 Harvey Field Runway Improvement Project



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Figure 2
Existing Conditions - Study Area and Vicinity
 Biological Resources Technical Report
 Harvey Field Runway Improvement Project



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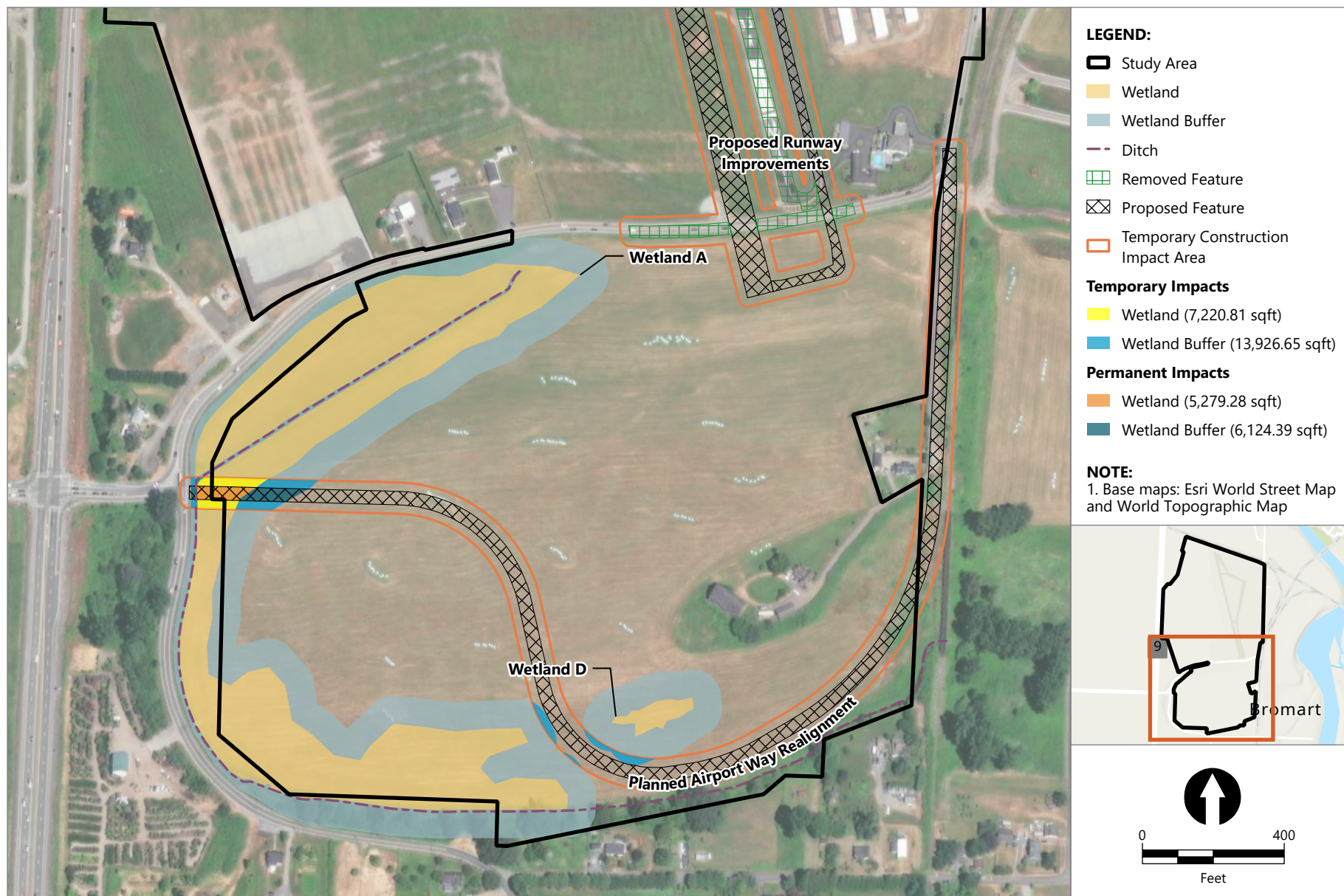
Figure 3
Wetlands and Ditches in Study Area
Biological Resources Technical Report
Harvey Field Runway Improvement Project



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Figure 4
Potential Wetland Impacts - North
 Biological Resources Technical Report
 Harvey Field Runway Improvement Project



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Figure 5
Potential Wetland Impacts - South
Biological Resources Technical Report
Harvey Field Runway Improvement Project

Attachment A

Site Photographs

Photograph 1

Study Area north of Airport Way and west of Airport, looking southwest. Off-site forested Wetland C in background, to right. On-site emergent Wetland B in background, to left.



Photograph 2

Study Area north of Airport Way and west of Airport, looking northwest. Off-site forested Wetland C in background, to left.



Photograph 3

Study Area south of Airport Way, looking south. On-site emergent Wetland D, to left. Southern lobe of on-site emergent Wetland A, to right.



Photograph 4

Study Area south of Airport Way, looking southeast. On-site emergent Wetland D in foreground.



Photograph 5

Study Area south of Airport Way, looking northeast. On-site emergent Wetland D in foreground.



Photograph 6

Study Area south of Airport Way, looking southwest. On-site emergent Wetland A and associated ditch, center.



Photograph 7

Study Area south of Airport Way, looking west. Northern lobe of on-site emergent Wetland A. Associated ditch, to left. Airport Way embankment to right.



Photograph 8

Study Area south of Airport Way. North side of Wetland A, north of the ditch, looking southeast.



Photograph 9

Ditch within Wetland A (see lines showing relative difference between water surface level and ground surface level); looking northwest



Photograph 10

Study Area south of Airport Way, looking west from disused train trestle. Ditch draining Wetland A to left, on-site Wetland D, center. On-site Wetland A in background.



Attachment B

Plant and Wildlife Species

Vegetation Species Observed in the Study Area During June 2023 Site Visits

Scientific Name	Common Name
Trees	
<i>Acer macrophyllum</i>	Bigleaf maple
<i>Alnus rubra</i>	Red alder
<i>Crataegus monogyna</i>	Common hawthorn
<i>Populus balsamifera</i>	Black cottonwood
<i>Pseudotsuga menziesii</i>	Douglas fir
<i>Thuja plicata</i>	Western red cedar
Shrubs	
<i>Salix lasiandra</i>	Pacific willow
<i>Sambucus racemosa</i>	Red elderberry
<i>Symphoricarpos albus</i>	Snowberry
Grasses	
<i>Agrostis capillaris</i>	Colonial bentgrass
<i>Holcus lanatus</i>	Yorkshire fog
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phleum pratense</i>	Timothy
<i>Poa pratensis</i>	Kentucky bluegrass
Herbaceous	
<i>Carex obnupta</i>	Slough sedge
<i>Equisetum arvense</i>	Field horsetail
<i>Hypochaeris radicata</i>	Common cat's ear
<i>Iris pseudacorus</i>	Yellow-flag iris
<i>Juncus effusus</i>	Soft rush
<i>Lotus corniculatus</i>	Bird's-foot trefoil
<i>Plantago lanceolata</i>	Narrowleaf plantain
<i>Prunella vulgaris</i>	Common self-heal
<i>Ranunculus repens</i>	Creeping buttercup
<i>Reynoutria sp.</i>	Knotweed
<i>Rubus armeniacus</i>	Himalayan blackberry
<i>Taraxacum officinale</i>	Common dandelion
<i>Trifolium repens</i>	White clover

Wildlife Species Observed in the Study Area

Scientific Name	Common name	Observed During June 2023 Site Visits	Audubon Survey ¹ or Other Observations ²
Birds of Prey			
<i>Accipiter cooperii</i>	Cooper's hawk		X
<i>Accipiter striatus</i>	sharp-shinned hawk		X
<i>Bubo virginianus</i>	great horned owl		X
<i>Buteo jamaicensis</i>	red-tailed hawk	X	X
<i>Circus hudsonius</i>	northern harrier		X
<i>Falco columbarius</i>	Merlin		X
<i>Falco sparverius</i>	American kestrel		X
<i>Haliaeetus leucocephalus</i> ,	bald eagle		X
<i>Pandion haliaetus</i>	osprey	X	X
<i>Strix varia</i>	barred owl		X
<i>Tyto alba</i>	barn owl		X
Waterbirds and Waterfowl			
<i>Aix sponsa</i>	wood duck		X
<i>Anas acuta</i>	northern pintail		X
<i>Anas crecca</i>	common teal		X
<i>Anas platyrhynchos</i>	mallard		X
<i>Anser caerulescens</i>	snow goose		X
<i>Ardea alba</i>	great egret		X
<i>Ardea herodias</i>	great blue heron	X	X
<i>Aythya collaris</i>	ring-necked duck		X
<i>Branta canadensis</i>	Canada goose		X
<i>Bucephala albeola</i>	bufflehead		X
<i>Butorides virescens</i>	green heron		X
<i>Charadrius vociferus</i>	killdeer	X	X
<i>Fulica americana</i>	American coot		X
<i>Larus glaucescens</i>	Glaucus-winged gull		X
<i>Lophodytes cucullatus</i>	hooded merganser		X
<i>Mareca americana</i>	American wigeon		X
<i>Mareca strepera</i>	gadwall		X
<i>Megaceryle alcyon</i>	belted kingfisher		X
<i>Mergus merganser</i>	common merganser		X
<i>Spatula clypeata</i>	northern shoveler		X

Scientific Name	Common name	Observed During June 2023 Site Visits	Audubon Survey ¹ or Other Observations ²
Woodpeckers			
<i>Colaptes auratus</i>	northern flicker		X
<i>Dryocopus pileatus</i>	pileated woodpecker		X
<i>Dryobates pubescens</i>	downy woodpecker		X
<i>Leuconotopicus villosus</i>	hairy woodpecker		X
<i>Sphyrapicus ruber</i>	red-breasted sapsucker		X
Passerines			
<i>Agelaius phoeniceus</i>	red-winged blackbird	X	X
<i>Bombycilla cedrorum</i>	cedar waxwing		X
<i>Cardellina pusilla</i>	Wilson's warbler		X
<i>Catharus ustulatus</i>	Swainson's thrush		X
<i>Cistothorus palustris</i>	marsh wren		X
<i>Columba livia</i>	rock pigeon		X
<i>Corthylio calendula</i>	ruby-crowned kinglet		X
<i>Corvus brachyrhynchos</i>	American crow		X
<i>Corvus corax</i>	common raven		X
<i>Cyanocitta stelleri</i>	Steller's jay		X
<i>Haemorhous mexicanus</i>	house finch		X
<i>Haemorhous purpureus</i>	purple finch		X
<i>Ixoreus naevius</i>	varied thrush		X
<i>Junco hyemalis</i>	dark-eyed junco		X
<i>Empidonax traillii</i>	willow flycatcher		X
<i>Empidonax difficilis</i>	pacific-slope flycatcher		X
<i>Euphagus cyanocephalus</i>	Brewer's blackbird		X
<i>Geothlypis trichas</i>	common yellowthroat		X
<i>Hirundo rustica</i>	barn swallow	X	X
<i>Melospiza melodia</i>	song sparrow		X
<i>Molothrus ater</i>	brown-headed cowbird		X
<i>Passer domesticus</i>	house sparrow	X	X
<i>Passerculus sandwichensis</i>	savannah sparrow		X
<i>Passerella iliaca</i>	fox sparrow		X
<i>Petrochelidon pyrrhonota</i>	cliff swallow		X
<i>Pheucticus melanocephalus</i>	black-headed grosbeak		X
<i>Pipilo maculatus</i>	spotted towhee		X
<i>Poecile atricapillus</i>	black-capped chickadee	X	X
<i>Poecile rufescens</i>	chestnut-backed chickadee		X
<i>Psaltiriparus minimus</i>	bushtit		X

Scientific Name	Common name	Observed During June 2023 Site Visits	Audubon Survey ¹ or Other Observations ²
<i>Setophaga coronata</i>	yellow-rumped warbler		X
<i>Setophaga petechia</i>	yellow warbler		X
<i>Setophaga townsendi</i>	Townsend's warbler		X
<i>Sitta canadensis</i>	red-breasted nuthatch		X
<i>Spinus pinus</i>	pine siskin		X
<i>Spinus tristis</i>	American goldfinch		X
<i>Streptopelia decaocto</i>	Eurasian collared-dove		X
<i>Sturnus vulgaris</i>	European starling	X	X
<i>Tachycineta bicolor</i>	tree swallow	X	X
<i>Thryomanes bewickii</i>	Bewick's wren		X
<i>Troglodytes pacificus</i>	Pacific wren		X
<i>Turdus migratorius</i>	American robin	X	X
<i>Zonotrichia atricapilla</i>	golden-crowned sparrow		X
<i>Zonotrichia leucophrys</i>	white-crowned sparrow		X
Mammals			
<i>Canis latrans</i>	coyote		X
<i>Castor canadensis</i>	American beaver		X
<i>Didelphis virginiana</i>	Virginia possum		X
<i>Lontra canadensis</i>	North American river otter		X
<i>Lynx rufus</i>	bobcat		X
<i>Neurotrichus gibbsii</i>	American shrewmole		X
<i>Ondatra zibethicus</i>	muskrat		X
<i>Odocoileus hemionus ssp. columbianus</i>	Columbian black tailed deer		X
<i>Peromyscus sonoriensis</i>	western deer mouse		X
<i>Procyon lotor</i>	common raccoon		X
<i>Rattus norvegicus</i>	brown rat		X
<i>Rattus rattus</i>	black rat		X
<i>Scapanus townsendii</i>	Townsend's mole	X	X
<i>Sciurus carolinensis</i>	eastern gray squirrel		X
<i>Sylvilagus floridanus</i>	eastern cottontail		X
<i>Tamiasciurus douglasii</i>	Douglas' Squirrel		X
<i>Zapus trinotatus</i>	Pacific jumping mouse		X
Reptiles			
<i>Elgaria coerulea</i>	northern alligator lizard		X
<i>Thamnophis ordinoides</i>	northwestern garter snake		X
<i>Thamnophis sirtalis</i>	common garter snake	X	X
<i>Trachemys scripta</i>	pond slider		X

Scientific Name	Common name	Observed During June 2023 Site Visits	Audubon Survey ¹ or Other Observations ²
Amphibians			
<i>Ambystoma gracile</i>	northwestern salamander		X
<i>Ambystoma macrodactylum</i>	long-toed salamander		X
<i>Lithobates catesbeianus</i>	American bullfrog		X
<i>Pseudacris regilla</i>	Pacific tree frog		X
<i>Rana aurora</i>	northern red-legged frog		X

Notes:

1. Bird observations from Audubon Society, 2023. Pilchuk Audubon Society. Accessed July 7, 2023. Available at: <http://www.ncwaudubon.org>
2. Bird, mammal, reptile, and amphibian observations from iNaturalist, 2023. iNaturalist Research-Grade Observations. Accessed July 7, 2023. Available at: <https://doi.org/10.15468/ab3s5x> accessed via GBIF.org

Appendix C.2

U.S. Fish and Wildlife Service Consultation

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Ecological Services
1009 College St. SE, Suite 215
Lacey, Washington 98503



In Reply Refer to:
FWS/R1/2024-0015658

October 2, 2024

Ilon Logan
Federal Aviation Administration
2200 S 216th Street
Des Moines, Washington 98198

Dear Ilon Logan:

Subject: Harvey Field Runway Improvement Project

This letter is in response to your November 9, 2023, request for our concurrence with your determination that the proposed action at Harvey Field, Snohomish County, Washington, “may affect, but is not likely to adversely affect” federally listed species. We received your letter, Biological Assessment, and other supplemental materials providing information in support of “may affect, not likely to adversely affect” determinations, on November 9, 2023.

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

- Bull trout (*Salvelinus confluentus*)
- Designated bull trout critical habitat

Project Description:

The applicant proposes to construct a new 2,400-foot runway west of the existing asphalt runway. The turf runway will be decommissioned, and the partial parallel taxiway will be reused and extended to be a full paved parallel taxiway that meets Federal Aviation Administration (FAA) standards. Key elements of the project include the construction of a new 2,400-foot asphalt runway, removal of the existing asphalt runway that is 2,672 feet long by 36 feet wide, construction of a new 2,400-foot parallel taxiway with three runway connections while reusing much of the existing partial parallel taxiway pavement, removal of about 300 linear feet of taxiway pavement, and relocation of Airport Way to the south.

PACIFIC REGION 1

IDAHO, OREGON*, WASHINGTON,
AMERICAN SAMOA, GUAM, HAWAII, NORTHERN MARIANA ISLANDS

*PARTIAL

The relocated portion of Airport Way will be approximately 3,700 linear feet, approximately 600 linear feet shorter than the existing Airport Way. The proposed action also includes installation of new runway/taxiway lighting, removal of 21 trees from the approach and departure surfaces at both runway ends, installation of a retaining wall with water passage infrastructure at the south end of the runway to minimize fill quantities required by project earthwork construction. During construction, access to the project area will be through the existing Airport Service Road, accessed from the public parking lot at the main entrance to the Airport. The construction staging area for the project's airfield components will be located on an existing vehicle parking lot at the end of Airport Service Road. The construction staging area for the relocation of Airport Way will be in the field south of the existing Airport Way with the exact location to be determined at the time of construction.

The proposed action will increase pollution generating impervious surfaces (PGIS) by 6 acres. The action includes addition of 9 acres of new PGIS with the removal of 3 acres of existing impervious surfaces, resulting in 6 total new acres of impervious surface. With the implementation of stormwater best management practices (BMPs), any increase in the amount of runoff from new impervious surfaces will be flow-attenuated to ensure that proposed peak flow rates are less than or equal to existing peak flow rates. Runoff from existing and all new PGIS will be treated through use of infiltration trenches and a bioswale. All staging areas will be located in the upland in existing cleared areas, no in-water work will occur, and the timing of proposed work will occur in the dryer summer months and will take place during two construction seasons.

The Federal Aviation Administration (Action Agency) has determined that the action will have "no effect" on additional listed species and designated critical habitat. The determination of "no effect" to listed resources rests with the action agency. The U.S. Fish and Wildlife Service (Service) has no regulatory or statutory authority for concurring with "no effect" determinations, and no consultation with the Service is required. We recommend that the action agency document their analysis on effects to listed species and maintain that documentation as part of the project file.

Your letter and supporting information on the proposed action at Harvey Field, Snohomish County, Washington was received on November 9, 2023. Based on the information you provided, best available science, and complete and successful implementation of agreed-upon conservation measures, we concur with your determination that the effects of the proposed action "may affect, but is not likely to adversely affect" bull trout, and designated bull trout critical habitat.

EFFECTS SPECIFIC TO BULL TROUT

Exposure

Exposures are extremely unlikely (discountable) to bull trout (*Salvelinus confluentus*) because of the following:

- The action will be completed when bull trout are least likely to be present.

Effects to Bull Trout

Effects will not be measurable (insignificant) and will not significantly disrupt normal behaviors (i.e., the ability to successfully feed, move, and/or shelter) and are therefore considered insignificant because of the following effects to Bull Trout and their Prey.

- No in-water work is proposed and there will be no measurable impacts to water quality.
- Construction activities and proposed permanent features may impact habitat that supports the species and/or their prey sources. These impacts will be limited in physical extent and/or duration and will not measurably degrade habitat functions, including prey resources that are important to the species within the action area:
 - The action includes operations that will increase stormwater discharges. However, the action includes best management practices for effective treatment and removal of pollutants and/or control of peak discharges.

With successful implementation of the conservation measures included by the action agency as part of the proposed action, we expect that the effects of the action will neither measurably degrade nor diminish habitat functions or prey resources in the action area. Therefore, effects from the action are considered insignificant.

EFFECTS TO BULL TROUT DESIGNATED CRITICAL HABITAT

The Final rule designating critical habitat bull trout (75 FR 63898, [October 18, 2010]). The new critical habitat regulations (81 FR 7214) replace this term with physical or biological features (PBFs). This shift in terminology does not change the approach used in conducting our analyses, whether the original designation identified PCEs, PBFs, or essential features. In this letter, the term PCE is synonymous with PBF or essential features of critical habitat.

The following PCEs are in the action area. Of the PBFs/PCEs present, some will not be affected by the proposed action.

PCE 1: *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.*

- The action may impact springs, seeps, groundwater sources, and/or subsurface water; however, these features will continue to adequately contribute to water quality and quantity and provide thermal refuge.

PCE 2: *Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.*

- The action may temporarily introduce an impediment or barrier within migration habitat; however, it will not preclude bull trout movement through the area, either during or after construction, and any effects will be temporary. The migration habitat will not be permanently altered, destroyed, or degraded.

PCE 8: *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

- The action may impact water quantity and/or quality. However, the effects will be temporary; components of the project design include actions to avoid, reduce, or compensate for the effects; and/or we would be unable to measure, detect, or evaluate the effects.

CONCLUSION

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

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

This letter constitutes a complete response by the Service to your request for informal consultation. A complete record of this consultation is on file at the Washington Fish and Wildlife Office, in Lacey, Washington. If you have any questions about this letter or our shared responsibilities under the ESA, please contact the consulting biologist or supervisor identified below.

U.S. Fish and Wildlife Service Consultation Biologists:
Anne Heron (anne_heron@fws.gov)
Coastal, Lowland Aquatic, and Marine Zone Supervisor:
Joshua Emery (joshua_emery@fws.gov)

Sincerely,

JOSHUA
EMERY

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for Brad Thompson, State Supervisor
Washington Fish and Wildlife Office



U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
Seattle Airports District Office
2200 S. 216th Street
Des Moines, WA 98198

November 9, 2023

Kim Kratz, Assistant Regional Administrator
West Coast Region, NOAA Fisheries
Oregon and Washington Coastal Office
1201 Northeast Lloyd Boulevard, Suite 1100
Portland OR 97232

Subject: Agency Request for Section 7 Consultation
Runway Improvement Project – Harvey Field
Snohomish, Washington
NMFS Reference No: **WCRO-2023-02840**

Dear Kim Kratz:

The Federal Aviation Administration (FAA) would like to request informal consultation under Section 7 of the Endangered Species Act for the Runway Improvement Project occurring at Harvey Field in Snohomish, Washington.

A Biological Assessment (BA), prepared by Anchor QEA, was completed and is provided with this request letter. The BA evaluated the potential effects of the proposed project on Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) and Puget Sound steelhead (*Oncorhynchus mykiss*) and their designated critical habitat. The analysis of effects determined that the project “may affect, is not likely to adversely affect” Chinook salmon and steelhead. The BA also provides justification for a “no effect” determination for the Southern Resident killer whale (*Orcinus orca*), bocaccio (*Sebastes paucispinus*) and yelloweye rockfish (*Sebastes ruberrimus*). An assessment of Essential Fish Habitat (EFH), in accordance with the Magnuson-Stevens Act, was also prepared in the BA. The assessment found that the proposed project would not adversely affect Pacific salmon EFH.

Upon your review of the BA, we hereby request your concurrence with the effects determinations for provided above. Please do not hesitate to contact the Environmental Protection Specialist assigned to this project at (206) 231-4220 or Ilon.Logan@faa.gov with any questions, comments or concerns.

Sincerely,

**RYAN C
ZULAUF**

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Ryan Zulauf, Acting Manager
Seattle Airports District Office

Ilon Elizabeth Logan
Environmental Protection Specialist

Cc: Kandace Harvey, Airport Owner, Harvey Field
Julie Barrow, RS&H

Enclosure: Harvey Field Runway Improvement Project Biological Assessment. Prepared by Anchor QEA for Harvey Field. November 2023.



U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
Seattle Airports District Office
2200 S. 216th Street
Des Moines, WA 98198

November 9, 2023

Ryan McReynolds
Zone Team Supervisor
Coastal, Lowland Aquatics, and Marine Zone
U.S. Fish & Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503-1263

Subject: Agency Request for Section 7 Consultation
Runway Improvement Project – Harvey Field
Snohomish, Washington

Dear Ryan McReynolds:

The Federal Aviation Administration (FAA) would like to request informal consultation under Section 7 of the Endangered Species Act for the Runway Improvement Project occurring at Harvey Field in Snohomish, Washington.

A Biological Assessment (BA), prepared by Anchor QEA, was completed and is provided with this request letter. The BA evaluated the potential effects of the proposed project on coastal Puget Sound bull trout and their designated critical habitat. The analysis of effects determined that the project “may affect, is not likely to adversely affect” bull trout. The BA also provides justification for a “no effect” determination for marbled murrelet (*Brachyrhampus marmoratus*).

Upon your review of the BA, we hereby request your concurrence with the effect determination for bull trout. Please do not hesitate to contact me at (206) 231-4220 or Ilon.Logan@faa.gov with any questions, comments or concerns.

Sincerely,

Ilon Elizabeth Logan
Environmental Protection Specialist

Cc: Kandace Harvey, Airport Owner, Harvey Field
Julie Barrow, RS&H

Enclosure: Harvey Field Runway Improvement Project Biological Assessment. Prepared by Anchor QEA for Harvey Field. November 2023.



November 2023
Harvey Field Runway Improvement Project



Biological Assessment

Prepared for Harvey Field

November 2023
Harvey Field Runway Improvement Project

Biological Assessment

Prepared for
Harvey Field
9900 Airport Way
Snohomish, Washington 98296

Prepared by
Anchor QEA, LLC
1201 3rd Avenue, Suite 2600
Seattle, Washington 98101

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ABBREVIATIONS

Airport	Harvey Field Airport
BA	Biological Assessment
BMP	best management practice
CFR	Code of Federal Regulations
dBA	A-weighted decibel
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
FCD	Flood Control District
Fed. Reg.	<i>Federal Register</i>
HUC	Hydrologic Unit Code
PBF	physical and biological features
PEM	palustrine emergent
PFO	palustrine forested
PGIS	pollution-generating impervious surface
Project	Harvey Field Runway Improvement Project
USFWS	U.S. Fish and Wildlife Service

1 Introduction

1.1 Project Overview

This Biological Assessment (BA) has been prepared for the Harvey Field Runway Improvement Project (Project). The Project proposes to safely and efficiently accommodate current and projected aviation activity at Harvey Field Airport (Airport) in Snohomish, Washington, by meeting current Federal Aviation Administration (FAA) design standards (Figure 1).

This BA evaluates the potential effects on listed and proposed species under the Endangered Species Act (ESA) of 1973 and the potential effects on Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (now called the Magnuson-Stevens Act). The preliminary effects determinations described in Section 7 were made for the listed species that may occur in the Action Area.

In this document, the term *Action Area* has a specific meaning as defined in Section 3. The project's Action Area is different from the *Project Area*, which generally encompasses the limits of construction.

1.2 Endangered Species Act-Listed Species and Critical Habitats that May Occur in the Action Area

Listed species and designated critical habitat that may occur in the Action Area and the associated effect determinations are summarized in Table 1 (USFWS 2023a; NMFS 2023a). The Project effects that may occur during construction or operation include noise, water quality, and habitat modifications. Conservation measures and best management practices (BMPs) would be employed to avoid and minimize these effects. A detailed discussion of Project-related effects is provided in Section 6.

Table 1
Endangered Species Act-Listed Species and Critical Habitats that May Occur in the Action Area

Species and Scientific Name	Listing Status	Agency	Critical Habitat
Chinook salmon, Puget Sound ESU <i>Oncorhynchus tshawytscha</i>	Threatened	NMFS	Designated; includes Action Area
Steelhead, Puget Sound DPS <i>Oncorhynchus mykiss</i>	Threatened	NMFS	Designated; includes Action Area
Killer whale, Southern Resident DPS (<i>Orcinus orca</i>)	Endangered	NMFS	Designated; includes Action Area
Bocaccio, Georgia Basin DPS (<i>Sebastes paucispinus</i>)	Endangered	NMFS	Designated; does not include Action Area

Species and Scientific Name	Listing Status	Agency	Critical Habitat
Yelloweye rockfish, Georgia Basin DPS (<i>Sebastes ruberrimus</i>)	Threatened	NMFS	Designated; does not include Action Area
Bull trout, Coastal-Puget Sound DPS (<i>Salvelinus confluentus</i>)	Threatened	USFWS	Designated; includes Action Area
Marbled murrelet (<i>Brachyrhampus marmoratus</i>)	Threatened	USFWS	Designated; does not include Action Area

The effect of the Project on these species and critical habitats was determined by documenting environmental baseline conditions and evaluating effects of the Project on the species and environmental baseline. Species, habitat information, and effects of the Project are described in Sections 4 through 6.

Two additional ESA-listed species under the U.S. Fish and Wildlife Service (USFWS) jurisdiction occur in Washington and are considered by USFWS to potentially occur in the Action Area; however, they are not addressed in this BA as they are extremely unlikely to occur within the Action Area. These two species with the rationale for eliminating them from this analysis are listed as follows:

- North American wolverine (*Gulo gulo luscus*)—Proposed threatened
 - Rationale: does not occur in the Action Area and suitable habitat does not exist in the Action Area. The North American wolverine typically lives in boreal forest, taiga, and tundra ecosystems. In Washington, they occupy alpine and subalpine forest habitats, especially within North Cascades National Park and the wilderness areas of Okanogan-Wenatchee National Forest (WDFW 2023a). Wolverines require a snowy habitat for their young, and a large range to roam.
- Yellow-billed cuckoo (*Coccyzus americanus*), Western Distinct Population Segment (DPS)—Threatened
 - Rationale: does not occur in Action Area and is a very rare migrant in Washington state (WDFW 2023b); location is also outside of proposed critical habitat (USFWS 2023b), and suitable habitat does not exist in the Action Area. Yellow-billed cuckoos are migratory birds that breed in North America and winter in Central and South America. They nest within and use willow and cottonwood riparian forests with a dense closed canopy (Csuti et al. 2001).

1.3 Essential Fish Habitat Assessment

This BA also provides an Effects Analysis and Determination for EFH pursuant to the Magnuson-Stevens Act, the 1996 Sustainable Fisheries Act, and the North Pacific Fisheries Management Council. Under this legislation, an evaluation for impacts to EFH is necessary for activities that may adversely affect EFH. EFH is defined by the Magnuson-Stevens Act in Code of Federal Regulations (CFR)

Title 50, Section 600.905-930 as "Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Within the Action Area, EFH is designated for Pacific salmon species. It is concluded that the Project would not adversely affect EFH. The EFH assessment is included in Section 8.

1.4 Consultation History

On August 15, 2023, staff from FAA, Harvey Field, RS&H, and Anchor QEA met with David Price of NOAA Fisheries to discuss the ESA consultation process. RS&H provided a brief overview of the purpose and need for the Project and the main Project components. Based on his preliminary understanding of the project, David Price thought that a Letter of Concurrence was likely the appropriate ESA consultation pathway. He also provided comments on items to include in the BA and shared review timeframes. USFWS did not have capacity to attend a preliminary meeting to discuss the project.

2 Proposed Project

2.1 Project Description

2.1.1 *Project Overview*

The Project proposes to construct a new 2,400-foot runway west of the existing asphalt Runway 15L-33R. The turf runway, 15L-33R, would be decommissioned, and the partial parallel taxiway would be reused and extended to be a full paved parallel taxiway that meets FAA standards. Key elements of the Project include the following:

- Construction of a new 2,400-foot asphalt Runway 15-33
- Removal of the existing asphalt Runway 15L-33R that is 2,672 feet long by 36 feet wide.
- Construction of a new 2,400-foot parallel taxiway with three runway connections while reusing much of the existing partial parallel taxiway pavement
- Removal of about 300 linear feet of taxiway pavement
- Relocation of Airport Way to the south. The relocated portion of Airport Way is 3,700 linear feet.
- Removal of approximately 600 linear feet of existing Airport Way
- Installation of new runway/taxiway lighting
- Removal of 21 trees from the approach and departure surfaces at both runway ends
- Installation of a retaining wall with water passage infrastructure at the south end of Runway 33 to minimize fill quantities required by Project earthwork construction

During construction, access to the Project Area would be via the existing Airport Service Road, accessed from the public parking lot at the main entrance to the Airport. The construction staging area for the Project's airfield components would be located on an existing vehicle parking lot at the end of Airport Service Road. The construction staging area for the relocation of Airport Way would be in the field south of the existing Airport Way with the exact location to be determined at the time of construction.

2.1.2 *Stormwater Management*

The Project's airfield components and Airport Way relocation would add approximately 9 acres of new impervious surfaces, and would remove approximately 3 acres of impervious surface, resulting in a net addition of approximately 6 acres of new impervious surface at the Airport. Project earthwork construction would require approximately 3.29 acres of fill, which would include fill in wetlands, wetland buffers, and in the 100-year floodplain. Earthwork fill material is expected to be sourced on site. If necessary, fill material meeting FAA specifications would be imported from off site.

The Project would expand existing stormwater BMPs or would install new stormwater BMPs that would be designed to accommodate the calculated treatment volumes and account for the treatment volume already provided by existing BMPs that are not demolished. Water treatment volumes are provided in Table 2. Viable BMPs to remove pollutants and decrease overall turbidity include the following:

- Biofiltration swale
- Pretreatment settling basins
- Filtration
- Bioretention

These BMPs will be designed to limit standing water and to not interfere with known groundwater elevations. Additionally, the soils at the site of selected BMPs should utilize soils with high infiltration rates. Specific BMPs to be installed will be determined during final design of the Project. Inspection and maintenance of existing and proposed stormwater BMPs would be conducted in accordance with procedures and standards established in Snohomish County Drainage Manual, Volume V – *Runoff Treatment BMPs* as well as Snohomish County Drainage Manual, Volume VI - *Stormwater Facility Maintenance*.

Table 2
Basin Water Quality Volumes For Disturbed Areas

Basin	Disturbed Area (ac)	Water Quality Volume (ft³)	Water Quality Volume (ac-ft)	Demolished Existing Water Quality Volume (ac-ft)	Total Required Water Quality Volume (ac-ft)
North	26.49	8,269	0.19	0.05	0.24
South	7.86	2,768	0.06	-	0.06

2.2 Project Timing

Project construction would begin in 2026, occurring over 2 construction years, primarily during the drier summer months. The new Runway 15-33 would open for use in fall 2028. Project construction would be phased so that the Airport remains operational at all times.

2.3 Best Management Practices

All applicable permits for the Project would be obtained prior to construction. A preliminary list of permits to be obtained is included in Table 3. All work would be performed according to the requirements and conditions of these permits, including working during daylight hours to the extent

practicable. The following conservation measures and BMPs would be used during construction of the Project:

- The contractor would be responsible for the preparation and implementation of a Stormwater Pollution Prevention Plan to be used for the duration of the Project. The plan would contain measures for erosion and spill prevention.
- Excess or waste materials would not be disposed of or abandoned waterward of the ordinary high-water mark or allowed to enter waters of the state.
- No petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials would be allowed to enter surface waters.
- Demolition and construction materials would not be stored where upland runoff can cause materials to enter surface waters.
- All staging areas would be located outside of rivers, wetlands, and their buffers.
- Construction stormwater BMPs that could be implemented could include, but are not limited to, interceptor dikes and swales, vegetated strips, wattles, sediment traps, and construction stormwater filtration, as well as avoidance of water bodies during construction.
- Source control BMPs in accordance with the Snohomish County Drainage Manual will be applied during construction if any pollution-generating activities are performed on the site during construction.
- Source control BMPs in accordance the Snohomish County Drainage Manual will be selected, designed, and constructed if any pollution-generating activities or uses are proposed for the developed site following construction.

Table 3
Preliminary List of Anticipated Permit, Approvals, Determinations, Certification, and Consultations

Permit/Approval	Agency
Clean Water Act (CWA) Section 404 Permit	U.S. Army Corps of Engineers
Endangered Species Act Section 7 Consultation	National Oceanographic and Atmospheric Agency (NOAA) Fisheries and U.S. Fish and Wildlife Service
Magnuson Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation	NOAA Fisheries
National Historic Preservation Act Section 106 Consultation	Department of Archaeology and Historic Preservation
CWA Section 401 Water Quality Certification	Washington State Department of Ecology
CWA Section 402 National Pollutant Discharge Elimination System Construction Stormwater General Permit	Washington State Department of Ecology
Hydraulic Project Approval	Washington Department of Fish and Wildlife

Permit/Approval	Agency
Flood Hazard Permit	Snohomish County
Grading/Land Disturbing Activities Permit	Snohomish County
Shoreline Substantial Development Permit	Snohomish County
Right of Way Permit	Snohomish County
Traffic Worksheet/Traffic Study	Snohomish County

3 Action Area

The Action Area is defined as the area to be affected directly or indirectly by the federal action (50 CFR Section 402.02). This area is the geographic extent of the physical, chemical, and biological effects resulting from the Project. The Action Area boundary is thus set as the limits of the Project effects, as discussed below. The Action Area includes two general areas of effect: terrestrial and aquatic.

3.1 Terrestrial Zone of Effect

Noise from construction equipment is expected to be the impact with the most far-reaching terrestrial environmental effects. The loudest piece of equipment anticipated to be used is a hoe ram, which is expected to generate in-air noise levels of 97 A-weighted decibels (dBA).

The Project setting is within a rural residential area and located adjacent to SR 9, a major arterial highway. Based on traffic volumes and speeds on SR 9 as well as the rural residential setting, 70 dBA was used as the ambient noise level for the Action Area.

Noise attenuates to ambient, or background, levels as the distance from the source of the noise increases. In areas of soft ground cover, such as the surrounding grassy areas and fields, the standard reduction for point-source noise is 7.5 dBA for each doubling distance from the source. Using a 7.5 dBA reduction for each doubling of distance (WSDOT 2021b), conditions were calculated for the distances at which in-air noise is expected to attenuate to ambient conditions using a spreading loss model.

Sound levels from the loudest anticipated construction activity would attenuate to background levels within 601 feet from the Project Area. Therefore, 601 feet (0.11 mile) from the Action Area footprint is used as the outer extent of the terrestrial zone of impact (Figure 3). Variable site topography could cause the noise to attenuate to background levels sooner than 601 feet.

3.2 Aquatic Zone of Effect

The Project does not include any in-water work. The aquatic effects of the Project would be limited to stormwater runoff from construction areas and when completed, the additional pollution-generating impervious surface (PGIS). Due to the addition of new PGIS, which will contribute additional runoff and potential pollutants into the river system, the overall aquatic zone of effect includes the Snohomish River until it meets Puget Sound. Any potential contaminants generated by stormwater would have the potential to reach marine waters. Stormwater discharge locations from the Project Area to the Snohomish River are located at Batt Slough and from a drainage ditch managed by the Marshland Flood Control District as shown in Figure 3.

4 Environmental Baseline

4.1 Topography

In general, the topography of the Project Area is relatively flat and low in elevation. Current site elevations range between 8 and 25 feet above sea level (Snohomish County 2023) and are located within a density fringe area of the 100-year floodplain. The portion of the Project Area north of Airport Way is flat around the Airport and runways, but gently slopes down to the west to a ditch that drains towards SR 9. The portion of the Project Area south of Airport Way contains low areas in association with a historical oxbow of the Snohomish River and a slightly higher centrally located area.

4.2 Soils

The Natural Resources Conservation Service Web Soil Survey (NRCS 2023a) identifies the following soil series in the vicinity of the Project Area:

- Puget silty clay loam: This soil is very deep, artificially drained, and formed in alluvium in depressions on floodplains. Puget silty clay loam is listed as hydric (NRCS 2023b). Permeability is slow and it has a high water table. Typically, the surface layer to 10 inches is dark grayish brown silty clay loam and the subsurface layer to 60 inches is olive gray and gray silty clay loam.
- Puyallup fine sandy loam: This soil is very deep, well drained with high saturated hydraulic conductivity, and formed in mixed recent alluvium on floodplains and low stream terraces. Puyallup fine sandy loam is not listed as hydric (NRCS 2023b). Permeability is fast and it has a low water table. Typically, the surface layer to 10 inches is dark brown fine sandy loam and the subsurface layer to 60 inches is very dark grayish brown gravelly sand.
- Sultan silt loam: This soil is very deep, moderately well drained, and formed in recent alluvium on floodplains. Sultan silt loam is not listed as hydric (NRCS 2023b). Permeability is moderately slow and has a moderately high water table. Typically, the surface layer to 10 inches is very dark grayish brown silt loam and the subsurface layer to 60 inches is olive gray very fine sandy loam stratified with light gray medium sand.

4.3 Hydrology and Water Quality

The Project Area is located within Water Resources Inventory Area 7: Snohomish, in the Snohomish subbasin (Hydrologic Unit Code [HUC] 17110011); the Quilceda Creek – Frontal Possession Sound watershed (HUC 1711001102), and the Snohomish River - Frontal Possession Sound subwatershed (HUC 171100110203) (Ecology 2023). Hydrologic characteristics in the Project Area are influenced primarily by local precipitation, surface water runoff, and a high groundwater table. The Snohomish

River in the vicinity of the Project is on the Washington State Department of Ecology (Ecology) 303(d) list for temperature (Ecology 2023).

The Project Area contains two stormwater basins designated as the North Basin and South Basin. The North Basin contains the existing airfield and associated airfield development. Stormwater runoff from the North Basin generally sheet flows off airfield pavements into vegetated infields and ditches where it is then collected in storm sewer and discharged off site to the west via a culvert under SR 9 (Woodinville Snohomish Road). Stormwater runoff from the North Basin then flows through a series of grass-lined drainage ditches and eventually discharges into the Snohomish River at a pump station several miles downstream of the Airport. A portion of the stormwater runoff generated from the northern portion of Airport Property is conveyed to water quality stormwater BMPs, which provide water quality treatment of stormwater runoff for frequent, low flow runoff-producing precipitation events. BMPs located within or immediately adjacent to the Study Area include one bioswale and two sets of infiltration trenches.

The South Basin contains some residential buildings and the low-lying area to the south of the airfield and Airport Way. Stormwater runoff from the South Basin generally sheet flows off paved roads and into Hanson Slough, which is a low-lying wetland area. Runoff is then discharged off site to the east under a railroad overpass. Runoff eventually discharges to the Snohomish River to the east. There are currently no existing water quality BMPs in the southern portion of Airport Property.

The off-site drainage ditches and pump station downstream from the Project Area are owned by the Marshland Flood Control District (FCD). The Marshland FCD has the authority to engage in flood control activities necessary to prevent inundation or flooding from water bodies and take actions necessary to protect life and property from inundation or flow of flood waters, stormwaters, or surface waters.

4.4 Wetlands

On June 12, 13, 14, and 15, 2023, Anchor QEA biologists performed a field investigation to verify the presence or absence of wetlands within the Project Area and delineate and rate any existing wetlands. Three wetlands were identified and delineated and rated for functions and values: Wetland A, Wetland B, and Wetland D (Table 4). All three wetlands are depressional, palustrine emergent wetlands. One wetland, Wetland C, was located off site to the northwest and identified as a depressional, palustrine forested wetland. Wetland C was not delineated or rated because Anchor QEA biologists did not have access to the property. Full details on wetlands located within the Project Area are included in the Wetlands Report (Anchor QEA 2023). An off-site, approximately 1,100 foot long culvert located to the east of the Project Area connects the ditch associated with Wetland A to Batt Slough, which drains through culverts and open channel segments to the Snohomish River. Another ditch that runs underneath Highway 9 and then to the north connects

Wetland B to the main channel of the Snohomish River. Off-site Wetland C and Wetland D are not directly connected to other surface waters.

Table 4
Wetlands Delineated Within the Project Area

Wetland	Cowardin Class ¹	HGM Class	Category	Total Wetland Area	
				Square Feet	Acres
On-Site Wetlands					
A	PEM	Depressional	III	515,142	11.83
B	PEM	Depressional	III	66,189	1.52
D	PEM	Depressional	III	11,593	0.27
Off-Site Wetland					
C	PFO	Depressional	N/A ²	208,650 ³	4.79 ³

Notes:

1. PEM: palustrine emergent; PFO: palustrine forested
2. N/A; Not Applicable. Wetland C was not rated, but conservatively provided the maximum protective buffer.
3. Wetland C area is approximate.

4.5 Streams

The Snohomish River flows along the east and north boundaries of the Project Area and is approximately 1,100 feet from the historical oxbow in the southern portion of the Project Area. The river flows from the northward east of the Project Area, and turns and flows westward north of the Project Area. The Project Area has been drained via a ditch system on both sides of Airport Way; the ditch in the northern portion flows west under SR 9 and the ditch in the southern portion flows through Wetland A, along the western and southern boundaries of Wetland A and east through a culvert under the disused BNSF rail line. The ditches have no defined bed or banks and are unlikely to be regulated under state or federal jurisdiction.

The ditches do not appear to provide potential fish habitat, because they lack defined bed and banks and provide water quality too poor to support salmonids. Furthermore, fish passage to the ditch associated with Wetland A is blocked due to a fish screen located beneath the railroad tracks at the opening of the 1,100-foot-long culvert to Batt Slough (The Watershed Company 2015). The WDFW Fish Passage & Diversion Inventory Database maps two blockages to fish passage to the ditch associated with Wetland B (WDFW 2023c). One blockage is a non-culvert crossing beneath State Route 9 (Site ID 934980) and the other is a buried culvert (Site ID 934981). On-site observations of potential wetland fish habitat are supported by Washington State mapping efforts (WDFW 2023d; WDNR 2023).

4.6 Plant Communities

Vegetation within the Project Area is characteristic of upland and wetland emergent habitats, maintained gravel roadway corridors, and grassy areas dominated by field and meadow grasses. Dominant herbaceous species include colonial bentgrass (*Agrostis capillaris*), velvet grass (*Holcus lanatus*), common cat's ear (*Hypochaeris radicata*), reed canary grass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), creeping buttercup (*Ranunculus repens*), Himalayan blackberry (*Rubus armeniacus*), common dandelion (*Taraxacum officinale*), and white clover (*Trifolium repens*). Few trees are located within the Project Area, but a forested area is located off site to the northwest of the Project Area and is dominated by red alder (*Alnus rubra*), black cottonwood (*Populus baslamifera*), and understory species such as Pacific willow (*Salix lasiandra*) and Himalayan blackberry.

5 Status of the Species

ESA-listed species that could occur in the Action Area include Chinook salmon, steelhead trout, bull trout, and marbled murrelet (see Table 1). ESA-designated critical habitat also occurs within the Action Area for Chinook salmon, steelhead, and bull trout. The following sections briefly summarize relevant life-history information for the protected species and their use of the Action Area.

5.1 Chinook Salmon Puget Sound Evolutionarily Significant Unit

The Puget Sound Chinook Salmon Evolutionary Significant Unit was listed as threatened on March 24, 1999, affirmed on June 28, 2005, and updated on April 14, 2014 (79 *Federal Register* [Fed. Reg.] 20802). Critical habitat was designated on September 2, 2005 (70 Fed. Reg. 52698) and includes the Snohomish River within the Action Area.

Puget Sound Chinook salmon are anadromous salmonids that return to freshwater rivers to spawn. Fry typically spend their first year rearing in estuarine habitats, though may remain to rear in the river for up to a year before emigrating to marine and estuarine habitats (NMFS 2023b).

Notable decline has been observed in Puget Sound Chinook salmon populations since their listing in 1999. The most recent 5-year status review showed continued population decline across all Puget Sound Chinook salmon populations (NMFS 2017a). Key factors of decline include estuarine and side-channel habitat loss due to conversion of floodplain to farmland (NMFS 2017a). Instream habitat availability is also threatened by insufficient stream flows, primarily driven by water withdrawals for irrigation purposes (NMFS 2017a). Additionally, contaminated runoff from development in surrounding regions and lack of natural riparian vegetation contributes to water quality impairment (NMFS 2017a).

5.1.1 Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of Puget Sound Chinook salmon and includes six physical and biological features (PBFs) necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. In the Action Area, only freshwater habitats are present; thus, three features necessary for conservation of the species could be affected by the Project as shown in Table 5.

Table 5
Chinook Salmon Critical Habitat Physical and Biological Features Within the Snohomish River

Physical and Biological Habitat Features	Status
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	PBF present Chinook salmon are documented as spawning in the Snohomish River near the Project Area (WDFW 2023d)
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	PBF present Freshwater rearing sites are limited due to disconnected floodplains, lack of riparian zone, and degraded instream habitat.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	PBF present Chinook salmon are known to use the Snohomish River to migrate between spawning areas in the Skykomish and Snoqualmie rivers and Puget Sound. Instream and riparian habitats are degraded.

5.1.2 Utilization of the Action Area

Naturally spawning Chinook salmon in the Snohomish River basin are divided into two populations: Skykomish Chinook and Snoqualmie Chinook. The Skykomish population includes all Chinook salmon that spawn in the Skykomish River and its tributaries and in the Snohomish River and its tributaries. The Snoqualmie population includes all Chinook salmon that spawn in the Snoqualmie River and its tributaries (Snohomish Basin Salmon Recovery Forum 2005). Chinook salmon are known to utilize the Snohomish River, including fall-run and summer-run populations. Fall-run Chinook salmon typically return to freshwater rivers from late July through December while summer-run Chinook salmon typically return from June to August (NMFS 2023b). Both adults and juveniles migrate within the Action Area and spawning also occurs in the Action Area (WDFW 2023d). Within the Snohomish River basin, the Chinook salmon population has fluctuated: after peaking at around 10,000 in 2004, escapements have fallen to pre-ESA listing levels of around 4,000 (Snohomish Basin Salmon Recovery Forum 2019). Escapement levels for 2020 were 2,722 for Skykomish Chinook and 1,211 for Snoqualmie Chinook (WDFW 2023e). Escapement is the total number of adult fish returning to a hatchery or stream to spawn (WDFW 2023f).

5.2 Steelhead Puget Sound Distinct Population Segment

Puget Sound steelhead were listed as threatened on May 11, 2007 (72 Fed. Reg. 26722), and updated on April 14, 2014 (79 Fed. Reg. 20802). Critical habitat was finalized on February 24, 2016 (81 Fed. Reg. 9252).

Steelhead are anadromous salmonids that, unlike most other Pacific salmon, are iteroparous (i.e., they can spawn several times), with spawning starting in their fourth or fifth year and continuing until reaching a maximum age of approximately 11 years (NMFS 2023b). Puget Sound steelhead smolts tend to migrate to the ocean to mature after spending 2 years in freshwater (NMFS 2011).

The recent 5-year status review showed continued decline of steelhead populations (NMFS 2017a). The potential for extinction of steelhead in Central Puget Sound is moderate.

5.2.1 Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of Puget Sound steelhead trout and includes six physical or biological features necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. In the Action Area, only freshwater habitats are present; thus, three features necessary for conservation of the species could be affected by the Proposed Action as shown in Table 6.

Table 6
Steelhead Critical Habitat Physical and Biological Features Within the Snohomish River

Physical and Biological Habitat Features	Status
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	PBF not present The Statewide Washington Integrated Fish Distribution Map does not identify spawning as occurring in the vicinity of the Project Area (WDFW 2023d); however, it is possible that a small amount of spawning could occur.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	PBF present Steelhead are documented as rearing in the Snohomish River near the Project Area (WDFW 2023d). Freshwater rearing sites are limited due to disconnected floodplains, lack of riparian zone and degraded instream habitat.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	PBF present Steelhead are known to use the Snohomish River to migrate between spawning areas in the Skykomish and Snoqualmie rivers and Puget Sound. Instream and riparian habitats are degraded.

5.2.2 Utilization of the Action Area

Steelhead are known to utilize the Snohomish River, including summer-run and winter-run populations. Summer-run steelhead typically return to freshwater rivers from May to October while winter-run steelhead typically return from November to May (Snohomish Basin Salmon Recovery Forum 2019). Both adults and juveniles migrate within the Action Area and rearing also occurs in the Action Area (WDFW 2023d). Since the early 2000s, both winter- and summer-run steelhead populations in the Snoqualmie River (a tributary to the Snohomish River) have declined (Snohomish Basin Salmon Recovery Forum 2019). Escapement levels for 2022 were 748 for Snohomish/Skykomish winter steelhead and 838 for Snoqualmie winter steelhead (WDFW 2023f). For context, the average escapement from 2012 to 2022 for Snohomish/Skykomish winter steelhead was 800 and for Snoqualmie winter steelhead was 625 (WDFW 2023f).

5.3 Southern Resident Killer Whale

The Southern Resident DPS of killer whales was listed as endangered on November 18, 2005 (70 FR 69903). Critical habitat was designated on November 29, 2006 (71 FR 69054), and revised on August 21, 2021 (86 FR 41668). Critical habitat includes the Action Area.

The Southern Resident DPS contains J pod, K pod, and L pod and its population is estimated in the 70s (NMFS 2023c). The geographic distribution of Southern Resident killer whales is year-round in the coastal waters off Oregon, Washington, Vancouver Island, and off the coast of central California and the Queen Charlotte Islands (Center for Biological Diversity 2001). In the summer, Southern Resident killer whales are typically found in the Georgia Strait, Strait of Juan de Fuca, and the outer coastal waters of the continental shelf. In the fall, the J pod migrates into Puget Sound, while the rest of the population makes extended trips through the Strait of Juan de Fuca. In the winter, the K and L pods retreat from inland waters and are seldom detected in the core areas until late spring. The J pod generally remains in inland waterways throughout the winter, with most of their activity in Puget Sound. Other winter movements and range of Southern Residents are not well understood (NMFS 2023c).

Killer whales use the entire water column, including regular access to the ocean surface to breathe and rest (Bateson 1974; Herman 1991). They remain underwater 95% of the time, with 60% to 70% of their time spent between the surface and a depth of 65 feet (20 meters), while diving regularly to depths of greater than 655 feet (200 meters; Baird 1994; Baird et al. 1998). Southern Residents spend less than 5% of their time between depths of 20 and 820 feet (60 and 250 meters; Center for Biological Diversity 2001). Time-depth recorder tagging studies of Southern Residents have documented that whales regularly dive to greater than 490 feet (150 meters), but that there is a trend toward a greater frequency of shallower dives in recent years (Baird and Hanson 2004).

Resident killer whales tend to feed primarily on fish, whereas transient killer whales prey on other marine mammals (NMFS 2008). Southern Resident killer whales primarily feed on salmon species (Balcomb et al. 1980; Bigg et al. 1987; NMFS 2008; Hanson et al. 2010). Chinook salmon dominate their diet (38%), followed by pink salmon (10%) and other salmon species or unidentifiable salmon species (Ford et al. 1998; Ford and Ellis 2006). Recent studies have indicated that while in their summer range (outside of the Action Area), Chinook salmon from the Fraser River basin accounted for 80% to 90% of the salmonid prey for Southern Resident killer whales, and fish originating in Puget Sound accounted for 6% to 14% (Hanson et al. 2010). Other species such as lingcod (*Ophiodon elongates*), halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp.), and Dover sole (*Microstomus pacificus*) were identified as additional prey species and may increasingly contribute to the diet as salmon populations decline (Center for Biological Diversity 2001; Hanson et al. 2010).

5.3.1 Critical Habitat

Critical habitat for Southern Resident killer whales is designated for areas containing the physical and biological habitat features, or PBFs, essential for the conservation of the species or that require special management considerations, as follows:

PBF 1: Water quality to support growth and development

PBF 2: Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and

PBF 3: Passage conditions to allow for migration, resting, and foraging.

These PBFs apply in marine waters deeper than 20 feet and therefore would overlap with the Action Area.

5.3.2 Utilization of the Action Area

The Action Area of the Project extends to the nearshore area of Puget Sound. Southern Resident killer whales could be present in the vicinity of the Action Area. Based on their known distribution and the available information on sightings, Southern Resident killer whales have the potential to occur in the Action Area.

5.4 Bocaccio

The Puget Sound/Georgia Basin DPS of bocaccio was listed as threatened on April 28, 2010 (75 FR 22276). Critical habitat was designated on November 13, 2014 (79 FR 68042). Critical habitat for bocaccio is not present in the Action Area.

Bocaccio are large, long-lived rockfish that inhabit deep waters, from 160 to more than 800 feet (ranging as deep as approximately 1,400 feet; NMFS 2017b). Rockfish are viviparous (i.e., their eggs

are fertilized internally) and produce 1 million to 3 million larvae annually. The larvae are released in the spring and are distributed widely in surface water, floating with tides and currents. After 3 to 6 months as larvae, juveniles move into offshore or nearshore benthic habitats including rocky reefs, kelp canopies, and structures such as piers and oil platforms. Juveniles feed on zooplankton including the larvae of crustaceans, small fish, and invertebrates, and as they grow larger, typically move into deeper water and habitats with high roughness (i.e., rocky reefs). Adult bocaccio have a diverse diet including numerous fish species (juvenile salmon, forage fish, flatfish, pollock, lingcod, etc.) and larger invertebrates such as crabs, and can be found associated with rocky or bouldery benthic habitats, but have also been captured in soft-bottomed habitats (NMFS 2017b).

5.4.1 Utilization of the Action Area

Bocaccio are difficult to sample. Historically, they appear to have been most abundant in the South Sound and Main Basin of Puget Sound (Drake et al. 2010 and Williams et al. 2010; cited in NMFS 2017b). Juveniles and subadults are more common than adults in shallower water, and bocaccio are known to school in nearshore waters as juveniles (McCall and He 2002). Adults are generally associated with rocky areas and outcrops (Drake et al. 2010), but some are also frequently found in areas lacking hard substrate (Washington 1977; Miller and Borton 1980). The area where the Snohomish River meets Puget Sound is not ideal habitat for bocaccio rockfish due to its natural lack of rocky reefs or substrate.

5.5 Yelloweye Rockfish

The Puget Sound/Georgia Basin DPS of yelloweye rockfish was listed as threatened on April 28, 2010 (75 FR 22276). Critical habitat was designated on November 13, 2014 (79 FR 68042). Critical habitat for yelloweye rockfish is not present in the Action Area.

Yelloweye rockfish are a large long-lived rockfish most commonly occurring in deep water up to approximately 1,400 feet in depth (NMFS 2017b). Rockfish are viviparous (i.e., their eggs are fertilized internally) and produce 1 million to 3 million larvae annually. The larvae are released in the spring and are distributed widely in surface water, floating with tides and currents. Juveniles use shallow waters and habitats including rocky reefs, kelp canopies, and structures such as piers and oil platforms. Juvenile yelloweye rockfish rarely occur in nearshore areas. Juveniles feed on zooplankton including the larvae of crustaceans and invertebrates, as well as small fish. Adult yelloweye rockfish feed on many species of fish and larger invertebrates such as crabs and are more associated with rough rocky benthic habitats than bocaccio (NMFS 2017b).

5.5.1 Utilization of the Action Area

Yelloweye rockfish are most commonly found between 300 to 590 feet in depth (Love et al. 2002). They are highly associated with high relief zones with crevices and complex rock habitats (Love et al.

1991; Richards 1986). The area where the Snohomish River meets Puget Sound is not ideal habitat for yelloweye rockfish due to its natural lack of rocky reefs or substrate and shallow depths. Yelloweye rockfish were recently sampled in low numbers in Puget Sound (NMFS 2017b).

5.6 Bull Trout

The coterminous United States population of bull trout was listed as threatened on November 1, 1999 (64 Fed. Reg. 58910), and critical habitat was finalized on October 18, 2010 (75 Fed. Reg. 63898). Critical habitat includes the Snohomish River within the Action Area.

Bull trout have specific cold-water requirements and are rarely found in waters with temperatures above 64°F (USFWS 2023c). They may also exhibit four different life-history types: anadromous, adfluvial, fluvial, and resident. Bull trout spawn from late summer through December, typically when water temperatures drop below 48°F (Wydoski and Whitney 2003). Juvenile bull trout feed on insects and then transition to small fish. Larger bull trout prey predominantly on fish.

5.6.1 Critical Habitat

Critical habitat is designated based on the life history and habitat requirements of bull trout. Nine PBFs essential to the conservation of the species have been identified as essential for the conservation of bull trout and may require special management considerations or protection, as summarized in Table 7. In the Action Area all PBFs are present except for PBF 1, 5, and 6.

Table 7
Bull Trout Critical Habitat Physical and Biological Features Within the Snohomish River

Physical and Biological Habitat Features	Status
PBF 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	PBF not present. The Snohomish River in the vicinity of the Project is on the Ecology 303(d) list for temperature (Ecology 2023). Hyporheic flows were likely present historically.
PBF 2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	PBF present. Bull trout migration occurs in the Snohomish River within the Action Area and there are no barriers present.
PBF 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	PBF present. The Action Area is presumed to supply an adequate food base.
PBF 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and	PBF not present. The Snohomish River has areas of undeveloped shorelines and contains complex habitat such as riparian vegetation and large wood;

Physical and Biological Habitat Features	Status
unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	however, these features are not present in the Action Area.
PBF 5: Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	PBF not present. The Snohomish River in the vicinity of the Project is on the Ecology 303(d) list for temperature (Ecology 2023).
PBF 6: In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	PBF not present. Bull trout spawning occurs upstream of the Snohomish River, mainly in the upper north fork Skykomish River.
PBF 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	PBF present. The Snohomish River contains a natural hydrograph although it is likely modified due to timber harvest and water withdrawals.
PBF 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	PBF present. Although bull trout are known to utilize the area, they are sensitive to high river temperatures.
PBF 9: Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout	PBF present. Walleye, northern pike, brook trout, and brown trout are not known to occur in the Snohomish River (WDFW 2023d).

5.6.2 Utilization of the Action Area

Bull trout are known to utilize the Snohomish River. In 2008, a 5-year review estimated bull trout abundance in the Snohomish and Skykomish river core area as between 1,000 and 2,500 individuals, which, in the short term, was likely increasing (Snohomish Basin Salmon Recovery Forum 2019). Although these data provide a sense of trends in bull trout spawner abundance, it does not represent a total population value for the Snohomish Basin (Snohomish Basin Salmon Recovery Forum 2019).

5.7 Marbled Murrelet

The marbled murrelet was listed as threatened on October 1, 1992 (57 Fed. Reg. 45328). Critical habitat was designated on May 24, 1996 (61 Fed. Reg. 26256), and revised on October 5, 2011 (76

Fed. Reg. 61599). Critical habitat in Washington is located on federal lands designated as Late Successional Reserves as part of the Northwest Forest Plan, and some areas of state and county land.

Marbled murrelets are small seabirds of the family Alcidae that occur along the north Pacific coast from Alaska to California. Murrelets forage on small fish and invertebrates in open but somewhat sheltered marine waters, such as bays or sounds where water depth is less than 330 feet (Carter 1984). The nesting period typically begins in late March and continues through mid-September (Hamer and Nelson 1995). Nesting occurs in mature and old-growth forest (Carter 1984), where large branches or other suitable platforms exist on the trees for nesting. Because of the scarcity of mature forest stands, it is common for murrelets to fly inland many miles to nest, more than 40 miles in some studies (Cooper et al. 2006, 2007). Marbled murrelets fly to and from their nest sites during dawn and dusk time periods, spending the daytime hours foraging. The key factors of decline for the species include loss of old-growth forests with suitable nesting sites, mortality from oil spills and fishing nets, a low reproductive rate, and low nesting success and survival (USFWS 1997). In addition, it is believed that forest fragmentation makes nests vulnerable to predation by jays, crows, ravens, and great horned owls.

5.7.1 Utilization of the Action Area

There is no designated critical habitat in the Action Area. Marbled murrelets require old-growth forest to nest and proximity to marine areas for feeding. The nearest critical habitat is approximately 12 miles west of the Project (USFWS 2023d). The Action Area lacks old-growth forest habitat required for murrelet nesting, and there are no foraging opportunities within the vicinity of the Action Area because murrelets utilize nearshore marine water resources. Overall, the Action Area is unfavorable for murrelets; however, they may be present while flying between foraging and nesting sites.

6 Effects Analysis

6.1 Direct Effects to Species

6.1.1 Noise Effects

Overall, the activities associated with the Project are not expected to create a noise impact on ESA-listed species. Construction activities such as pavement demolition and paving of new surfaces would lead to elevated noise levels; however, pile driving is not proposed, and no underwater noise impacts are expected from the Project. In-air noise impacts are not anticipated to exceed disturbance thresholds for ESA-listed terrestrial species (marbled murrelet). In addition, marbled murrelet would not use the Action Area for foraging or nesting, so would only be present if flying over the area between foraging and nesting sites. If present, marbled murrelet response to noise disturbance would likely include moving away from the construction site.

6.1.2 Water Quantity

The quantity of stormwater runoff could be affected by operation of the Project because of the increase in impervious surfaces. The Project would result in a net increase in impervious surfaces of approximately 6 acres. In the North Basin, the impervious surface area would increase by approximately 1%, and in the South Basin, the impervious surface area would increase by approximately 4%. These increases would result in impacts on aquatic habitat and species. Water quantity is not expected to significantly change due to the Project and BMPs would be sized to provide flow attenuation to ensure that proposed peak flow rates are less than or equal to existing peak flow rates up to the 50-year storm event.

Without BMPs for attenuation, the Project would increase stormwater runoff in both drainage basins across each design storm analyzed. Table 8 presents the peak discharges and increases in peak discharge across each basin for the three design storms analyzed. With the implementation of BMPs, there would not be increases in peak discharge.

Table 8
Peak Discharge Summary

	Area (ac)	2-Year Peak Discharge (cfs)	10-Year Peak Discharge (cfs)	50-Year Peak Discharge (cfs)
North Basin				
Existing	178.68	3.49	9.30	21.18
Proposed		3.60	9.36	21.59
Change		+0.11	+0.06	+0.41
South Basin				

Existing	84.16	1.46	3.66	7.79
Proposed		1.62	4.00	8.35
Change		+0.16	+0.34	+0.56

6.1.3 Water Quality

Multiple pollutants found in stormwater degrade water quality, negatively impact ESA-listed fish and marine mammals, and affect water quality in EFH even after the water has been treated to reduce pollutant loads (WSDOT 2022; Table 9). ESA-listed fish in the Snohomish River and Puget Sound as well as marine species in Puget Sound may be exposed to contaminants in stormwater that is discharged, or they may be exposed by consuming contaminated prey. Effects of exposure could range from avoidance of affected areas, to reduced growth, altered immune function, or mortality. The intensity of effects depends on the pollutant, its concentration, and/or the duration of exposure. Repeated exposure, even at very low concentrations, may also result in adverse effects.

Table 9
Pollutants Commonly Found in Stormwater Runoff in Washington State¹

Pollutant Class	Examples	Urban Sources
PBT (persistent bioaccumulating toxicants)	POPs (persistent organochlorine pollutants), PCBs (polychlorinated biphenyls), PBDEs (polybrominated diphenyl ethers), PFCs (poly- and per-fluorinated compounds), Pharmaceuticals (estrogen, antidepressant)	Eroding soils, solids, development, redevelopment, vehicles, emissions, industrial, consumer products
Petroleum hydrocarbons	PAHs (poly aromatic hydrocarbons)	Roads (vehicles, tires), industrial, consumer products
Microplastics	6PPD/6PPD-q	Vehicle tires
Metals	Mercury, copper, chromium, nickel, titanium, zinc, arsenic, lead	Roads, electronics, pesticides, paint, waste treatment
Common use pesticides, surfactants	Herbicides (glyphosate, diquat), insecticides, fungicides, adjuvants, surfactants (detergents, soaps)	Roads, railways, lawns, levees, golf courses, parks
Nutrients and sediment	Nitrogen, phosphorus fertilizers, fine-grained inorganic sediment	Fertilizer, soil erosion
Temperature and dissolved oxygen	Warm water, unvegetated exposed surfaces (soil, water, sediments)	Impervious surfaces, rock, soils (roads, parking lots, railways, roofs)
Bacteria	Escherichia coli	Livestock waste, organic solids, pet waste, septic tanks

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The quality of stormwater runoff would be affected by construction and operation of the Project. However, stormwater generated during construction and operations would be required to comply

with state and county requirements and BMPs to avoid and minimize runoff of turbid water and contaminants.

Stormwater runoff generated by the Project would enter surface waters and cause minor effects on aquatic species receiving runoff. An increase of PGIS would cause an increase in pollutants in stormwater runoff, which would affect water quality in the Snohomish River (potentially extending all the way to Puget Sound) and could affect ESA-listed species as described above. These impacts would be minimized through the use of stormwater BMPs that would be installed to treat stormwater runoff from Project PGIS using technology to remove sediments and associated pollutants as required by the *Stormwater Management Manual for Western Washington* (Ecology 2019). BMPs such as flow control, water quality treatment, and infiltration requirements may be necessary to prevent an increase in pollutant discharges that could harm endangered species. Construction stormwater BMPs that could be implemented could include, but are not limited to, interceptor dikes and swales, vegetated strips, wattles, sediment traps, and construction stormwater filtration, as well as avoidance of water bodies during construction. Runoff from additional PGIS would be treated, which would reduce water quality impacts to ESA-listed species.

Tires contain an antioxidant known as 6PPD that is used to increase tire durability; however, it can transform into the chemical 6PPD-quinone. Studies have shown that 6PPD-quinone can have lethal effects on coho salmon, Chinook salmon, and steelhead; however, Chinook salmon and steelhead are somewhat less sensitive than coho salmon (French et al. 2022). Additional research is needed to better understand sublethal effects to salmon species such as long-term disruptions to gill, heart, or brain function (NWFSC 2022). Although research regarding the effects of 6PPD-quinone is still emerging, infiltration BMPs that allow rainfall and stormwater runoff to percolate into the ground are anticipated to perform well in capturing tire wear particles and reducing toxicity effects (Ecology 2022b). Additional research conducted by Washington State University showed that “lethality to coho juveniles, adults, and alevin could be prevented by bioretention filtration, as could sublethal impairments to aquatic invertebrates...” (Ecology 2022). The Project is only increasing PGIS in the corridor by approximately 1% in the North Basin and 4% in the South Basin and stormwater BMPs would also reduce impacts to species from 6PPD to the extent practicable based on current evidence. According to recent research, infiltration is estimated to be a BMP with high effectiveness (Ecology 2022), so should be prioritized when determining stormwater BMPs to be installed as part of the final design process.

6.1.4 Modification of Habitat

The Project includes removal of 21 trees, approximately five of which are located within 200 feet of the Snohomish River (Figure 2), in order to meet FAA safety regulations. The FAA requires the Airport to ensure there are no obstructions, including trees, on or around Harvey Field that could affect flight safety. Obstructions hazardous to air navigation are defined by the FAA as features that “affect the

safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities.” (14 Code of Federal Regulations [CFR] Part 77).

Trees to be removed are located on private property, and can only be removed if the Airport Sponsor receives permission from the landowner. Trimming of trees on Snohomish County property near the Snohomish River currently occurs as part of regular maintenance and would continue to occur. All tree trimming and tree removal would be conducted without generating turbidity or placing anything into aquatic areas such as the Snohomish River or wetlands. The only impact from tree removal and tree trimming would be a minor loss of vegetation from the riparian area of the Snohomish River. Due to the small number of trees that would be affected, and because the trees are not located directly on the riverbank, effects to ESA-listed species are expected to be negligible.

Based on preliminary design, construction of the Airport Way realignment would result in approximately 0.12-acre of permanent impacts to Wetland A, 0.17-acre of temporary impacts to Wetland A, 0.14-acre of permanent buffer impacts to Wetland A, and 0.24-acre of temporary buffer impacts to Wetland A, and 0.08-acre of temporary buffer impacts to Wetland D. Much of the permanent and temporary buffer impact area for Wetland A and Wetland D buffers are degraded, primarily due to presence of reed canary grass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus armeniacus*), and existing roadway surfaces. In addition, the affected wetlands are not anticipated to support ESA-listed fish species as described in Section 4.4.

6.2 Effects to Critical Habitats

6.2.1 Chinook Salmon Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of Chinook salmon and includes six PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 10 summarizes the three freshwater PBFs applicable to this Proposed Action and the potential Project effects on Chinook salmon PBFs.

Table 10
Potential Proposed Action Effects on Chinook Salmon Physical and Biological Features

Physical and Biological Habitat Features	Effect from Proposed Action
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities. It could also have minor

Physical and Biological Habitat Features	Effect from Proposed Action
cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	effects to natural cover from tree trimming and removal.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.

6.2.2 *Steelhead Critical Habitat*

The designation of critical habitat is based on the life history and habitat needs of steelhead and includes six PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 11 summarizes the three freshwater PBFs applicable to this Proposed Action and the potential Project effects on steelhead PBFs.

Table 11
Potential Proposed Action Effects on Steelhead Physical and Biological Features

Physical and Biological Habitat Features	Effect from Proposed Action
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities. It could also have minor effects to natural cover from tree trimming and removal.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.

6.2.3 *Southern Resident Killer Whale Critical Habitat*

Critical habitat for Southern Resident killer whales is designated for areas containing the PBFs essential for the conservation of the species or that require special management considerations. PBFs include water quality, prey species, and passage conditions. Table 12 summarizes the PBFs applicable to this Project and the potential Project effects on killer whale PBFs.

Table 12**Potential Project Effect on Southern Resident Killer Whale PBFs**

Killer Whale PBFs Present	Effect from Proposed Action
PBF 1: Water quality to support growth and development	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	The Project may affect Chinook salmon, the killer whales' favored food source. However, the Project is not anticipated to have significant effects from water quality to Chinook salmon, because these stormwater BMPs would be implemented to reduce water quality effects.
PBF 3: Passage conditions to allow for migration, resting, and foraging	Killer whale passage within critical habitat would not be affected because no construction would occur within or near critical habitat.

6.2.4 Coastal-Puget Sound Bull Trout Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of bull trout and includes nine PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 13 summarizes the PBFs applicable to this Proposed Action and the potential Project effects on bull trout PBFs.

Table 13**Potential Proposed Action Effect on Bull Trout Physical and Biological Features**

Bull Trout PBFs Present	Effect from Proposed Action
PBF 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	The Project would have minor effects on water quality due to an increase in PGIS; however, infiltration of runoff would continue to contribute to groundwater recharge.
PBF 2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
PBF 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	The Project would not affect this PBF.
PBF 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	The Project would not affect this PBF.

Bull Trout PBFs Present	Effect from Proposed Action
PBF 5: Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	The Project would not affect this PBF.
PBF 6: In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	The Project would not affect this PBF.
PBF 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	The Project would not affect this PBF because flow control requirements would avoid or minimize any increase in stormwater runoff.
PBF 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
PBF 9: Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	The Project would not affect this PBF.

6.3 Delayed Consequences

Delayed consequences are those caused by or resulting from the Project and occur later in time but are still reasonably certain to occur (50 CFR 402). No significant delayed consequences are anticipated as a result of this work.

6.4 Cumulative Effects

Cumulative effects are effects of future state or private activities that are reasonably certain to occur within the Action Area (50 CFR 402). From an ESA perspective, the analysis of cumulative effects considers future nonfederal projects that do not require federal permits that may affect habitats and listed species in the Action Area. Future development projects that result in PGIS have the potential to occur in the Action Area. The effects of these actions could result in degraded riparian and freshwater habitat. However, state and local regulations and conservation plans are expected to mitigate some of the potential effects of human development and may reduce effects on listed

species and habitat. There are no foreseeable future state or private activities in the vicinity of this Project that are reasonably certain to occur within the Action Area as a result of this Project.

7 Effects Determinations

For listed species, a key factor in making an effects determination and distinguishing between a significant and insignificant effect is determining if the effect would be significant enough to cause a take. "Take," as defined by the ESA, includes such activities that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct (ESA Section 3[19]). Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering; harass is further defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3).

7.1 Puget Sound Evolutionarily Significant Unit Chinook Salmon

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** Chinook salmon.

This Project **may affect** Chinook salmon because of the following:

- Chinook salmon are known to spawn, rear, and migrate in the Snohomish River.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field.

This Project **is not likely to adversely affect** Chinook salmon because of the following:

- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on Chinook salmon.

7.1.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** Chinook salmon designated critical habitat.

This Project **may affect** Chinook salmon designated critical habitat because of the following:

- Designated critical habitat for Chinook salmon is present in the Action Area.
- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** Chinook salmon designated critical habitat because of the following:

- No work would occur in-water.
- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on Chinook salmon critical habitat.

7.2 Puget Sound DPS Steelhead

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** steelhead.

This Project **may affect** steelhead because of the following:

- Steelhead are known to rear and migrate in the Snohomish River.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field.

This Project **is not likely to adversely affect** steelhead because of the following:

- No work would occur in-water.
- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on steelhead.

7.2.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** steelhead designated critical habitat.

This Project **may affect** steelhead designated critical habitat because of the following:

- Designated critical habitat for steelhead is present in the Action Area.
- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** steelhead designated critical habitat because of the following:

- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on steelhead critical habitat.

7.3 Southern Resident Killer Whale

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on Southern Resident killer whale. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on southern resident killer whale is considered insignificant. In addition, the Project is not likely to adversely affect Chinook salmon (as described in Section 7.1), which is the southern resident killer whale's preferred prey.

7.3.1 Critical Habitat Effects Determination

Based on the above analysis, the Project would have **no effect** on Southern Resident killer whale critical habitat. Although the Project would discharge treated stormwater in an area that drains to waters that support Chinook salmon, it would not appreciably reduce the survival or recovery of Chinook salmon and would not, therefore, result in any population-scale reductions in the availability of this prey resource.

7.4 Bocaccio

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on bocaccio. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on bocaccio is considered insignificant.

7.5 Yelloweye Rockfish

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on yelloweye rockfish. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on yelloweye rockfish is considered insignificant.

7.6 Coastal-Puget Sound Bull Trout

Based on the above analysis, the effect determination is that the Project **may affect, is not likely to adversely affect bull trout**.

This Project **may affect** bull trout because of the following:

- Bull trout are known to rear and migrate in the Snohomish River.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field.

The Project **is not likely to adversely affect** bull trout because of the following:

- No work would occur in-water.
- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on bull trout.

7.6.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Proposed Action **may affect, is not likely to adversely affect**, designated bull trout critical habitat because of the following:

This Project **may affect** bull trout designated critical habitat because of the following:

- Designated critical habitat for bull trout is present in the Action Area.
- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** bull trout designated critical habitat because of the following:

- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on bull trout critical habitat.

7.7 Marbled Murrelet

Based on the analysis in Section 6, the effect determination is that the Proposed Action would have **no effect** on marbled murrelet. Although it is possible that marbled murrelets could fly over the action area, any potential effects are negligible due to the presence of highways, existing airport use,

and other disturbances. In addition, the nearest critical habitat is located approximately 12 miles west of the Project Area.

8 Essential Fish Habitat Assessment

The objective of this EFH assessment is to determine whether the Project “may adversely affect” designated EFH for relevant commercially, federally managed fisheries species within the Action Area. This section provides a description and assessment of EFH in the Project Area and the potential impacts on these habitats.

8.1 Essential Fish Habitat Background

The Sustainable Fisheries Act of 1996 (Public Law 104-297) amended the Magnuson-Stevens Act and requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries on activities that may adversely affect EFH.

EFH is defined as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 United States Code 1802(10)). Waters include aquatic areas (marine waters, intertidal habitats, and freshwater streams) and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate. Substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities. Necessary means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers a species’ full life cycle (50 CFR 600.10). The Magnuson-Stevens Act promotes the protection of these habitats through assessment and mitigation of activities that may adversely affect these habitats.

The EFH mandate applies to all species managed under a Fishery Management Plan. In Washington, Oregon, and California, there are three Fishery Management Plans covering groundfish, coastal pelagic species, and Pacific salmon. Federal agencies must consider the impact of a proposed action on all three types of EFH. The Action Area for the Project includes the EFH for Pacific salmon species (NMFS 2023d).

8.2 Potential Effects of the Proposed Project

The definition of Adverse Effect is “any impact that reduces quality or quantity of EFH, including direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.810).

For the Project, the effects have been discussed in the ESA effects analysis for Chinook salmon, steelhead, and bull trout and their respective critical habitats, and collectively these would apply to EFH. The potential effects of the Project include minor effects on water quality due to an increase in

stormwater runoff from new PGIS and the removal of approximately five trees within the riparian zone. The Project would **not adversely affect** Pacific salmon EFH.

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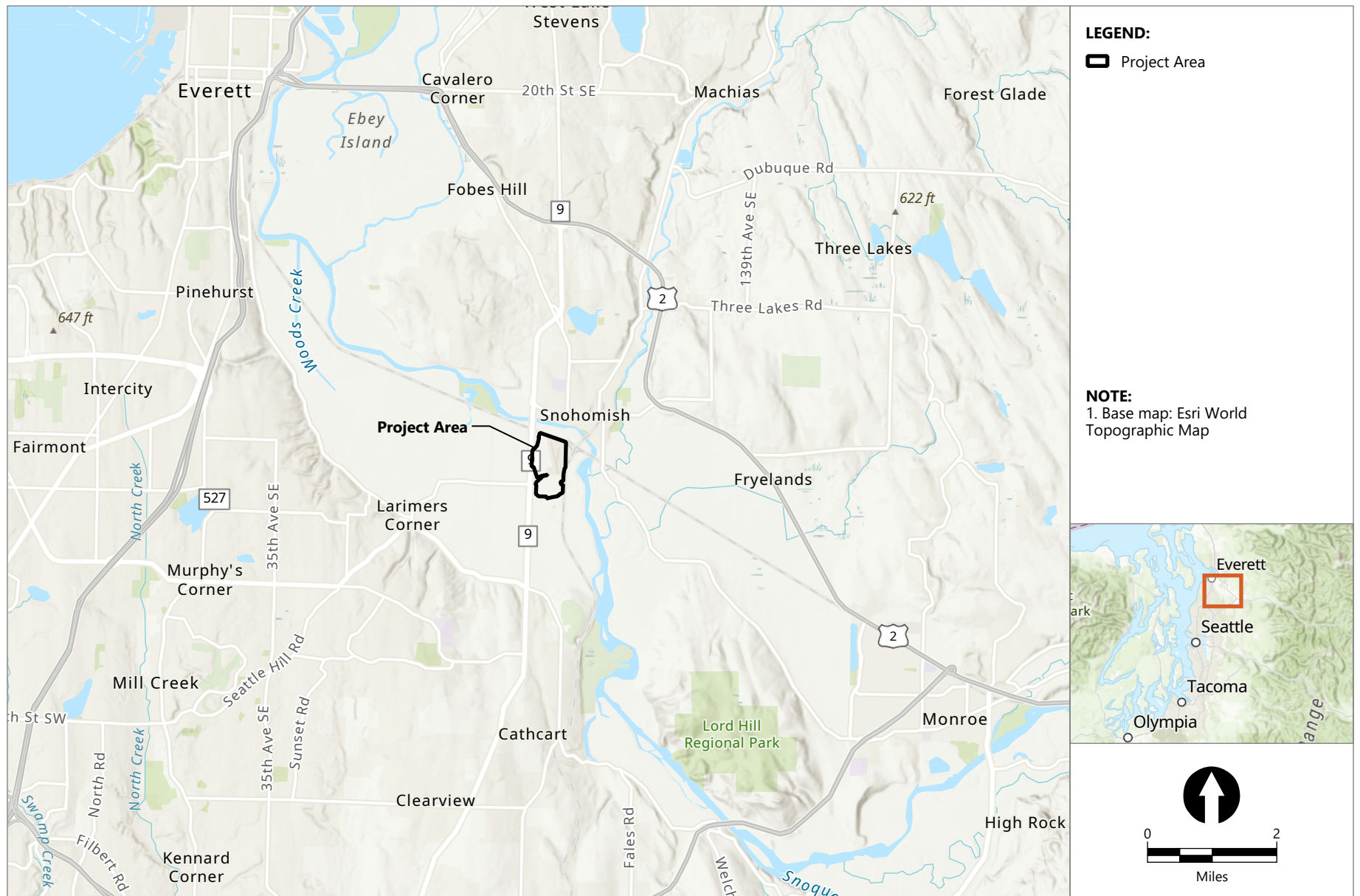
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Figures



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Figure 1
Vicinity Map

Biological Assessment
 Harvey Field Runway Improvement Project



Source: ESRI, 2023; RS&H, 2023

Legend

0 500 1,000 Feet

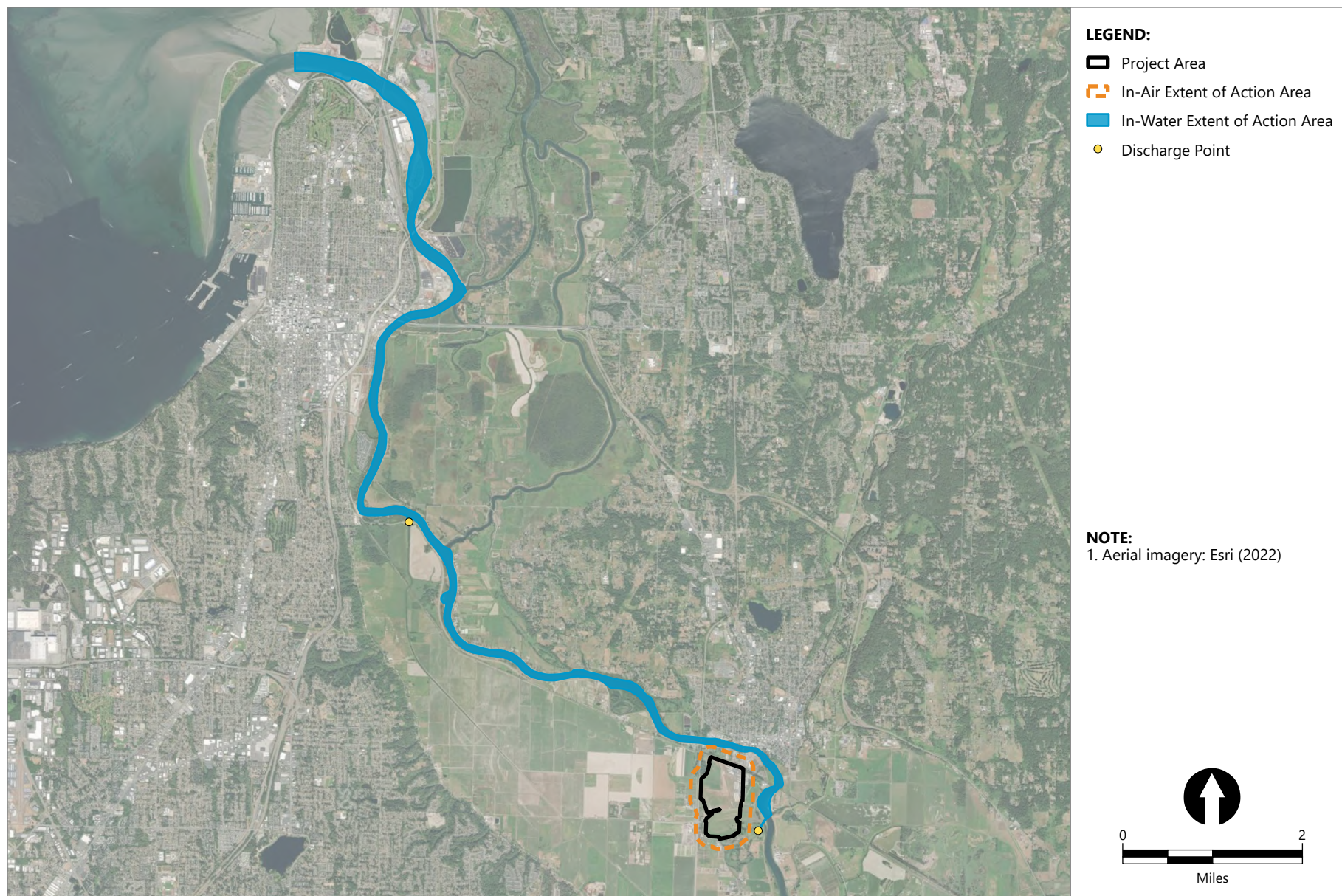


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**Figure 2
Site Plan**

Biological Assessment
Harvey Field Runway Improvement Project



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Figure 3
Action Area

Biological Assessment
Harvey Field Runway Improvement Project

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FW: FAA Harvey Field Runway Improvement Project #WCRO-2023-02840 - revised BA

From Barrow, Julie <Julie.Barrow@rsandh.com>
Date Fri 2024-09-06 8:28 AM
To Philipson, Alex <Alex.Phiplipson@rsandh.com>

Hi Alex,

Please save this to the Harvey BA folder too.

Thanks,
Julie

Julie Barrow

Environmental Specialist
4582 South Ulster Street, Suite 1100, Denver, CO 80237
O 303-409-7940 | M 408-858-4913

From: Logan, Ilon (FAA) <Ilon.Logan@faa.gov>
Sent: Thursday, September 5, 2024 5:55 PM
To: Consultationupdates WCR - NOAA Service Account <consultationupdates.wcr@noaa.gov>
Cc: Donald Hubner - NOAA Federal <donald.hubner@noaa.gov>; Kandace Harvey <kharvey@harveyfield.com>; Cynthia Hendrickson <cyndyh@harveyfield.com>; Barrow, Julie <Julie.Barrow@rsandh.com>; Prevo, Matthew A (FAA) <Matthew.A.Prevo@faa.gov>
Subject: [External] RE: FAA Harvey Field Runway Improvement Project #WCRO-2023-02840 - revised BA

External Sender: Please use caution with links and attachments.
Thank you for this confirmation.

Have a great afternoon,
Ilon

Ilon E. Logan

Regional Environmental Protection Specialist
Federal Aviation Administration
Airports Division, Northwest Mountain Region
2200 S. 216th Street
Des Moines, WA 98198
(206) 231-4220
Ilon.Logan@faa.gov

From: Consultationupdates WCR - NOAA Service Account <consultationupdates.wcr@noaa.gov>
Sent: Thursday, September 5, 2024 4:37 PM
To: Logan, Ilon (FAA) <Ilon.Logan@faa.gov>
Cc: Donald Hubner - NOAA Federal <donald.hubner@noaa.gov>; Kandace Harvey <kharvey@harveyfield.com>; Cynthia Hendrickson <cyndyh@harveyfield.com>; Barrow, Julie <Julie.Barrow@rsandh.com>; Prevo, Matthew A

(FAA) <Matthew.A.Prevo@faa.gov>

Subject: Re: FAA Harvey Field Runway Improvement Project #WCRO-2023-02840 - revised BA

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

thank you for the update, it has been filed with the project and Don will reach out if needed

Frankie Johnson
(INBOX ADMINISTRATOR)
360-320-6298 (Google Voice)
253-753-4297(Cell)

On Thu, Sep 5, 2024 at 4:27 PM Logan, Ilon (FAA) <Ilon.Logan@faa.gov> wrote:

Hello,

FAA is submitting a revised Biological Assessment for this ongoing consultation (Reference #: WCRO-2023-02840). This submission is for formal consultation and supersedes our previous submission for informal consultation. We will be sending emails in the future to request status updates on our consultation and whether it has been assigned or reviewed for completeness.

Sincerely,

Ilon

Ilon E. Logan

Regional Environmental Protection Specialist
Federal Aviation Administration
Airports Division, Northwest Mountain Region

2200 S. 216th Street
Des Moines, WA 98198
(206) 231-4220
Ilon.Logan@faa.gov

Appendix C.3

National Marine Fisheries Service Consultation

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OR 97232-1274

Refer to NMFS No:
WCRO-2023-02840

June 26, 2025

Laura A. Sample
Environmental Protection Specialist
Seattle Airport District Office
Federal Aviation Administration
4419 Airport Way
Fairbanks, Alaska 99709

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response for the
Harvey Field Runway Improvement Project, Snohomish County, Washington, NMFS
Reference No: WCRO-2023-02840

Dear Ms. Sample:

This letter responds to your September 5, 2024, request for initiation of formal consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and analysis because it met our screening criteria and contained required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed the Federal Aviation Administration's (FAA's) consultation request and related initiation package. Where relevant, we have adopted the information and analyses you have provided and/or referenced but only after our independent, science-based evaluation confirmed they meet our regulatory and scientific standards. In our biological opinion below, we indicate what parts of your document(s) we have incorporated by reference and where that information is being incorporated

We adopt by reference the following sections of the Biological Assessment (BA; Anchor QEA 2024):

- Section 1.0 Introduction
- Section 2.0 Proposed Project
- Section 3.0 Action Area
- Section 4.0 Environmental Baseline
- Section 5.0 Status of the Species
- Section 6.0 Effects Analysis
- Section 8.0 Essential Fish Habitat

CONSULTATION HISTORY

On November 9, 2023, FAA submitted a request for informal consultation under Section 7 of the ESA, along with a BA. The BA evaluated the potential effects of the proposed project on Puget



Sound Evolutionarily Significant Units (ESU) Chinook salmon (*Oncorhynchus tshawytscha*), Puget Sound Distinct Population Segment (DPS) steelhead (*Oncorhynchus mykiss*), and their designated critical habitat. The analysis of effects determined that the project “may affect, is not likely to adversely affect” Chinook salmon and steelhead. The BA also provides justification for a “no effect” determination for the Southern Resident DPS killer whale (*Orcinus orca*), Puget Sound/Georgia Basin DPS bocaccio (*Sebastes paucispinus*), and Puget Sound/Georgia Basin yelloweye rockfish (*Sebastes ruberrimus*). An assessment of Essential Fish Habitat (EFH), in accordance with the Magnuson-Stevens Act, was also prepared in the BA. The assessment found that the proposed project would not adversely affect Pacific Salmon EFH.

On February 15, 2024, FAA provided NMFS with a follow up letter regarding their initial consultation request. This letter clarified that FAA had based their request for informal consultation on guidance from NMFS staff provided on August 15, 2023, that indicated informal consultation was the appropriate consultation pathway. The letter further states that FAA received subsequent guidance from NMFS staff on January 26, 2024, directing FAA to submit a request for formal consultation and replace their previous consultation request because stormwater from the project area would discharge pollutants to waters that are occupied by ESA-listed fish and to waters that are designated as critical habitat as well as EFH. The letter concludes with a request from FAA that NMFS continue with informal consultation given the absence of published scientific or policy papers or the announcement of regulatory guidance that would necessitate formal consultation.

On May 14, 2024, NMFS provided a response to FAA’s follow-up letter. In this response, NMFS communicated that the agency continues to believe that the proposed action is likely to adversely affect ESA-listed fish species, their critical habitat, and EFH for Pacific Salmon, and as such, would require formal consultation. On September 5, 2024, FAA submitted a revised BA along with a request for formal consultation that would supersede their previous submission for informal consultation.

FAA contacted NMFS to request updates on the status of the formal consultation on the following dates:

- October 10, 2024
- December 17, 2024
- February 13, 2025
- March 3, 2025
- May 21, 2025
- June 10, 2025

On April 11, 2025, NMFS was informed that FAA may complete the ESA consultation for the proposed action using emergency provisions.

On May 13, 2025, NMFS contacted FAA to confirm whether FAA planned to complete the ESA consultation using the emergency provisions.

On May 14, 2025, FAA confirmed that after evaluating the potential for an emergency declaration, it was determined that following the emergency provisions was not appropriate. Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

Proposed Action

The proposed action consists of improvements to existing infrastructure at the Harvey Field Airport (Harvey Field) in Snohomish, Washington, necessary to meet current FAA design standards. Key elements of the proposed action include:

- Construction of a new 2,400-foot asphalt runway.
- Removal of the existing asphalt runway that is 2,672 feet long by 36 feet wide.
- Construction of a new 2,400-foot parallel taxiway with three runway connections while reusing much of the existing partial parallel taxiway pavement.
- Removal of approximately 300 linear feet of taxiway pavement.
- Relocation of Airport Way to the south. The relocated portion of Airport Way is 3,700 linear feet.
- Removal of approximately 600 linear feet of existing Airport Way.
- Installation of new runway/taxiway lighting.
- Removal of 21 trees from the approach and departure surfaces at both runway ends.
- Installation of a retaining wall with water passage infrastructure to minimize fill quantities required by earthwork construction.

The proposed action's components involve construction of 9.5 acres of new impervious surface and removal of approximately 3.8 acres of existing impervious surface, resulting in a net addition of approximately 5.7 acres of new impervious surface at the Harvey Field Airport. Section 2 of the BA further describes how the proposed action will be implemented, including conservation measures and best management practices, and is being adopted here.

Stormwater runoff generated from new impervious surface area is the primary pathway for anticipated effects on ESA-listed species and designated critical habitat. Other possible effects on ESA-listed species and/or designated critical habitat (e.g., noise, vibration, visual disturbance, erosion, accidental spills) were assessed but are expected to be minimal because of the distance between the portions of the action area where these types of effects would occur and potentially suitable and/or occupied habitats for ESA-listed species. NMFS requires stormwater management (treatment and/or flow control) for all new impervious surface area constructed. Reconstruction of existing impervious surface area requires such areas to meet NMFS' current stormwater management (treatment and/or flow control) requirements.

BIOLOGICAL OPINION

We examined the status of each species that would be adversely affected by the proposed action to inform the description of the species’ “reproduction, numbers, or distribution” as described in 50 CFR 402.02. We also examined the condition of critical habitat throughout the designated area and discuss the function of the physical or biological features essential to the conservation of the species that create the conservation value of that habitat.

We incorporate by reference the analysis and findings of effects submitted in the BA (Anchor QEA 2024). Table 1 summarizes the determinations for listed species, critical habitat (where designated), and species proposed for listing, based on the BA’s analyses supplemented by our own analyses informed by the most recent scientific data and policy guidance. Species and critical habitats included in our analyses, but absent from the BA, are the humpback whale (*Megaptera novaeangliae*) and the sunflower sea star (*Pycnopodia helianthoides*; proposed for listing).

Table 1. Project-related Effects to ESA-listed Species and Designated Critical Habitat

ESA-Listed Species	Determination of Effect to Listed Species	Determination of Effect to Critical Habitat	Pathway for Potential Effects
Chinook salmon Puget Sound ESU* 70 FR 37160 , 70 FR 52630 , NMFS 2017	LAA [†]	LAA	Water quality degradation from stormwater runoff; Construction-related disturbance
Steelhead Puget Sound DPS** 72 FR 26722 , 76 FR 20558 , 73 FR 55451 , NMFS 2017	LAA	LAA	
Bocaccio Puget Sound/Georgia Basin DPS 75 FR 22276 , 80 FR 7977	LAA	LAA	Water quality degradation from stormwater runoff
Yelloweye rockfish Puget Sound/Georgia Basin DPS 75 FR 22276 , 80 FR 7977	LAA	LAA	
Killer Whale Southern Resident DPS 70 FR 69903 , 80 FR 7380 , 71 FR 69054 , 86 FR 41668	LAA	LAA	Potential reduction in prey base
Humpback Whale Central American DPS 81 FR 62260 , 86 FR 21082	NLAA [‡]	NLAA	
Humpback Whale Mexico DPS 81 FR 62260 , 86 FR 21082	NLAA	NLAA	
Sunflower Sea Star (Proposed) 88 FR 16212	LAA	--	Water quality degradation from stormwater runoff
*Evolutionarily Significant Unit (ESU); * Distinct Population Segment (DPS); [†] Likely to Adversely Affect; [‡] Not Likely to Adversely Affect			

We also examined the likely effects on any listed species and critical habitats that your agency made “not likely to adversely affect” (NLAA) determinations for. Our conclusions regarding the effects of the action on those species and critical habitats is presented below, under the heading: NLAA determinations.

Action Area

“Action area” means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). We incorporate here, by reference, the action areas described in Section 3.0 of the submitted BA (Anchor QEA 2024).

Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area; the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultations; and the impact of state or private actions that are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from federal agency activities or existing federal agency facilities that are not within the agency’s discretion to modify are part of the environmental baseline (50 CFR 402.02).

The status of each species considered in this consultation varies considerably from very high risk of extinction, to moderate, to low risk of extinction. The environmental baseline is such that individual ESA-listed species in the Puget Sound/Georgia Basin are exposed to reduced water quality, lack of suitable riparian and aquatic habitat, reduced abundance of prey species, and restricted movement due to developed urban areas and land use practices that have limited access to historically available habitat. Many conditions in the baseline are understood to limit productivity and specified as factors limiting productivity in a manner that impedes species recovery. These stressors, as well as those from environmental variation, already exist, and we consider these factors with the addition of any adverse effects produced by the proposed action. Sections 4.0 and 5.0 of the BA (Anchor QEA 2024) describe the environmental baseline in detail and are adopted here.

In summary, the action area is part of a highly anthropogenically impacted network of habitats for ESA-listed species whose populations have continued to decrease or remain somewhat stable at low levels for many years. However, the aquatic habitats present in the action area continue to provide a wide range of important habitat functions for ESA-listed species.

Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

Puget Sound DPS Chinook Salmon & Puget Sound DPS Steelhead

Sections 6.0 and 7.0 of the BA (Anchor QEA 2024) provide a detailed discussion and comprehensive assessment of the effects of the proposed action on salmonids and are adopted

here (50 CFR 402.14(h)(3)). NMFS has evaluated the analyses presented in the BA and after our independent, science-based evaluation, determined they meet our regulatory and scientific standards. However, we have supplemented the BA's analysis of likely project effects to the freshwater, estuarine, and nearshore marine components of critical habitat for Puget Sound (PS) Chinook salmon and steelhead populations using the Snohomish River and determined that the proposed action is likely to adversely affect (LAA) the freshwater and estuarine habitat for these species. These LAA determinations for critical habitat now align with NMFS' current scientific research and policy.

Short-term effects of the proposed action are primarily associated with upland construction activities at the Harvey Field Airport. Effects may include increased turbidity in surface water discharge, construction noise and vibration disturbance, and contaminant leaks from construction equipment use and storage. Such effects are expected to be limited because of the distance from occupied habitat, properly implemented best management practices (BMPs), and the relatively discrete construction duration. At most, NMFS anticipates no more than two cohorts of Chinook salmon and steelhead to be impacted by construction-related effects.

The proposed action's long-term effects on ESA-listed species and designated critical habitat are primarily associated with the degradation of water quality caused by stormwater runoff from new and reconstructed impervious surface areas. Even with proper and functioning stormwater BMPs, contaminants within stormwater runoff are conveyed to receiving waters and, because of the persistence of some contaminants, eventually reach the Puget Sound. Stormwater runoff delivers a wide variety of pollutants to aquatic ecosystems, and many of the pollutants are unregulated and unevaluated. Exposure to these ubiquitous pollutants in freshwater, estuarine, and nearshore marine habitats is likely to have multiple adverse effects on salmon and steelhead, even at pre-project, ambient levels (Hecht et al. 2007; Laetz et al. 2009; Macneale et al. 2010; Sandahl et al. 2007; Spromberg and Meador 2006). Contaminants also accumulate in both the prey and tissues of juvenile salmonids. Depending on the level of concentration, these contaminants can cause a variety of lethal and sublethal effects on salmon and steelhead, including disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities (Fresh et al. 2005; Hecht et al. 2007; Lower Columbia River Estuary Partnership 2007). Even at very low levels, chronic exposures to such contaminants are known to have a wide range of adverse effects on the ESA-listed species considered in this opinion (Carls et al. 2008; Comeleo et al. 1996; Feist et al. 2011; Hecht et al. 2007; Sandahl et al. 2007; Spromberg and Meador 2006), including:

- Early development – gastrulation, organogenesis, hatching success
- Juvenile growth – foraging behavior, growth rate, condition index
- Smoltification (only in salmonids) – anion exchange, thyroxin blood hormone, salinity tolerance
- Disease induced mortality – immunocompetence, pathogens, histopathology
- Predation-induced mortality – predator detection, shelter use, schooling behavior
- Migration/distribution – use of rearing habitats, adult homing, spawning site selection
- Reproduction – courtship behavior, number of eggs produced, fertilization success

The types of contaminants in stormwater runoff throughout the action area have been shown to injure or kill individual exposed fish. Injury or death from exposure to contaminants in stormwater may occur through a variety of behavioral, endocrine disrupting, and immunotoxic disease effects, either by themselves or through additive, interactive, and synergistic interactions with other contaminants (Baldwin et al. 2009; Feist et al. 2011; Hicken et al. 2011; Spromberg and Meador 2006; Spromberg and Scholz 2011) at ambient levels already present in Washington's rivers, estuaries, and nearshore marine habitats (Fuhrer et al. 1996; Johnson et al. 2013; Morace 2006; Morace 2012; ODEQ 2012).

Puget Sound/Georgia Basin DPS Bocaccio and Puget Sound/Georgia Basin DPS Yelloweye Rockfish

The submitted BA (Anchor QEA 2024) assesses the effects of the proposed action on Puget Sound/Georgia Basin DPSs of bocaccio and yelloweye rockfish and their critical habitat, concluding that the project will have no effect on either of the species or their critical habitat. NMFS has evaluated the analyses presented and concluded these determinations do not meet our regulatory and scientific standards. We have supplemented the BA's analysis of likely project effects to the species and their critical habitat for populations using marine waters within Puget Sound and determined that the proposed action is likely to adversely affect (LAA) individuals from both DPSs and is likely to adversely affect (LAA) their designated critical habitat. These determinations align with NMFS' current scientific research and policy.

Based on the primary pathway of water quality contaminants reaching Puget Sound via stormwater, individuals among both rockfish species are likely to be exposed to water quality degradation as a result of the proposed action. The level of exposure attributable to the proposed action cannot be quantified, but given the chronic and systemic nature of water quality pollution, it is likely that individual rockfish at larval, juvenile, or adult life stages will encounter some components of runoff from the proposed action. Greene and Godersky report that "contaminants such as polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers, and chlorinated pesticides appear in rockfish collected in urban areas (Palsson et al. 2009). While the highest levels of contamination occur in urban areas, toxins can be found in the tissues of fish throughout Puget Sound. Although few studies have investigated the effects of toxins on rockfish ecology or physiology, other fish in the Puget Sound region that have been studied show a substantial impact, including reproductive dysfunction of some sole species. Reproductive function of rockfish is also likely affected by contaminants, and other life-history stages may be affected as well (Greene and Godersky, 2012). Recent studies conducted in the San Francisco Bay also document injury to similar species from stormwater-derived pollutants (Overdahl et al. 2021; Peters et al. 2024). Repeated and chronic exposures, even of very low levels, are likely to injure or kill individual fish by themselves and through synergistic interactions with other contaminants already present in the water (Baldwin et al. 2009; Feist et al. 2011; Hicken et al. 2011; Overdahl et al. 2021; Peters et al. 2024; Spromberg and Meador 2006; Spromberg and Scholz 2011).

Southern Resident DPS Killer Whale

The submitted BA (Anchor QEA 2024) provides an assessment of the effects of the proposed action on Southern Resident DPS of killer whale and their critical habitat, concluding that the project will have no effect on the species or their critical habitat. NMFS has evaluated the analyses presented and concluded these determinations do not meet our regulatory and scientific

standards. We have supplemented the analysis of likely project effects to the species and their critical habitat for populations utilizing the marine waters within Puget Sound and determined that the proposed action is likely to adversely affect individuals and their designated critical habitat. These determinations align with NMFS' current scientific research and policy.

SRKW will be exposed to water pollution that is generated in part by the proposed action, in both their designated and their proposed critical habitat. Toxic contaminants have been identified as one of three key threats to SRKW, and the biological report supporting the original designation of critical habitat, states that because of their long lifespan, position at the top of the food chain and their blubber stores, killer whales accumulate high concentrations of contaminants. Organochlorines, such as PCBs and dichlorodiphenyltrichloro-ethane (DDT), and many other chemical compounds including polychlorinated naphthalenes, polybrominated diphenyl ethers (PBDE), polycyclic aromatic hydrocarbons (PAHs), dioxins, furans, and heavy metals, are a concern because of their ability to induce immune suppression, reproductive impairment, or other physiological damage, as observed in several species of marine mammals (NMFS 2006).

The available data indicate that SRKW are not at risk of health effects from aluminum, ammonia, nickel, selenium, silver, zinc, and PCBs. Some of these compounds are essential elements to the nutrition of marine mammals (e.g., aluminum, nickel, selenium, and zinc; Das et al. 2003) and are generally found in low levels in marine mammals distributed throughout the world's oceans (see Appendices 10-5 to 10-8 in O'Shea 1999 for summaries of selected surveys of metals and trace element concentrations in tissues of seals, sea lions, toothed whales, baleen whales, sea otters, dugongs, manatees, and polar bears). Therefore, these essential elements found in low concentrations in marine mammals distributed globally are not anticipated to cause adverse health effects for Southern Resident killer whales. Although silver is not considered an essential element for mammals, its toxicity is generally not a concern and it has not been measured often in marine mammals (O'Hara et al. 2003). Ammonia does not build up in the food chain, but serves as a nutrient for plants and bacteria (EPA 2003) and is not anticipated to accumulate in whales. PCB is an organochlorine pesticide that does not readily bioaccumulate. When found in marine mammals, its presence is likely the result of biotransformation of other chemicals and not bioaccumulation (e.g., as observed in bowhead whales, Hoekstra et al. 2003). Furthermore, PCBs readily degrade in the environment and by all available evidence do not appear to biomagnify (Garrett and Ross 2010). NMFS does not anticipate that the proposed action will affect accumulation of PCBs in Southern Residents. For these reasons, NMFS does not anticipate that the proposed action will result in any health effects from these compounds and we do not discuss these compounds further.

Metals can bioaccumulate in the aquatic environment (EPA 2007). However, most metals (with the exception of methylmercury), do not appear to biomagnify and are regulated and excreted (Gray 2002, EPA 2007). Upper trophic-level predators can still accumulate metals even in the absence of biomagnification (Reinfelder et al. 1998). However, low levels of arsenic, chromium, copper, and lead have been measured in marine mammal tissues (O'Shea 1999, Grant and Ross 2002, Das et al. 2003). Although high cadmium levels are measured in some marine mammals, cadmium is known to combine with metallothionein (a protein molecule) to mitigate the toxic effects (Dietz et al. 1998, Klaassen et al. 2009). Further, no toxic effects of cadmium have been

observed in marine mammals. Although threshold levels at which adverse health effects occur are currently unknown for these metals, the available data indicate that the low levels measured in their tissues do not pose a health risk to marine mammals (O'Shea 1999).

At certain concentrations, dieldrin, endosulfan, endrin, heptachlor epoxide, lindane, and tributyltin (TBT) can have a wide variety of toxic effects on organisms including neurotoxicity, reproductive defects, tremors and convulsions, organ tissue damage (e.g., liver or kidney tissue damage), cancer, endocrine disruption, and reduced immune response. Here we compare the concentrations of these compounds in the SRKWs or in surrogate species to known threat levels found in surrogate species. There are currently no known killer whale-specific health effects thresholds, thereby requiring the use of surrogate species to estimate risks.

The contaminants of gravest concern to SRKW (PAHs, PCBs, and PDBEs) are not contributed in significant amounts by the proposed action. Previous chemical analyses revealed that stormwater runoff contained a complex mixture of metals, PAHs, and nutrients (McIntyre et al. 2014), and that stormwater runoff contained high levels of dissolved copper and nickel and a broad range of PAHs including naphthalenes, phenanthrenes, chrysenes, fluoranthenes, and pyrene (Ecology and King County 2011). Scat analysis indicates that for PAHs, which do not generally bioaccumulate, overall measures of PAHs were low (ppb, wet weight), and their presence would reflect recent SRKW exposure to oil, engine (combustion) exhaust, among other potential exposure sources (PSEMP 2018).

In marine mammals, metals generally do not bioaccumulate and may be detoxified and/or eliminated. However, chronic exposure to metals such as mercury, cadmium, copper, and lead, may present a moderate and/or localized health risk to killer whales. Most metals are a localized environmental concern; concentrations tend to be elevated near large urban and industrial centers where discharges are concentrated (Grant and Ross, 2002). The second largest source of copper in urban runoff is roofing material, and the largest source of zinc is from moss control, and siding materials are the second largest source of this metal (PSEMP 2019). Because the contaminants in stormwater generated by the proposed action are not expected to bioaccumulate, they are of lesser concern for SRKW; we therefore consider the likely response of SRKW to exposure to the types of water quality contaminants produced by the proposed action to be adverse, but only incrementally so.

Sunflower Sea Star

Little is known about specific effects of toxic contaminants on sunflower sea stars or how stress from exposure to such chemicals affects susceptibility to sea star wasting syndrome. Laboratory challenge tests have exposed larval stages of various marine invertebrates to hydrocarbons, heavy metals, pesticides, and other contaminants commonly found in stormwater runoff. Documented impacts range from developmental abnormalities to behavioral augmentation, and mortality is common at concentrations as low as several parts per million (e.g., Hudspeth et al. 2017, de Almeida Rodrigues et al. 2022). For juvenile and adult marine invertebrates, including sea stars and other echinoderms, a variety of sublethal behavioral and physiological effects from these toxic contaminants have been documented, but mortality is also possible. Suspended sediment in stormwater may also be a concern as sea stars that become covered by sediment may experience greater risk of wasting disease. Absent species-specific data for the sunflower sea

star, ecologically and physiologically similar species can be used as proxies to state that stormwater runoff is likely to harm, injure, or kill sunflower sea stars, having the greatest effects during the larval life history stage.

Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The submitted BA (Anchor QEA 2024) concluded that there were, “no foreseeable future state or private activities in the vicinity of this Project that are reasonably certain to occur within the Action Area as a result of this Project.” NMFS does not concur with this assessment of potential and likely cumulative effects and has provided the following analysis.

Some continuing non-federal activities are reasonably certain to contribute to environmental variation within the action area. However, it is difficult if not impossible to distinguish between the action area’s future environmental conditions caused by global environmental variation that are properly part of the environmental baseline versus cumulative effects. Therefore, all relevant future environmental conditions relating to environmental variation in the action area are assumed to be part of the environmental baseline.

We expect most non-federal activities that impact listed species and their critical habitat to continue for the foreseeable future, contributing to cumulative effects driven by economic conditions that characterize traditional natural-resource-based industries, resource demands associated with settlement of local and regional population centers, and efforts by social groups dedicated to the river restoration and use of natural amenities, such as cultural inspiration and recreational experiences. Although we cannot measure the relative influence of these future activities, we have incorporated it qualitatively into the environmental baseline for the action area.

The economic and environmental significance of the natural-resource-based economy is currently declining in absolute terms and relative to a newer economy based on mixed manufacturing and marketing with an emphasis on high technology (Brown 2011). However, resource-based industries are likely to continue to have an influence on environmental conditions within the action area for the indefinite future. Because resource-based industries have adopted management practices that avoid or minimize many of their most harmful impacts, as is evidenced by the conservation measures included with the proposed action, the level of cumulative effects anticipated from these activities is likely to be less intense than would have been anticipated even a few years ago.

While natural-resource extraction within Washington may be declining, general resource demands are increasing with growth in the size and standard of living of the local and regional human population. The percentage increase in population growth may provide the best estimate of general resource demands because as local human populations grow, so does the overall consumption of local and regional natural resources. Per Washington’s Office of Financial Management, Washington’s population growth had been below 1.0 percent from 2009 to 2013

but has increased recently to 1.6 percent. Population growth remains concentrated in the five largest metropolitan counties - Clark, King, Pierce, Snohomish, and Spokane. The state added 45,300 housing units in 2019, compared to 42,200 in 2018, an increase of 7.3 percent. Fifty-five percent of all new units built in the past year were multi-family units. The state's housing stock has grown by an average of 31,700 units per year since 2010, 27 percent below the prior decade average of 43,500 units per year. More than 71 percent of all new housing units this decade were built in one of the state's five largest metropolitan counties. King County leads all counties with 104,500 new housing units or 37 percent of the state total since 2010.

Demand for cultural and aesthetic amenities also continues to grow with human population and is reflected in decades of concentrated effort by tribes, states, and local communities to restore an environment that supports flourishing wildlife populations, including populations of species that are now ESA-listed. Reduced economic dependence on traditional resource-based industries has been associated with growing public appreciation for the economic benefits of river restoration and growing demand for the cultural amenities that river restoration provides. Thus, many non-federal actions have become more responsive to the recovery needs of ESA-listed species. Those actions included efforts to ensure that resource-based industries adopt improved practices to avoid, minimize, or offset their adverse impacts.

Elsewhere, many actions have focused on completion of river restoration projects specifically designed to counter the major factors now limiting the survival of ESA-listed species at all stages of their life cycle. Those actions have improved the availability and quality of estuarine and nearshore habitats, floodplain connectivity, channel structure and complexity, riparian areas and large wood recruitment, stream substrates, stream flow, water quality, and fish passage. In this way, the goal of ESA-listed species recovery has become a common and accepted part of the state's economic and environmental culture. We expect this trend to continue into the future as public awareness of environmental and at-risk species issues. However, funding for restoration activities from governmental and non-governmental sources is uncertain, while development demands are largely consistent or growing over time, and therefore more certain to occur.

The EPA, via the states, regulates stormwater effluent through a National Pollution Discharge Elimination System Municipal Separate Storm Sewer System permit. The Washington Department of Ecology, under EPA's delegated authority, issues permits for the operation of the stormwater system, requiring municipalities to maintain publicly owned storm and surface water facilities for water quality. Municipal Separate Storm Sewer System permits have "anti-backsliding" provisions, which require stormwater management plans to control pollutant discharges to the maximum extent practicable. Renewal permits require the permittees to ensure that all new development and redevelopment follow local construction and post-construction stormwater regulations.

NMFS also expects that state, tribal, local, or private parties will continue taking actions to reduce toxic pollution and stormwater runoff to the Puget Sound from all sources (U.S. EPA 2012a). While there are reasons to expect continued reduction in pollutant deliveries to the river and sound from existing sources, increasing human population growth and corollary upland development are likely to result in new sources of both point and non-point load. Therefore, we expect the concentration of contaminants in the Snohomish River and Puget Sound are unlikely

to show improvements in habitat conditions or lead to improvement in population viability of ESA-listed species.

In summary, resource-based activities such as timber harvest, agriculture, mining, shipping, and energy development are likely to continue to exert an influence on the quality of freshwater, estuarine, nearshore marine, and marine habitats in the action area. The intensity of this influence is difficult to predict and is dependent on many social and economic factors. However, the adoption of industry-wide standards to reduce environmental impacts and the shift away from resource extraction to a mixed manufacturing and technology-based economy should result in a gradual decrease in influence over time. In contrast, the population of Washington is likely to increase in the next several decades with a corresponding increase in natural resource consumption. Additional residential and commercial development, and a general increase in human activities, are likely to cause localized degradation of freshwater, estuarine, and marine habitats. Interest in restoration activities is growing along with greater environmental awareness among the public. At best, this will lead to localized improvements to these habitat types. Otherwise, it is likely that cumulative effects will not have a strong positive or negative effect on population abundance trends of ESA-listed species or the quality and function of critical habitat physical and biological features.

Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency's biological opinion as to whether the proposed action is likely to: 1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or 2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

Effects to Species at the Population Scale

The FAA's proposed action is likely adversely affect individuals from five of the seven ESA-listed species considered in the opinion. Of the many populations comprising these species that have had a viability analysis completed, few rate as "viable." The overall risk of extinction varies among the component populations from low (1 to 5 percent chance of extinction in 100 years) to very high (greater than 60 percent chance of extinction in 100 years).

The SRKW is listed as an endangered species. Low abundance and productivity are concerns for each of these listed marine mammals.

The baseline conditions in the action area include a variety of factors NMFS has identified as limiting the recovery of the fish species, most notably degraded habitat, including degraded water quality. Other baseline factors affecting fish are hatchery and harvest-related effects and adverse effects related to hydropower development. Many of the baseline conditions are considered limiting. Poor prey base (both quality and quantity) are concerns for the marine mammals, with ongoing risks from vessels via either noise or ship strikes.

We considered the effects of the FAA's proposed action in the context of those extinction risks. Given the size of the action area, the proposed action is likely to expose individual fish from every population of the four listed fish species considered in this opinion to slightly decreased water quality resulting from stormwater run-off. Individual fish will respond to that exposure in different ways depending on their life history stage at exposure. That, in turn, will determine 1) the duration of the exposure (e.g., rearing fish are exposed longer than migrating fish), 2) the pathways of exposure (e.g., prey or water quality), and 3) the nature of effect (e.g. juveniles more likely to experience latent sub-lethal effects, returning adults are more likely to experience impaired olfactory function that can impair homing ability). Relevant environmental cycles influencing exposure include the probabilistic time necessary for existing pollutants to flush from the basin by river discharge as measured in a half-life estimated to last for days for dissolved pollutants but will require decades for pollutants adsorbed or absorbed onto sediment.

Of the species potentially exposed to these water quality changes, those that are likely to have the greatest level of exposure and response are steelhead because their freshwater juvenile rearing period can be up to 2 years long, and spring Chinook salmon, which can rear for a year before their migration to salt water. The responses of individuals exposed to water quality changes are likely to include multiple episodes of impairment of essential fish rearing and feeding behavior patterns for some individuals among each cohort of each of the listed fish species considered.

The increment of water quality degradation that FAA's proposed action will add to the baseline condition is small but chronic. At the scale of the full proposed action, these effects are additive but diffuse throughout the aquatic environment. For this reason, the number of individual fish that ultimately will be injured or killed by FAA's project is not likely to be concentrated in a way that has a more intense effect on one population compared to another. Thus, post-construction stormwater runoff is unlikely to discernibly affect the levels of abundance, productivity, spatial structure or diversity of any fish population or species considered in this opinion. The contemporaneous effects of environmental variation are likely to have a similar chronic and slightly negative effect on populations that cannot be estimated with any precision and are also, generally, very difficult to distinguish from baseline conditions.

Relative to marine mammals, the species most at risk of exposure is SRKW based on their extended presence in Puget Sound. However, similar to fish species, the diffuse and chronic nature of this exposure among SRKW, while likely to be adverse, is not expected to significantly alter the intensity or duration from the baseline level of exposure in a manner that alters the abundance of the species. Effects among individuals will be difficult to discern or distinguish from existing conditions.

The sunflower sea star is proposed for listing throughout its range, and no data exists to suggest anything other than a single, panmictic population. Therefore, to reach a determination of jeopardy, a proposed action would have to impact range-wide population dynamics. We are not currently aware of any habitat types or locations used by sunflower sea stars for mating or spawning, larvae are planktonic, and juveniles appear in a variety of habitats. We do not expect any single site-specific action to result in jeopardy, but broad-scale programmatic actions occurring over a substantial portion of the range might result in appreciable reductions in the number, distribution, or reproduction of sea stars.

In summary, given the range-wide status of the species likely to be adversely affected by the proposed action, the environmental baseline in the extensive action area, the effects of the proposed action on species, and cumulative effects in the action area, the FAA's proposed action poses a small, chronic, and additive risk to listed species considered in this opinion, but at a scale and intensity which cannot be distinguished from existing conditions or population trends.

Effects on Critical Habitat Conservation Value

We also consider the effects to critical habitat from the proposed action in the context of the status of critical habitat and baseline conditions. Environmental variation and human development have affected and continue to adversely affect critical habitat, creating limiting factors and threats to the recovery of the ESA-listed species. Many locations within the action area are designated as critical habitat for ESA-listed salmon and steelhead. Physical and biological features designated for these listed fish species include those physical and biological features that support the following site types:

- Pacific salmon – freshwater spawning, freshwater rearing, freshwater migration, estuarine areas, nearshore areas
- PS/GB DPS yelloweye rockfish – nearshore marine and marine spawning, rearing, and forage habitat areas
- PS/GB DPS bocaccio – nearshore marine and marine spawning, rearing, and forage habitat areas

Features of critical habitat for listed fish, as a baseline condition throughout the action area, are degraded by multiple anthropogenic changes, included modified hydrographs, reduced complexity of stream habitat, and diminished water quality. Federal, tribal, state, and local entities are actively carrying out habitat improvement projects, but at the same time, human population growth and development pressures on aquatic systems are increasing throughout many areas in Washington. The long-term consequences of human population growth trends may further reduce habitat values necessary to support fish populations and degrade the quality and function of critical habitat. Environmental variation will have a range of effects on habitat contemporaneous with the design life of Harvey Field Airport, which could exert additional downward pressure on habitat functions.

For marine mammals, the action area includes Puget Sound where SRKW have designated critical habitat. Prey and water quality are features of critical habitat for these species, and each is currently diminished at a baseline condition. For SRKW in particular, contaminated prey and lack of prey are points of significant concern. As described above, in the analytical sections of this document, both water quality and prey are likely to be incrementally but chronically affected by the proposed action at a scale and intensity that is difficult to distinguish from baseline levels.

In this context, for critical habitats of all listed species considered in this document, the effects of the proposed action are likely to cause a very small additional detriment to the physical and biological features related to freshwater, estuarine, nearshore marine, and marine conditions, via substrate and water quality, and prey communities, when contaminated runoff from the FAA's project reach waterways. The discharges will occur episodically, and, with each episode, will briefly reduce water quality and forage components of critical habitats during and after each

discharge throughout the design life of the project. However, the duration and severity of each effect will vary widely based on specific site and precipitation event characteristics, such as the discharge flow in the receiving water, the length of antecedent dry period, and the type and amount of precipitation.

However, the increment of water quality degradation resulting from the proposed action will be impossible to distinguish from baseline water quality conditions and, consequently, is unlikely to diminish the physical and biological features of critical habitats within the action area by any discernible measure. Therefore, the conservation value of critical habitat within the action area is unlikely to be reduced by the proposed action.

Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of, or to destroy or adversely modify designated critical habitat for:

- Puget Sound ESU Chinook salmon
- Puget Sound ESU steelhead
- Puget Sound/Georgia Basin DPS bocaccio
- Puget Sound/Georgia Basin DPS yelloweye rockfish
- Southern Resident DPS killer whale

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows: FAA proposes to fund and permit redevelopment actions at Harvey Field Airport, which include construction that will occur at upland sites that are disconnected and remote from aquatic habitats, and no construction activity will require entry into, or any disturbance of, those habitats. Therefore, those construction actions, themselves, are unlikely to have any effect on ESA-listed

species or critical habitats. However, the proposed action will result in the production of stormwater runoff that will deliver a wide variety of pollutants into aquatic habitats at times when those habitats are occupied by individuals of the five ESA-listed species considered in the biological opinion.

Stormwater runoff resulting from the proposed action is likely to expose ESA-listed species to dissolved and particulate metals (e.g., copper, lead, zinc), PAHs, pesticides, sediment, and other pollutants of concern, resulting in harm to those species from impaired growth, migration, and reproduction. This take cannot be accurately quantified as a number of ESA-listed species individuals because, although the relationship between numerical concentrations of stormwater pollutants are easily demonstrated under laboratory conditions, the pollutants in actual runoff come from many small sources that cannot be distinguished after they reach a given waterbody.

The distribution of stormwater pollutants also varies widely within the receiving waterbodies as a function of surrounding land use, pre-rainfall conditions, rainfall intensity and duration, and mixing from other drainage areas. Stormwater runoff events are often relatively brief, especially in urban streams, so that large inputs of runoff and pollutants can occur and dissipate within a few hours. Moreover, the distribution and abundance of fish that occur within the action area is inconsistent over time, affected by habitat quality, interactions with other species, harvest programs, and other influences that cannot be precisely determined by observation or modelling.

When take cannot be estimated as a number of individuals, we identify a surrogate measure called an extent of take. The extent must be causally related to the take and observable to serve as an effective re-initiation trigger. Because stormwater generated at the project site will impair water quality that each of the ESA-listed species considered in the biological opinion depend upon for survival, growth, fitness, and reproduction, we identify the take surrogate as the implementation of a stormwater facility inspection and maintenance program by the owners/operators of Harvey Field Airport. If such an Operations and Maintenance (O&M) plan already exists, the O&M plan shall be updated to include the stormwater facilities proposed for construction as part of the proposed action. Proper recording of O&M actions will be necessary because those variables will determine whether the proposed stormwater treatment system continues to reduce the concentration of pollutants in stormwater runoff as designed, and, thus, reflect the amount of incidental take analyzed in the opinion. This indicator is appropriate for the proposed action because it has a rational connection to the release of stormwater pollutants that cause take of listed species.

1. All actions, whether implemented by FAA or its non-federal permittee (Harvey Field Airport), shall construct, implement, or otherwise install the stormwater facilities/BMPs detailed in the BA.
2. FAA, or its non-federal permittee (Harvey Field Airport), shall monitor the function of installed stormwater facilities/BMPs to ensure their proper operation and conformation with established O&M procedures for stormwater abatement, treatment, and detention/retention facilities at Harvey Field.

If the stormwater system is not implemented, inspected, and maintained (as described in #1 and #2, above), the extent of take surrogate for stormwater will be exceeded.

The amount or extent of take in this ITS serves two functions. First, it identifies the quantity of incidental take exempted for the action agency and applicant. In the case of a species without 4(d) protective regulations, such as the sunflower sea star, the exemption is not needed because incidental take is not prohibited. Second, it serves as a check on NMFS' jeopardy analysis. The amount or extent of take identifies the anticipated level of take NMFS considered in reaching its conclusion that the proposed action will not jeopardize the continued existence of a listed species. If this level of take is exceeded, reinitiation of consultation is triggered to ensure that NMFS' no-jeopardy conclusion remains valid.

Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

"Reasonable and prudent measures" (RPMs) refer to those actions the Director considers necessary or appropriate to minimize the impact of the incidental take on the species (50 CFR 402.02). The following RPMs are necessary or appropriate to minimize the extent of incidental take of listed species from the proposed action:

1. The FAA will minimize take to species assessed in the biological opinion from exposure to stormwater pollutants associated with new and reconstructed impervious surfaces by ensuring that stormwater runoff produced by impervious surfaces of Harvey Field Airport that are modified through the proposed actions are treated and discharge(s) managed with stormwater facilities/BMPs that are designed, constructed, operated, and maintained using the best available information on low impact development (LID) principals and best management practices for stormwater treatment, flow control, and discharge.
2. The FAA will minimize take by ensuring the completion of a monitoring and reporting program to confirm that the take exemption of the proposed action is not exceeded and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The FAA or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement RPM #1 (stormwater management):

- a. The project developer will be responsible for ensuring installation, function, and maintenance of the proposed stormwater facilities/BMPs during construction, as described in the proposed action detailed in the BA.
 - b. Following construction, Harvey Field's owners/operators, or any successor in interest to the project developer, will assume responsibility for maintenance of all of the system components per the manufacturers recommendations and/or as described in the BA and in the airport's stormwater management plans for Harvey Field.
 - c. Harvey Field's owners/operators will carry out the stormwater operation and maintenance plans as described in the BA including all provisions pertaining to: identification of responsible parties, inspection and maintenance schedule, and inspection and maintenance procedures. Harvey Field will also keep and preserve a log of all maintenance activities.
2. The following terms and conditions implement RPM #2 (monitoring and reporting):
- a. The FAA shall submit the following reports to NMFS:
 - i. A project completion report within 60-days of completing construction¹ for each of the proposed activities, including:
 1. Project name (include the consultation tracking number WCRO-2024-002704)
 2. FAA contact person
 3. Harvey Field contact person
 4. Construction completion date
 - ii. Three (3) annual reports summarizing each stormwater facility/BMP O&M for the three, consecutive, full years following construction¹, including the following information:
 1. Stormwater facility/BMP identifying information:
 - a. Identifying name or number
 - b. Location
 - c. Diagram or schematic of facility/BMP depicting its location relative to adjacent infrastructure
 2. Stormwater facility/BMP monitoring logs with:
 - a. The name of the employee or contractor responsible for all inspections
 - b. The date of each regular inspection, as specified in the airport's O&M plan for stormwater facilities/BMPs

¹ Construction completion is identified as the date on which all stormwater facility/BMP components have been completed such that it can enter into service at its designed functionality. This includes vegetation installation, where applicable.

- c. The date of any additional inspection made in response to triggering events (such as storm events with greater than or equal to 1 inch of rain during a 24-hour period, spills or foreign materials entering a stormwater facility/BMP with the potential to impair its function or effectiveness)
- d. A description of any structural repairs (such as facility cleanout – sediment and oil removal and disposal – vegetation management, erosion control, ponding water, pests, trash or debris removal) to return the facility/BMP to its designed functional condition
- e. An estimate of the percent cover of healthy vegetation in those stormwater facilities/BMPs that rely on vegetated elements to achieve treatment or flow control functions. For those stormwater facilities/BMPs that have less than 80% cover of desirable vegetation, include a description of any corrective action taken to attain the 80% cover requirement.

iii. Each of the above reports must be submitted to:

projectreports.wcr@noaa.gov

Attn: WCRO-2023-02840

Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). No conservation recommendations are included with this biological opinion.

Reinitiation of Consultation

Under 50 CFR 402.16(a): “Reinitiation of consultation is required and shall be requested by the federal agency where discretionary federal involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action.”

NLAA DETERMINATIONS

We reviewed FAA’s consultation request document and related materials. Based on our knowledge, expertise, and your action agency’s materials, we find that the proposed action is not

likely to adversely affect the following NMFS ESA-listed species and/or designated critical habitat:

- Central American DPS Humpback Whales
- Mexico DPS Humpback Whales

Central American and Mexico DPS Humpback Whales

Humpback whales have been seen with increasing frequency in recent decades in Puget Sound. As krill has declined in abundance with warming ocean conditions, humpback whales are pursuing anchovies, herring, sardines, and other small schooling fishes. As humpbacks migrate north in the spring, some enter and delay in Puget Sound before returning to their northern migration, again likely in pursuit of prey. These feeding patterns make it very likely that humpback whales will be exposed to stormwater contaminants generated by the proposed action. Seasonal feeding behavior and high fidelity to feeding areas allow humpback whales to be used as biological indicators of regional contamination (Elfes et al, 2009). Humpback whale biopsies taken from individuals in North Atlantic and North Pacific locations evaluated levels of PCBs, DDTs, Chlordanes, PBDEs, and hexachlorocyclohexanes (HCHs). In the North Pacific, distribution patterns of persistent organic pollutants varied by class with levels of PCBs, DDTs, and PBDEs being greater along the U.S. West Coast and the highest concentrations being detected in southern California and Washington whales (Elfes et al 2009). However, health impacts of these contaminants are not well assessed and are not currently considered a significant conservation threat (Elfes et al 2009).

The contribution of contaminants from the proposed action is expected to peak with storm events, causing potential exposure during and after each discharge of runoff throughout the design life of the project. The duration and severity of each effect will vary with event specific characteristics, such as airfield usage, average traffic volume (determining the amount of pollutant to be carried by stormwater), precipitation volume (determining the concentration of pollutant in the stormwater), and the volume of stream flow in the receiving stream (determining the rate of dilution of the stormwater). The contaminants primarily contributed by similar projects are chronic but remain only incrementally adverse to humpbacks, since they are not known to bioaccumulate.

ESSENTIAL FISH HABITAT RESPONSE

NMFS also reviewed the proposed action for potential effects on EFH designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855(b)). This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. We have concluded that the action would adversely affect EFH designated under the following fisheries management plans:

- Pacific Coast Salmon Fishery Management Plan (PFMC 2024a)
- Coastal Pelagic Species Fishery Management Plan (PFMC 2024b)
- Pacific Coast Groundfish Fishery Management Plan (PFMC 2024c)

EFH conservation recommendations are provided below.

Magnuson-Stevens Fishery Conservation and Management Act

Section 305(b) of the MSA directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”, and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects may result from actions occurring within EFH or outside of it and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (50 CFR 600.905(b)).

EFH Affected by the Proposed Action

The proposed project occurs within EFH for various federally managed fish species within the Pacific Coast Salmon (PFMC 2024a), coastal pelagic species (PFMC 2024b), and Pacific Coast groundfish (PFMC 2024c) fishery management plans.

We evaluated the effects of the proposed actions on EFH, as regulated by the Magnuson-Stevens Fisheries Conservation and Management Act. We incorporate by reference the analyses and findings of effects submitted in the BA (Anchor QEA 2024). Fisheries management plans included in our analyses, but absent from the BA, include plans for Coastal Pelagic Species EFH and Pacific Coast Groundfish EFH. In conjunction with our own analyses, we make the following determinations for EFH within the proposed project's action area.

Table 2. Project-related Effects to Essential Fish Habitat

Essential Fish Habitat	Determination of Effect to EFH	Pathway for Potential Effects
Pacific Salmonids PFMC 2024a	LAA	Water quality degradation from stormwater runoff
Coastal Pelagic Species PFMC 2024b	LAA	Water quality degradation from stormwater runoff
Pacific Coast Groundfish PFMC 2024c	LAA	Water quality degradation from stormwater runoff

Adverse Effects on EFH

NMFS determined the proposed action would adversely affect EFH as follows:

Coastal Pelagic Species

The discharge of point and nonpoint source wastewater into open ocean, bay, or estuarine waters can introduce pollutants detrimental to estuarine and marine habitats. These pollutants include

pathogens, nutrients, sediments, heavy metals, oxygen demanding substances, hydrocarbons and other toxics. Stormwater runoff, such as that resulting from the proposed action, continues to be a significant remaining source of pollution to the coastal areas and ocean. Stormwater runoff resulting from the proposed action may contribute to changes in coastal pelagic species community structure and function, health, and abundance. Many of these changes can be long-lasting.

Pacific Coast Groundfish

The effects of stormwater runoff from the proposed action on Pacific Coast Groundfish EFH may include: 1) altered hydrology and geomorphology; and 2) release of contaminants.

Pacific Salmon

Activities associated with urbanization, including components of the proposed action (e.g., vegetation removal, road building, storm water discharge), can significantly alter the land surface, soil, vegetation, and hydrology and adversely impact salmon EFH through habitat loss or modification. These alterations can destroy salmon habitat directly or indirectly by interrupting sediment supply that creates spawning and rearing habitat for prey species (e.g., sand lance, surf smelt, herring), by increasing turbidity levels and diminishing light penetration to eelgrass and other vegetation, by altering hydrology and flow characteristics, by raising water temperature, and by resuspending pollutants (Phillips 1984).

Construction activities, such as those included under the proposed action, can also have detrimental effects on salmon habitat through the run-off of large quantities of sediment, as well as nutrients, heavy metals, and pesticides. Because of the intermittent nature of rainfall and runoff, the large variety of pollutant source types, and the variable nature of source loadings, urban runoff is difficult to control (Safavi 1996). The National Water Quality Inventory (EPA 2002) reports that runoff from urban areas is the leading source of impairment to surveyed estuaries and the third largest source of impairment to surveyed lakes. Oxygen deficits associated with high biological oxygen demand during and after storms are common (Faulkner et al. 2000; Ometo et al. 2000). Run-off of petroleum products and oils from roads and parking lots and sediment, nutrients, and chemicals from yards as well as discharges from municipal sewage treatment plants and industrial facilities are also associated with urbanization (EPA 1993). Urbanized areas also alter the rate and intensity of stormwater run-off into streams and waterways. Inorganic and organic contaminants in urban runoff can cause acute, chronic and sub-lethal effects in aquatic species.

EFH Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the adverse effects of the proposed action on EFH:

- The FAA should implement RPM 1 to minimize the delivery of stormwater pollutants to streams containing EFH for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species. Implementation of RPM 1, including the required Terms and Conditions, will serve as EFH conservation measures.

Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the FAA must provide a detailed response in writing to NMFS within 30 days after receiving an EFH conservation recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH conservation recommendations, unless NMFS and the federal agency have agreed to use alternative time frames for the federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations, the federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

Supplemental Consultation

The FAA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600. 920(l)).

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The biological opinion will be available through NOAA Institutional Repository [<https://repository.library.noaa.gov/>]. A complete record of this consultation is on file at Oregon Washington Coastal Office in Portland, Oregon.

Please direct questions regarding this letter to Brad Rawls, ESA Consultation Biologist in the Oregon Washington Coastal Office, at 503-230-5414 or brad.rawls@noaa.gov.

Sincerely,



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Assistant Regional Administrator
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cc:

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Subject: [External] FAA Harvey Field Runway Improvement Project #WCRO-2023-02840 - revised BA

External Sender: Please use Hello,
caution with links and attachments.

FAA is submitting a revised Biological Assessment for this ongoing consultation (Reference #: WCRO-2023-02840). This submission is for formal consultation and supersedes our previous submission for informal consultation. We will be sending emails in the future to request status updates on our consultation and whether it has been assigned or reviewed for completeness.

Sincerely,

Ilon

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August 2024
Harvey Field Runway Improvement Project



Biological Assessment

Prepared for Harvey Field

August 2024
Harvey Field Runway Improvement Project

Biological Assessment

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Executive Summary

The Harvey Field Airport (Airport) is proposing the Harvey Field Runway Improvement Project (Project), which will safely and efficiently accommodate current and projected aviation activity at the Airport by meeting current Federal Aviation Administration design standards as identified in the 2018 Airport Master Plan.

This Biological Assessment (BA) evaluates the potential effects to species under the jurisdiction of the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) that are listed or proposed for listing under the Endangered Species Act (ESA) of 1973. It also includes the potential effects on Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (now called the Magnuson-Stevens Act).

Seven ESA-listed species under the jurisdiction of NMFS may be present with the Action Area. This includes Chinook salmon, steelhead, killer whale, bocaccio, yelloweye rockfish, bull trout, and marbled murrelet. Two additional ESA-listed species under USFWS jurisdiction occur in Washington and are considered by USFWS to potentially occur in the Action Area; however, they are not addressed in this BA as they are extremely unlikely to occur within the Action Area.

Although the Project does not include any in-water work, effects to ESA-listed species will primarily occur from stormwater runoff from new impervious surfaces. Stormwater from all new impervious surfaces will be treated; however, stormwater treatment is not 100% effective at removing all pollutants. Chinook salmon, steelhead, and bull trout are known to occur in the Snohomish River, but runoff would have to travel approximately 12 miles before it would reach habitat for marine species such as killer whale, bocaccio, and yelloweye rockfish. Other potential impacts to ESA-listed species could occur from noise or habitat modifications. Because there would be potential impacts to ESA-listed species, the Project's effect determination is **likely to adversely affect** Chinook salmon, steelhead, and bull trout. The Project would have **no effect** on killer whale, bocaccio, yelloweye rockfish, or marbled murrelet.

The minor effects from stormwater runoff and the removal of approximately five trees within the riparian zone are not expected to lead to long-term adverse impacts on EFH for salmon; therefore, the Project **would not adversely affect** Pacific salmon EFH.

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APPENDIX

Appendix A Water Resources Analysis

ABBREVIATIONS

Airport	Harvey Field Airport
BA	Biological Assessment
BMP	best management practice
CFR	Code of Federal Regulations
cfs	cubic foot per second
dBA	A-weighted decibel
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
FAHP	Federal-Aid Highway Program
FCD	Flood Control District
Fed. Reg.	<i>Federal Register</i>
HUC	Hydrologic Unit Code
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
PBF	physical and biological features
PEM	palustrine emergent
PFO	palustrine forested
PGIS	pollution-generating impervious surface
Project	Harvey Field Runway Improvement Project
SCDM	<i>Snohomish County Drainage Manual</i>
SLOPES	Standard Local Operating Procedures for Endangered Species
SWMMWW	<i>Stormwater Management Manual for Western Washington</i>
USFWS	U.S. Fish and Wildlife Service

1 Introduction

1.1 Project Overview

This Biological Assessment (BA) has been prepared for the Harvey Field Runway Improvement Project (Project). The Project proposes to safely and efficiently accommodate current and projected aviation activity at Harvey Field Airport (Airport) in Snohomish, Washington, by meeting current Federal Aviation Administration (FAA) design standards (Figure 1).

This BA evaluates the potential effects on listed and proposed species under the Endangered Species Act (ESA) of 1973 and the potential effects on Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (now called the Magnuson-Stevens Act). The preliminary effects determinations described in Section 7 were made for the listed species that may occur in the Action Area.

In this document, the term *Action Area* has a specific meaning as defined in Section 3. The Project's Action Area is different from the *Project Area*, which generally encompasses the limits of construction as shown in Figure 2. The Action Area is shown in Figure 3.

1.2 Endangered Species Act-Listed Species and Critical Habitats that May Occur in the Action Area

Listed species and designated critical habitat that may occur in the Action Area and the associated effect determinations are summarized in Table 1 (USFWS 2023a; NMFS 2023a). The Project effects that may occur during construction or operation include noise, water quality, and habitat modifications. Conservation measures and best management practices (BMPs) would be employed to avoid and minimize these effects. A detailed discussion of Project-related effects is provided in Section 6.

Table 1
Endangered Species Act-Listed Species and Critical Habitats that May Occur in the Action Area

Species and Scientific Name	Listing Status	Agency	Critical Habitat
Chinook salmon, Puget Sound ESU <i>Oncorhynchus tshawytscha</i>	Threatened	NMFS	Designated; includes Action Area
Steelhead, Puget Sound DPS <i>Oncorhynchus mykiss</i>	Threatened	NMFS	Designated; includes Action Area
Killer whale, Southern Resident DPS (<i>Orcinus orca</i>)	Endangered	NMFS	Designated; includes Action Area
Bocaccio, Puget Sound/Georgia Basin DPS (<i>Sebastes paucispinus</i>)	Endangered	NMFS	Designated; does not include Action Area

Species and Scientific Name	Listing Status	Agency	Critical Habitat
Yelloweye rockfish, Puget Sound/Georgia Basin DPS (<i>Sebastes ruberrimus</i>)	Threatened	NMFS	Designated; does not include Action Area
Bull trout, Coastal-Puget Sound DPS (<i>Salvelinus confluentus</i>)	Threatened	USFWS	Designated; includes Action Area
Marbled murrelet (<i>Brachyrhampus marmoratus</i>)	Threatened	USFWS	Designated; does not include Action Area

Notes:

ESU is Evolutionarily Significant Unit which is a population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species.

DPS is Distinct Population Segment and is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.

The effect of the Project on these species and critical habitats was determined by documenting environmental baseline conditions and evaluating effects of the Project on the species and environmental baseline. Species, habitat information, and effects of the Project are described in Sections 4 through 6.

Two additional ESA-listed species under the U.S. Fish and Wildlife Service (USFWS) jurisdiction occur in Washington and are considered by USFWS to potentially occur in the Action Area; however, they are not addressed in this BA as they are extremely unlikely to occur within the Action Area. These two species with the rationale for eliminating them from this analysis are listed as follows:

- North American wolverine (*Gulo gulo luscus*)—Threatened
 - Rationale: does not occur in the Action Area and suitable habitat does not exist in the Action Area. The North American wolverine typically lives in boreal forest, taiga, and tundra ecosystems. In Washington, they occupy alpine and subalpine forest habitats, especially within North Cascades National Park and the wilderness areas of Okanogan-Wenatchee National Forest (WDFW 2023a). Wolverines require a snowy habitat for their young, and a large range to roam.
- Yellow-billed cuckoo (*Coccyzus americanus*), Western Distinct Population Segment (DPS)—Threatened
 - Rationale: does not occur in Action Area and is a very rare migrant in Washington State (WDFW 2023b); Action Area is also outside of proposed critical habitat (USFWS 2023b), and suitable habitat does not exist in the Action Area. Yellow-billed cuckoos are migratory birds that breed in North America and winter in Central and South America. They nest within and use willow and cottonwood riparian forests with a dense closed canopy (Csuti et al. 2001).

1.3 Essential Fish Habitat Assessment

This BA also provides an Effects Analysis and Determination for EFH pursuant to the Magnuson-Stevens Act, the 1996 Sustainable Fisheries Act, and the North Pacific Fisheries Management Council. Under this legislation, an evaluation for impacts to EFH is necessary for activities that may adversely affect EFH. EFH is defined by the Magnuson-Stevens Act in Code of Federal Regulations (CFR) Title 50, Section 600.905-930 as “Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Within the Action Area, EFH is designated for Pacific salmon species. It is concluded that the Project would not adversely affect EFH. The EFH assessment is included in Section 8.

1.4 Consultation History

On August 15, 2023, staff from FAA, Harvey Field, RS&H, and Anchor QEA met with David Price of NMFS to discuss the ESA consultation process. RS&H provided a brief overview of the purpose and need for the Project and the main Project components. Based on his preliminary understanding of the Project, David Price thought that a Letter of Concurrence under informal consultation was likely the appropriate ESA consultation pathway. He also provided comments on items to include in the BA and shared review timeframes. USFWS did not have capacity to attend a preliminary meeting to discuss the Project. The BA was submitted to USFWS and NMFS in November 2023.

On January 26, 2024, staff from FAA, Harvey Field, RS&H, and Anchor QEA met with Don Hubner of NMFS to continue discussion of the ESA consultation process based on the BA that was submitted. Anchor QEA provided background information on the ESA consultation and RS&H provided information on the proposed stormwater treatment approach. NMFS shared that the only way to achieve a not likely to adversely affect determination is if all stormwater is treated and infiltrated into the ground and there is no surface water connection to the Snohomish River or other occupied habitat. NMFS recommended that FAA submit a request for formal consultation.

On February 15, 2024, FAA sent a letter to NMFS requesting that the Project continue with informal consultation as FAA was not aware of any published scientific or policy papers or the announcement of regulatory guidance regarding impacts from stormwater on fish. FAA received a response letter from NMFS on May 14, 2024, stating that formal consultation would be required for the Project.

On February 21, 2024, Ryan McReynolds from USFWS provided an email response regarding key items they are interested in, primarily stormwater.

2 Proposed Project

2.1 Project Description

2.1.1 *Project Overview*

The Project proposes to construct a new 2,400-foot runway west of the existing asphalt Runway 15L-33R. The turf runway, 15L-33R, would be decommissioned, and the partial parallel taxiway would be reused and extended to be a full paved parallel taxiway that meets FAA standards. Key elements of the Project include the following:

- Construction of a new 2,400-foot asphalt Runway 15-33
- Removal of the existing asphalt Runway 15L-33R that is 2,672 feet long by 36 feet wide.
- Construction of a new 2,400-foot parallel taxiway with three runway connections while reusing much of the existing partial parallel taxiway pavement
- Removal of about 300 linear feet of taxiway pavement
- Relocation of Airport Way to the south. The relocated portion of Airport Way is 3,700 linear feet.
- Removal of approximately 600 linear feet of existing Airport Way
- Installation of new runway/taxiway lighting
- Removal of 21 trees from the approach and departure surfaces at both runway ends
- Installation of a retaining wall with water passage infrastructure at the south end of Runway 33 to minimize fill quantities required by Project earthwork construction

During construction, access to the Project Area would be via the existing Airport Service Road, accessed from the public parking lot at the main entrance to the Airport. The construction staging area for the Project's airfield components would be located on an existing vehicle parking lot at the end of Airport Service Road. The construction staging area for the relocation of Airport Way would be in the field south of the existing Airport Way with the exact location to be determined at the time of construction.

2.1.2 *Stormwater Management*

The Project's airfield components and Airport Way relocation would add approximately 9.5 acres of new impervious surfaces, and would remove approximately 3.8 acres of impervious surface, resulting in a net addition of approximately 5.7 acres of new impervious surface at the Airport. Project earthwork construction would require approximately 9.3 acres of fill, including 3.3 acres for airfield improvements and 6 acres for relocation of Airport Way. Fill will occur in wetlands, wetland buffers, and in the 100-year floodplain. Earthwork fill material is expected to be sourced on site. If necessary, fill material meeting FAA specifications would be imported from off site.

There are three water quality facilities located within or immediately adjacent to the Project Area: one bioswale and two sets of infiltration trenches. A bioswale is a vegetated channel designed to convey surface stormwater runoff while removing pollutants, whereas an infiltration trench receives runoff from adjacent upstream surfaces and allows water to infiltrate into the ground prior to leaving the site.

The Project would include water quality treatment for all new impervious surfaces, which would include expanding existing stormwater BMPs or installing new stormwater BMPs that can accommodate the calculated treatment volumes and account for the treatment volume already provided by existing BMPs that are not demolished. Existing stormwater BMP water quality volumes are provided in Table 2 and water treatment volumes for the Project are provided in Table 3. Existing stormwater BMPs can treat 0.34 acre-foot of stormwater. With the Project, 0.05 acre-foot of existing water quality volume would be demolished and the Project would require 0.30 acre-foot of additional water quality treatment.

The Project volumes can be mostly accommodated with existing BMPs, but a small expansion or new facility would be needed. The expanded or new facility would be one of the following:

- Biofiltration swale
- Pretreatment settling basins
- Bioretention

These BMPs will be designed to limit standing water and to not interfere with known groundwater elevations. Additionally, the soils at the site of selected BMPs should utilize soils with high infiltration rates. The soils beneath the majority of the Project Area are listed by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as Hydrologic Soil Group C, which is indicative of low infiltration potential. If the existing BMPs cannot be expanded to accommodate the slight increase in runoff, a detention facility would most likely be installed.

Specific BMPs to be installed will be determined during final design of the Project. Design, construction, and operation of existing and proposed stormwater BMPs would be conducted in accordance with procedures and standards established in *Snohomish County Drainage Manual* (SCDM; Snohomish County 2021). Additional information is available in the Water Resources Analysis (Appendix A).

Table 2
Existing Stormwater Best Management Practice Water Quality Volumes

Existing Stormwater Facility	Contributing Area (square feet)	Available Treatment Volume (cubic feet)	Available Treatment Volume (acre-feet)
Facility 1 – Bioswale	927,808	8,273	0.19

Existing Stormwater Facility	Contributing Area (square feet)	Available Treatment Volume (cubic feet)	Available Treatment Volume (acre-feet)
Facility 2 – Runway Infiltration Trench ¹	373,600	2,273	0.05
Facility 3 – Hangar Infiltration Trenches	134,549	4,171	0.10
Total for all facilities	1,435,957	14,717	0.34

Note:

1. Facility 2 will be demolished as part of Project construction. This is also noted in Table 3.

Table 3
Additional Water Quality Treatment Requirements for Project

Basin	Disturbed Area (acres)	Water Quality Volume (cubic feet)	Water Quality Volume (acre-feet)	Demolished Existing Water Quality Volume (acre-feet)	Total Required Water Quality Volume (acre-feet)
North	26.49	8,269	0.19	0.05	0.24
South	7.86	2,768	0.06	-	0.06
Total	34.35	11,037	0.25	0.05	0.30

2.2 Project Timing

Project construction would begin in 2026, occurring over 2 construction years, primarily during the drier summer months. The new Runway 15-33 would open for use in fall 2028. Project construction would be phased so that the Airport remains operational at all times.

2.3 Best Management Practices

All applicable permits for the Project would be obtained prior to construction. A preliminary list of permits to be obtained is included in Table 4. All work would be performed according to the requirements and conditions of these permits, including working during daylight hours to the extent practicable. The following conservation measures and BMPs would be used during construction of the Project:

- The contractor would be responsible for the preparation and implementation of a Stormwater Pollution Prevention Plan to be used for the duration of the Project. The plan would contain measures for erosion and spill prevention.
- Excess or waste materials would not be disposed of or abandoned waterward of the ordinary high-water mark or allowed to enter waters of the state.
- No petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials would be allowed to enter surface waters.

- Demolition and construction materials would not be stored where upland runoff can cause materials to enter surface waters.
- All staging areas would be located outside of rivers, wetlands, and their buffers.
- Construction stormwater BMPs that could be implemented include, but are not limited to, interceptor dikes and swales, vegetated strips, wattles, sediment traps, and construction stormwater filtration, as well as avoidance of water bodies during construction.
- Source control BMPs in accordance with the SCDM will be applied during construction if any pollution-generating activities are performed on the site during construction.
- Source control BMPs in accordance the SCDM will be selected, designed, and constructed if any pollution-generating activities or uses are proposed for the developed site following construction.

Table 4
Preliminary List of Anticipated Permit, Approvals, Determinations, Certification, and Consultations

Permit/Approval	Agency
Clean Water Act (CWA) Section 404 Permit	U.S. Army Corps of Engineers
ESA Section 7 Consultation	NMFS and USFWS
Magnuson-Stevens Fishery Conservation and Management Act EFH Consultation	NMFS
National Historic Preservation Act Section 106 Consultation	Department of Archaeology and Historic Preservation
CWA Section 401 Water Quality Certification	Ecology
CWA Section 402 National Pollutant Discharge Elimination System Construction Stormwater General Permit	Ecology
Hydraulic Project Approval	Washington Department of Fish and Wildlife
Shoreline Variance and Shoreline Conditional Use Permit	Snohomish County, with Ecology approval
Flood Hazard Permit	Snohomish County
Grading/Land Disturbing Activities Permit	Snohomish County
Shoreline Substantial Development Permit	Snohomish County
Right of Way Permit	Snohomish County
Traffic Worksheet/Traffic Study	Snohomish County

3 Action Area

The Action Area is defined as the area to be affected directly or indirectly by the federal action (50 CFR Section 402.02). This area is the geographic extent of the physical, chemical, and biological effects resulting from the Project. The Action Area boundary is thus set as the limits of the Project effects, as discussed below. The Action Area includes two general areas of effect: terrestrial and aquatic.

3.1 Terrestrial Zone of Effect

Noise from construction equipment is expected to be the impact with the most far-reaching terrestrial environmental effects. The loudest piece of equipment anticipated to be used is a hoe ram, which is expected to generate in-air noise levels of 97 A-weighted decibels (dBA).

The Project setting is within a rural residential area and located adjacent to SR 9, a major arterial highway. Based on traffic volumes and speeds on SR 9 as well as the rural residential setting, 70 dBA was used as the ambient noise level for the Action Area.

Noise attenuates to ambient, or background, levels as the distance from the source of the noise increases. In areas of soft ground cover, such as the surrounding grassy areas and fields, the standard reduction for point-source noise is 7.5 dBA for each doubling distance from the source. Using a 7.5 dBA reduction for each doubling of distance (WSDOT 2023), conditions were calculated for the distances at which in-air noise is expected to attenuate to ambient conditions using a spreading loss model.

Sound levels from the loudest anticipated construction activity would attenuate to background levels within 601 feet from the Project Area. Therefore, 601 feet (0.11 mile) from the Action Area footprint is used as the outer extent of the terrestrial zone of impact (Figure 3). Variable site topography could cause the noise to attenuate to background levels sooner than 601 feet.

3.2 Aquatic Zone of Effect

The Project does not include any in-water work. The aquatic effects of the Project would be limited to stormwater runoff from construction areas and when completed, the additional pollution-generating impervious surface (PGIS). Due to the addition of new PGIS, which will contribute additional runoff and potential pollutants into the river system, the overall aquatic zone of effect includes the Snohomish River until it meets Puget Sound. Any potential contaminants generated by stormwater would have the potential to reach marine waters. Stormwater discharge locations from the Project Area to the Snohomish River are located at Batt Slough and from a drainage ditch managed by the Marshland Flood Control District (FCD) as shown in Figure 3.

4 Environmental Baseline

4.1 Topography

In general, the topography of the Project Area is relatively flat and low in elevation. Current site elevations range between 8 and 25 feet above sea level (Snohomish County 2023) and are located within a density fringe area of the 100-year floodplain. The portion of the Project Area north of Airport Way is flat around the Airport and runways, but gently slopes down to the west to a ditch that drains towards SR 9. The portion of the Project Area south of Airport Way contains low areas in association with a historical oxbow of the Snohomish River and a slightly higher centrally located area.

4.2 Soils

The NRCS Web Soil Survey (NRCS 2023a) identifies the following soil series in the vicinity of the Project Area:

- Puget silty clay loam: This soil is very deep, artificially drained, and formed in alluvium in depressions on floodplains. Puget silty clay loam is listed as hydric (NRCS 2023b). Permeability is slow and it has a high water table. Typically, the surface layer to 10 inches is dark grayish brown silty clay loam and the subsurface layer to 60 inches is olive gray and gray silty clay loam.
- Puyallup fine sandy loam: This soil is very deep, well drained with high saturated hydraulic conductivity, and formed in mixed recent alluvium on floodplains and low stream terraces. Puyallup fine sandy loam is not listed as hydric (NRCS 2023b). Permeability is fast and it has a low water table. Typically, the surface layer to 10 inches is dark brown fine sandy loam and the subsurface layer to 60 inches is very dark grayish brown gravelly sand.
- Sultan silt loam: This soil is very deep, moderately well drained, and formed in recent alluvium on floodplains. Sultan silt loam is not listed as hydric (NRCS 2023b). Permeability is moderately slow and has a moderately high water table. Typically, the surface layer to 10 inches is very dark grayish brown silt loam and the subsurface layer to 60 inches is olive gray very fine sandy loam stratified with light gray medium sand.

4.3 Hydrology and Water Quality

The Project Area is located within Water Resources Inventory Area 7: Snohomish, in the Snohomish subbasin (Hydrologic Unit Code [HUC] 17110011); the Quilceda Creek – Frontal Possession Sound watershed (HUC 1711001102), and the Snohomish River - Frontal Possession Sound subwatershed (HUC 171100110203) (Ecology 2023). Hydrologic characteristics in the Project Area are influenced primarily by local precipitation, surface water runoff, and a high groundwater table. The Snohomish River in the vicinity of the Project is on the Washington State Department of Ecology (Ecology) 303(d) list for temperature (Ecology 2023). Additional aquatic habitat baseline conditions are included in Table 5.

Table 5
Snohomish River Aquatic Baseline Condition Summary

Pathway	Indicator	Baseline Conditions
Water Quality	Temperature	Not Properly Functioning 303(d)-listed water quality limited for temperature.
	Sediment	Properly Functioning Not listed on the 303(d) list for sediments.
	Chemical Contamination and Nutrients	Properly Functioning Not listed on the 303(d) list for any chemicals.
Channel Conditions and Dynamics	Width/Depth Ratio	N/A No specific information found.
	Streambank Condition	At Risk Eroding streambanks present.
	Floodplain Connectivity	Not Properly Functioning Historic practices have reduced floodplain wetlands and side channels.
Flow/Hydrology	Change in Peak/Base Flows	Not Properly Functioning Peak flows are expected increase in the future with climate change.
	Increase in Drainage Network	Not Properly Functioning Significant increases in drainage network due to roads.

The Project Area contains two stormwater basins designated as the North Basin and South Basin. The North Basin contains the existing airfield and associated airfield development. Stormwater runoff from the North Basin generally sheet flows off airfield pavements into vegetated infields and ditches where it is then collected in storm sewer and discharged off site to the west via a culvert under SR 9 (Woodinville Snohomish Road). Stormwater runoff from the North Basin then flows through a series of grass-lined drainage ditches and eventually discharges into the Snohomish River at a pump station several miles downstream of the Airport. A portion of the stormwater runoff generated from the northern portion of Airport Property is conveyed to water quality stormwater BMPs, which provide water quality treatment of stormwater runoff for frequent, low flow runoff-producing precipitation events. BMPs located within or immediately adjacent to the Study Area include one bioswale and two sets of infiltration trenches.

The South Basin contains some residential buildings and the low-lying area to the south of the airfield and Airport Way. Stormwater runoff from the South Basin generally sheet flows off paved roads and into Hanson Slough, which is a low-lying wetland area. It then flows off site through an 18-inch culvert into Batt Slough to the south. Runoff eventually discharges to the Snohomish River to

the east. There are currently no existing water quality BMPs in the southern portion of Airport Property.

The off-site drainage ditches and pump station downstream from the Project Area are owned by the Marshland FCD. The Marshland FCD has the authority to engage in flood control activities necessary to prevent inundation or flooding from water bodies and take actions necessary to protect life and property from inundation or flow of flood waters, stormwaters, or surface waters.

4.4 Wetlands

On June 12, 13, 14, and 15, 2023, Anchor QEA biologists performed a field investigation to verify the presence or absence of wetlands within the Project Area and delineate and rate any existing wetlands. Three wetlands were identified and delineated and rated for functions and values: Wetland A, Wetland B, and Wetland D (Table 6). All three wetlands are depressional, palustrine emergent wetlands. One wetland, Wetland C, was located off site to the northwest and identified as a depressional, palustrine forested wetland. Wetland C was not delineated or rated because Anchor QEA biologists did not have access to the property. Full details on wetlands located within the Project Area are included in the Wetlands Report (Anchor QEA 2023). An off-site, approximately 1,100-foot-long culvert located to the east of the Project Area connects the ditch associated with Wetland A to Batt Slough, which drains through culverts and open channel segments to the Snohomish River. Another ditch that runs underneath Highway 9 and then to the north connects Wetland B to the main channel of the Snohomish River. Off-site Wetland C and Wetland D are not directly connected to other surface waters.

Table 6
Wetlands Delineated Within the Project Area

Wetland	Cowardin Class ¹	HGM Class	Category	Total Wetland Area	
				Square Feet	Acres
On-Site Wetlands					
A	PEM	Depressional	III	515,142	11.83
B	PEM	Depressional	III	66,189	1.52
D	PEM	Depressional	III	11,593	0.27
Off-Site Wetland					
C	PFO	Depressional	N/A ²	208,650 ³	4.79 ³

Notes:

1. PEM: palustrine emergent; PFO: palustrine forested
2. N/A; Not Applicable. Wetland C was not rated, but conservatively provided the maximum protective buffer.
3. Wetland C area is approximate.

4.5 Streams

The Snohomish River flows along the east and north boundaries of the Project Area and is approximately 1,100 feet from the historical oxbow in the southern portion of the Project Area. The river flows from the northward east of the Project Area, and turns and flows westward north of the Project Area. The Project Area has been drained via a ditch system on both sides of Airport Way; the ditch in the northern portion flows west under SR 9 and the ditch in the southern portion flows through Wetland A, along the western and southern boundaries of Wetland A and east through a

culvert under the disused BNSF rail line. The ditches have no defined bed or banks and are unlikely to be regulated under state or federal jurisdiction.

The ditches do not appear to provide potential fish habitat, because they lack defined bed and banks and provide water quality too poor to support salmonids. Furthermore, fish passage to the ditch associated with Wetland A is blocked due to a fish screen located beneath the railroad tracks at the opening of the 1,100-foot-long culvert to Batt Slough (The Watershed Company 2015). The WDFW Fish Passage & Diversion Inventory Database maps two blockages to fish passage to the ditch associated with Wetland B (WDFW 2023c). One blockage is a non-culvert crossing beneath State Route 9 (Site ID 934980) and the other is a buried culvert (Site ID 934981). On-site observations of potential wetland fish habitat are supported by Washington State mapping efforts (WDFW 2023d; WDNR 2023).

4.6 Plant Communities

Vegetation within the Project Area is characteristic of upland and wetland emergent habitats, maintained gravel roadway corridors, and grassy areas dominated by field and meadow grasses. Dominant herbaceous species include colonial bentgrass (*Agrostis capillaris*), velvet grass (*Holcus lanatus*), common cat's ear (*Hypochaeris radicata*), reed canary grass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), creeping buttercup (*Ranunculus repens*), Himalayan blackberry (*Rubus armeniacus*), common dandelion (*Taraxacum officinale*), and white clover (*Trifolium repens*). Few trees are located within the Project Area, but a forested area is located off site to the northwest of the Project Area and is dominated by red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), and understory species such as Pacific willow (*Salix lasiandra*) and Himalayan blackberry.

5 Status of the Species

ESA-listed species that could occur in the Action Area include Chinook salmon, steelhead trout, bull trout, and marbled murrelet (see Table 1). ESA-designated critical habitat also occurs within the Action Area for Chinook salmon, steelhead, and bull trout. The following sections briefly summarize relevant life-history information for the protected species and their use of the Action Area.

5.1 Chinook Salmon, Puget Sound Evolutionarily Significant Unit

The Puget Sound Chinook Salmon Evolutionary Significant Unit (ESU) was listed as threatened on March 24, 1999, affirmed on June 28, 2005, and updated on April 14, 2014 (79 *Federal Register* [Fed. Reg.] 20802). Critical habitat was designated on September 2, 2005 (70 Fed. Reg. 52698) and includes the Snohomish River within the Action Area.

Puget Sound Chinook salmon are anadromous salmonids that return to freshwater rivers to spawn. Fry typically spend their first year rearing in estuarine habitats, though may remain to rear in the river for up to a year before emigrating to marine and estuarine habitats (NMFS 2023b).

Notable decline has been observed in Puget Sound Chinook salmon populations since their listing in 1999. The most recent 5-year status review showed continued population decline across all Puget Sound Chinook salmon populations (NMFS 2017a). Key factors of decline include estuarine and side-channel habitat loss due to conversion of floodplain to farmland (NMFS 2017a). Instream habitat availability is also threatened by insufficient stream flows, primarily driven by water withdrawals for irrigation purposes (NMFS 2017a). Additionally, contaminated runoff from development in surrounding regions and lack of natural riparian vegetation contributes to water quality impairment (NMFS 2017a).

5.1.1 Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of Puget Sound Chinook salmon and includes six physical and biological features (PBFs) necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. In the Action Area, only freshwater habitats are present; thus, three features necessary for conservation of the species could be affected by the Project as shown in Table 7.

Table 7**Chinook Salmon Critical Habitat Physical and Biological Features Within the Snohomish River**

PBFs	Status
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	PBF present Chinook salmon are documented as spawning in the Snohomish River near the Project Area (WDFW 2023d)
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	PBF present Freshwater rearing sites are limited due to disconnected floodplains, lack of riparian zone, and degraded instream habitat.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	PBF present Chinook salmon are known to use the Snohomish River to migrate between spawning areas in the Skykomish and Snoqualmie rivers and Puget Sound. Instream and riparian habitats are degraded.

5.1.2 Utilization of the Action Area

Naturally spawning Chinook salmon in the Snohomish River basin are divided into two populations: Skykomish Chinook and Snoqualmie Chinook. The Skykomish population includes all Chinook salmon that spawn in the Skykomish River and its tributaries and in the Snohomish River and its tributaries. The Snoqualmie population includes all Chinook salmon that spawn in the Snoqualmie River and its tributaries (Snohomish Basin Salmon Recovery Forum 2005). Chinook salmon are known to utilize the Snohomish River, including fall-run and summer-run populations. Fall-run Chinook salmon typically return to freshwater rivers from late July through December while summer-run Chinook salmon typically return from June to August (NMFS 2023b). Both adults and juveniles migrate within the Action Area and spawning also occurs in the Action Area (WDFW 2023d). Within the Snohomish River basin, the Chinook salmon population has fluctuated: after peaking at around 10,000 in 2004, escapements have fallen to pre-ESA listing levels of around 4,000 (Snohomish Basin Salmon Recovery Forum 2019). Escapement levels for 2020 were 2,722 for Skykomish Chinook and 1,211 for Snoqualmie Chinook (WDFW 2023e). Escapement is the total number of adult fish returning to a hatchery or stream to spawn (WDFW 2023f).

5.2 Steelhead, Puget Sound Distinct Population Segment

Puget Sound steelhead were listed as threatened on May 11, 2007 (72 Fed. Reg. 26722), and updated on April 14, 2014 (79 Fed. Reg. 20802). Critical habitat was finalized on February 24, 2016 (81 Fed. Reg. 9252).

Steelhead are anadromous salmonids that, unlike most other Pacific salmon, are iteroparous (i.e., they can spawn several times), with spawning starting in their fourth or fifth year and continuing until reaching a maximum age of approximately 11 years (NMFS 2023b). Puget Sound steelhead smolts tend to migrate to the ocean to mature after spending 2 years in freshwater (NMFS 2011).

The recent 5-year status review showed continued decline of steelhead populations (NMFS 2017a). The potential for extinction of steelhead in Central Puget Sound is moderate.

5.2.1 Critical Habitat

The designation of critical habitat is based on the life history and habitat needs of Puget Sound steelhead trout and includes six physical or biological features necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. In the Action Area, only freshwater habitats are present; thus, three features necessary for conservation of the species could be affected by the Proposed Action as shown in Table 8.

Table 8
Steelhead Critical Habitat Physical and Biological Features Within the Snohomish River

PBFs	Status
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	PBF not present The Statewide Washington Integrated Fish Distribution Map does not identify spawning as occurring in the vicinity of the Project Area (WDFW 2023d); however, it is possible that a small amount of spawning could occur.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	PBF present Steelhead are documented as rearing in the Snohomish River near the Project Area (WDFW 2023d). Freshwater rearing sites are limited due to disconnected floodplains, lack of riparian zone and degraded instream habitat.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	PBF present Steelhead are known to use the Snohomish River to migrate between spawning areas in the Skykomish and Snoqualmie rivers and Puget Sound. Instream and riparian habitats are degraded.

5.2.2 Utilization of the Action Area

Steelhead are known to utilize the Snohomish River, including summer-run and winter-run populations. Summer-run steelhead typically return to freshwater rivers from May to October while winter-run steelhead typically return from November to May (Snohomish Basin Salmon Recovery Forum 2019). Both adults and juveniles migrate within the Action Area and rearing also occurs in the Action Area (WDFW 2023d). Since the early 2000s, both winter- and summer-run steelhead populations in the Snoqualmie River (a tributary to the Snohomish River) have declined (Snohomish Basin Salmon Recovery Forum 2019). Escapement levels for 2022 were 748 for Snohomish/Skykomish winter steelhead and 838 for Snoqualmie winter steelhead (WDFW 2023f). For context, the average escapement from 2012 to 2022 for Snohomish/Skykomish winter steelhead was 800 and for Snoqualmie winter steelhead was 625 (WDFW 2023f).

5.3 Killer Whale, Southern Resident Distinct Population Segment

The Southern Resident DPS of killer whales was listed as endangered on November 18, 2005 (70 FR 69903). Critical habitat was designated on November 29, 2006 (71 FR 69054), and revised on August 21, 2021 (86 FR 41668). Critical habitat includes the Action Area.

The Southern Resident DPS contains J pod, K pod, and L pod and its population is estimated in the 70s (NMFS 2023c). The geographic distribution of Southern Resident killer whales is year-round in the coastal waters off Oregon, Washington, Vancouver Island, and off the coast of central California and the Queen Charlotte Islands (Center for Biological Diversity 2001). In the summer, Southern Resident killer whales are typically found in the Georgia Strait, Strait of Juan de Fuca, and the outer coastal waters of the continental shelf. In the fall, the J pod migrates into Puget Sound, while the rest of the population makes extended trips through the Strait of Juan de Fuca. In the winter, the K and L pods retreat from inland waters and are seldom detected in the core areas until late spring. The J pod generally remains in inland waterways throughout the winter, with most of their activity in Puget Sound. Other winter movements and range of Southern Residents are not well understood (NMFS 2023c).

Killer whales use the entire water column, including regular access to the ocean surface to breathe and rest (Bateson 1974; Herman 1991). They remain underwater 95% of the time, with 60% to 70% of their time spent between the surface and a depth of 65 feet (20 meters), while diving regularly to depths of greater than 655 feet (200 meters; Baird 1994; Baird et al. 1998). Southern Residents spend less than 5% of their time between depths of 20 and 820 feet (60 and 250 meters; Center for Biological Diversity 2001). Time-depth recorder tagging studies of Southern Residents have documented that whales regularly dive to greater than 490 feet (150 meters), but that there is a trend toward a greater frequency of shallower dives in recent years (Baird and Hanson 2004).

Resident killer whales tend to feed primarily on fish, whereas transient killer whales prey on other marine mammals (NMFS 2008). Southern Resident killer whales primarily feed on salmon species (Balcomb et al. 1980; Bigg et al. 1987; NMFS 2008; Hanson et al. 2010). Chinook salmon dominate their diet (38%), followed by pink salmon (10%) and other salmon species or unidentifiable salmon species (Ford et al. 1998; Ford and Ellis 2006). Recent studies have indicated that while in their summer range (outside of the Action Area), Chinook salmon from the Fraser River basin accounted for 80% to 90% of the salmonid prey for Southern Resident killer whales, and fish originating in Puget Sound accounted for 6% to 14% (Hanson et al. 2010). Other species such as lingcod (*Ophiodon elongates*), halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp.), and Dover sole (*Microstomus pacificus*) were identified as additional prey species and may increasingly contribute to the diet as salmon populations decline (Center for Biological Diversity 2001; Hanson et al. 2010).

5.3.1 Critical Habitat

Critical habitat for Southern Resident killer whales is designated for areas containing the physical and biological habitat features, or PBFs, essential for the conservation of the species or that require special management considerations, as follows:

PBF 1: Water quality to support growth and development

PBF 2: Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and

PBF 3: Passage conditions to allow for migration, resting, and foraging.

These PBFs apply in marine waters deeper than 20 feet and therefore would overlap with the Action Area.

5.3.2 Utilization of the Action Area

The Action Area of the Project extends to the nearshore area of Puget Sound. Southern Resident killer whales could be present in the vicinity of the Action Area. Based on their known distribution and the available information on sightings, Southern Resident killer whales have the potential to occur in the Action Area.

5.4 Bocaccio, Puget Sound/Georgia Basin Distinct Population Segment

The Puget Sound/Georgia Basin DPS of bocaccio was listed as threatened on April 28, 2010 (75 FR 22276). Critical habitat was designated on November 13, 2014 (79 FR 68042). Critical habitat for bocaccio is not present in the Action Area.

Bocaccio are large, long-lived rockfish that inhabit deep waters, from 160 to more than 800 feet (ranging as deep as approximately 1,400 feet; NMFS 2017b). Rockfish are viviparous (i.e., their eggs

are fertilized internally) and produce 1 million to 3 million larvae annually. The larvae are released in the spring and are distributed widely in surface water, floating with tides and currents. After 3 to 6 months as larvae, juveniles move into offshore or nearshore benthic habitats including rocky reefs, kelp canopies, and structures such as piers and oil platforms. Juveniles feed on zooplankton including the larvae of crustaceans, small fish, and invertebrates, and as they grow larger, typically move into deeper water and habitats with high roughness (i.e., rocky reefs). Adult bocaccio have a diverse diet including numerous fish species (juvenile salmon, forage fish, flatfish, pollock, lingcod, etc.) and larger invertebrates such as crabs, and can be found associated with rocky or bouldery benthic habitats, but have also been captured in soft-bottomed habitats (NMFS 2017b).

5.4.1 Utilization of the Action Area

Bocaccio are difficult to sample. Historically, they appear to have been most abundant in the South Sound and Main Basin of Puget Sound (Drake et al. 2010 and Williams et al. 2010; cited in NMFS 2017b). Juveniles and subadults are more common than adults in shallower water, and bocaccio are known to school in nearshore waters as juveniles (McCall and He 2002). Adults are generally associated with rocky areas and outcrops (Drake et al. 2010), but some are also frequently found in areas lacking hard substrate (Washington 1977; Miller and Borton 1980). The area where the Snohomish River meets Puget Sound is not ideal habitat for bocaccio rockfish due to its natural lack of rocky reefs or substrate.

5.5 Yelloweye Rockfish, Puget Sound/Georgia Basin Distinct Population Segment

The Puget Sound/Georgia Basin DPS of yelloweye rockfish was listed as threatened on April 28, 2010 (75 FR 22276). Critical habitat was designated on November 13, 2014 (79 FR 68042). Critical habitat for yelloweye rockfish is not present in the Action Area.

Yelloweye rockfish are a large long-lived rockfish most commonly occurring in deep water up to approximately 1,400 feet in depth (NMFS 2017b). Rockfish are viviparous (i.e., their eggs are fertilized internally) and produce 1 million to 3 million larvae annually. The larvae are released in the spring and are distributed widely in surface water, floating with tides and currents. Juveniles use shallow waters and habitats including rocky reefs, kelp canopies, and structures such as piers and oil platforms. Juvenile yelloweye rockfish rarely occur in nearshore areas. Juveniles feed on zooplankton including the larvae of crustaceans and invertebrates, as well as small fish. Adult yelloweye rockfish feed on many species of fish and larger invertebrates such as crabs and are more associated with rough rocky benthic habitats than bocaccio (NMFS 2017b).

5.5.1 Utilization of the Action Area

Yelloweye rockfish are most commonly found between 300 to 590 feet in depth (Love et al. 2002). They are highly associated with high relief zones with crevices and complex rock habitats (Love et al. 1991; Richards 1986). The area where the Snohomish River meets Puget Sound is not ideal habitat for yelloweye rockfish due to its natural lack of rocky reefs or substrate and shallow depths. Yelloweye rockfish were recently sampled in low numbers in Puget Sound (NMFS 2017b).

5.6 Bull Trout, Coastal-Puget Sound Distinct Population Segment

The coterminous United States population of bull trout was listed as threatened on November 1, 1999 (64 Fed. Reg. 58910), and critical habitat was finalized on October 18, 2010 (75 Fed. Reg. 63898). Critical habitat includes the Snohomish River within the Action Area.

Bull trout have specific cold-water requirements and are rarely found in waters with temperatures above 64°F (USFWS 2023c). They may also exhibit four different life-history types: anadromous, adfluvial, fluvial, and resident. Bull trout spawn from late summer through December, typically when water temperatures drop below 48°F (Wydoski and Whitney 2003). Juvenile bull trout feed on insects and then transition to small fish. Larger bull trout prey predominantly on fish.

5.6.1 Critical Habitat

Critical habitat is designated based on the life history and habitat requirements of bull trout. Nine PBFs essential to the conservation of the species have been identified as essential for the conservation of bull trout and may require special management considerations or protection, as summarized in Table 9. In the Action Area all PBFs are present except for PBF 1, 5, and 6.

Table 9
Bull Trout Critical Habitat Physical and Biological Features Within the Snohomish River

PBFs	Status
PBF 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	PBF not present. The Snohomish River in the vicinity of the Project is on the Ecology 303(d) list for temperature (Ecology 2023). Hyporheic flows were likely present historically.
PBF 2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	PBF present. Bull trout migration occurs in the Snohomish River within the Action Area and there are no barriers present.
PBF 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	PBF present. The Action Area is presumed to supply an adequate food base.

PBFs	Status
PBF 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	PBF not present. The Snohomish River has areas of undeveloped shorelines and contains complex habitat such as riparian vegetation and large wood; however, these features are not present in the Action Area.
PBF 5: Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	PBF not present. The Snohomish River in the vicinity of the Project is on the Ecology 303(d) list for temperature (Ecology 2023).
PBF 6: In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	PBF not present. Bull trout spawning occurs upstream of the Snohomish River, mainly in the upper north fork Skykomish River.
PBF 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	PBF present. The Snohomish River contains a natural hydrograph although it is likely modified due to timber harvest and water withdrawals.
PBF 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	PBF present. Although bull trout are known to utilize the area, they are sensitive to high river temperatures.
PBF 9: Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	PBF present. Walleye, northern pike, brook trout, and brown trout are not known to occur in the Snohomish River (WDFW 2023d).

5.6.2 Utilization of the Action Area

Bull trout are known to utilize the Snohomish River. In 2008, a 5-year review estimated bull trout abundance in the Snohomish and Skykomish river core area as between 1,000 and 2,500 individuals, which, in the short term, was likely increasing (Snohomish Basin Salmon Recovery Forum 2019). Although these data provide a sense of trends in bull trout spawner abundance, it does not represent a total population value for the Snohomish Basin (Snohomish Basin Salmon Recovery Forum 2019).

5.7 Marbled Murrelet

The marbled murrelet was listed as threatened on October 1, 1992 (57 Fed. Reg. 45328). Critical habitat was designated on May 24, 1996 (61 Fed. Reg. 26256), and revised on October 5, 2011 (76 Fed. Reg. 61599). Critical habitat in Washington is located on federal lands designated as Late Successional Reserves as part of the Northwest Forest Plan, and some areas of state and county forest land.

Marbled murrelets are small seabirds of the family Alcidae that occur along the north Pacific coast from Alaska to California. Murrelets forage on small fish and invertebrates in open but somewhat sheltered marine waters, such as bays or sounds where water depth is less than 330 feet (Carter 1984). The nesting period typically begins in late March and continues through mid-September (Hamer and Nelson 1995). Nesting occurs in mature and old-growth forest (Carter 1984), where large branches or other suitable platforms exist on the trees for nesting. Because of the scarcity of mature forest stands, it is common for murrelets to fly inland many miles to nest, more than 40 miles in some studies (Cooper et al. 2006, 2007). Marbled murrelets fly to and from their nest sites during dawn and dusk time periods, spending the daytime hours foraging. The key factors of decline for the species include loss of old-growth forests with suitable nesting sites, mortality from oil spills and fishing nets, a low reproductive rate, and low nesting success and survival (USFWS 1997). In addition, it is believed that forest fragmentation makes nests vulnerable to predation by jays, crows, ravens, and great horned owls.

5.7.1 *Utilization of the Action Area*

There is no designated critical habitat in the Action Area. Marbled murrelets require old-growth forest to nest and proximity to marine areas for feeding. The nearest critical habitat is approximately 12 miles west of the Project (USFWS 2023d). The Action Area lacks old-growth forest habitat required for murrelet nesting, and there are no foraging opportunities within the vicinity of the Action Area because murrelets utilize nearshore marine water resources. Overall, the Action Area is unfavorable for murrelets; however, they may be present while flying between foraging and nesting sites.

6 Effects Analysis

6.1 Direct Effects to Species

6.1.1 Noise Effects

Overall, the activities associated with the Project are not expected to create a noise impact on ESA-listed species. Construction activities such as pavement demolition and paving of new surfaces would lead to elevated noise levels; however, pile driving is not proposed, and no underwater noise impacts are expected from the Project. In-air noise impacts are not anticipated to exceed disturbance thresholds for ESA-listed terrestrial species (marbled murrelet). In addition, marbled murrelet would not use the Action Area for foraging or nesting, so would only be present if flying over the area between foraging and nesting sites. If present, marbled murrelet response to noise disturbance would likely include moving away from the construction site.

6.1.2 Modification of Habitat

The Project includes removal of 21 trees, approximately five of which are located within 200 feet of the Snohomish River (Figure 2), in order to meet FAA safety regulations. The FAA requires the Airport to ensure there are no obstructions, including trees, on or around Harvey Field that could affect flight safety. Obstructions hazardous to air navigation are defined by the FAA as features that “affect the safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities.” (14 CFR Part 77).

Trees to be removed are located on private property, and can only be removed if the Airport Sponsor receives permission from the landowner. Trimming of trees on Snohomish County property near the Snohomish River currently occurs as part of regular maintenance and would continue to occur. All tree trimming and tree removal would be conducted without generating turbidity or placing anything into aquatic areas such as the Snohomish River or wetlands. The only impact from tree removal and tree trimming would be a minor loss of vegetation from the riparian area of the Snohomish River. Due to the small number of trees that would be affected, and because the trees are not located directly on the riverbank, effects to ESA-listed species are expected to be negligible.

Based on preliminary design, construction of the Airport Way realignment would result in approximately 0.12-acre of permanent impacts to Wetland A, 0.17-acre of temporary impacts to Wetland A, 0.14-acre of permanent buffer impacts to Wetland A, and 0.24-acre of temporary buffer impacts to Wetland A, and 0.08-acre of temporary buffer impacts to Wetland D. Much of the permanent and temporary buffer impact area for Wetland A and Wetland D buffers are degraded, primarily due to presence of reed canary grass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus*

armeniacus), and existing roadway surfaces. In addition, the affected wetlands are not anticipated to support ESA-listed fish species as described in Section 4.4.

6.2 Delayed Consequences to Species

6.2.1 Water Quantity

The quantity of stormwater runoff could be affected by operation of the Project because of the increase in impervious surfaces. The Project would result in a net increase in impervious surfaces of approximately 6 acres. In the North Basin, the impervious surface area would increase by approximately 1%, and in the South Basin, the impervious surface area would increase by approximately 4%. These increases would result in impacts on aquatic habitat and species. Water quantity is not expected to significantly change due to the Project and BMPs would be sized to provide flow attenuation to ensure that proposed peak flow rates are less than or equal to existing peak flow rates up to the 50-year storm event.

Without BMPs for attenuation, the Project would increase stormwater runoff in both drainage basins across each design storm analyzed. Table 10 presents the peak discharges and increases in peak discharge across each basin for the three design storms analyzed. With the implementation of BMPs, there would not be increases in peak discharge. As necessary, BMPs will include detention ponds, detention pipes, and/or detention vaults.

Table 10
Peak Discharge Summary

	Area (ac)	2-Year Peak Discharge (cfs)	10-Year Peak Discharge (cfs)	50-Year Peak Discharge (cfs)
North Basin				
Existing	178.68	3.49	9.30	31.02
Proposed		3.63	9.41	31.64
Change		+0.14	+0.11	+0.62
South Basin				
Existing	84.16	1.46	3.66	7.79
Proposed		1.61	3.99	8.34
Change		+0.15	+0.33	+0.55

6.2.2 Water Quality

Multiple pollutants found in stormwater degrade water quality, negatively impact ESA-listed fish and marine mammals, and affect water quality in EFH even after the water has been treated to reduce pollutant loads (WSDOT 2022; Table 11). ESA-listed fish in the Snohomish River and Puget Sound as

well as marine species in Puget Sound may be exposed to contaminants in stormwater that is discharged, or they may be exposed by consuming contaminated prey. Effects of exposure could range from avoidance of affected areas, to reduced growth, altered immune function, or mortality. The intensity of effects depends on the pollutant, its concentration, and/or the duration of exposure. Repeated exposure, even at very low concentrations, may also result in adverse effects. Potential effects to species from common stormwater pollutants are identified in Table 11. Key pollutants of concern associated with this Project include 6PPD and metals.

Tires contain an antioxidant known as 6PPD that is used to increase tire durability; however, it can transform into the chemical 6PPD-quinone. Studies have shown that 6PPD-quinone can have lethal effects on coho salmon, Chinook salmon, and steelhead; however, Chinook salmon and steelhead are somewhat less sensitive than coho salmon (French et al. 2022). Additional research is needed to better understand sublethal effects to salmon species such as long-term disruptions to gill, heart, or brain function (NWFSC 2022). Although research regarding the effects of 6PPD-quinone is still emerging, infiltration BMPs that allow rainfall and stormwater runoff to percolate into the ground are anticipated to perform well in capturing tire wear particles and reducing toxicity effects (Ecology 2022b). Additional research conducted by Washington State University showed that “lethality to coho juveniles, adults, and alevin could be prevented by bioretention filtration, as could sublethal impairments to aquatic invertebrates...” (Ecology 2022). The Project is only increasing PGIS in the corridor by approximately 1% in the North Basin and 4% in the South Basin and stormwater BMPs would also reduce impacts to species from 6PPD to the extent practicable based on current evidence. According to recent research, infiltration, dispersion, and some biofiltration BMPs combined with sorption have the highest potential to reduce 6PPD and 6PPD-q (Evergreen StormH2O et al. 2022), so should be prioritized when determining stormwater BMPs to be installed as part of the final design process.

Metals, such as copper, zinc, cadmium, or mercury, can have a range of acute and chronic physiological and behavioral effects on fish. Impacts to salmonids can range from avoidance to mortality depending on the pollutant and its concentration (WSDOT 2022). Certain metals are toxic to the salmon nervous system and can disrupt feeding and predator avoidance, while others can impact the salmon’s ability to detect odors (NMFS 2016). Salmon can uptake metals through their gills, olfaction receptor neurons, or dietary intake. For dissolved metals, the most direct pathway to salmon is uptake via gills (WSDOT 2022). As discussed above for 6PPD, the Project is increasing PGIS as a small percentage of the total PGIS on site. BMPs to remove metals from stormwater include full dispersion and bioretention (Ecology 2024).

Table 11**Pollutants Commonly Found in Stormwater Runoff in Washington State and Associated Effects**

Pollutant Class¹	Examples¹	Urban Sources¹	Potential Effects to Species	Effects from Project
PBT (persistent bioaccumulating toxicants)	POPs (persistent organochlorine pollutants), PCBs (polychlorinated biphenyls), PBDEs (polybrominated diphenyl ethers), PFCs (poly- and per-fluorinated compounds), Pharmaceuticals (estrogen, antidepressant)	Eroding soils, solids, development, redevelopment, vehicles, emissions, industrial, consumer products	Environmental and biological accumulation of these chemicals can result in adverse long-term ecosystem impacts, including altering species behavior, reproduction, and growth. ¹	Could be present in stormwater runoff; however, the Project is not expected to contribute to an increase in this pollutant.
Petroleum hydrocarbons	PAHs (poly aromatic hydrocarbons)	Roads (vehicles, tires), industrial, consumer products	Environmental and biological accumulation of these chemicals can result in adverse long-term ecosystem impacts, including altering species behavior, reproduction, and growth. ¹	An increase in impervious surfaces could lead to an increase in PAHs from stormwater runoff. The Project will incrementally increase this pollutant from tires because the length that vehicles will travel on Airport Way will increase by approximately 0.25 mile. The Project will not lead to an increase in airplane or vehicle traffic.

Pollutant Class ¹	Examples ¹	Urban Sources ¹	Potential Effects to Species	Effects from Project
Microplastics	6PPD/6PPD-q	Vehicle tires	6PPD has toxic effects to salmonids and often leads to mortality.	An increase in impervious surfaces could lead to an increase in 6PPD/6PPD-q from stormwater runoff. The Project will incrementally increase this pollutant from tires because the length that vehicles travel on Airport Way will increase by approximately 0.25 mile. The Project will not lead to an increase in airplane or vehicle traffic.
Metals	Mercury, copper, chromium, nickel, titanium, zinc, arsenic, lead	Roads, electronics, pesticides, paint, waste treatment	Metals can affect salmonids, with effects ranging from avoidance to mortality depending on the pollutant and its concentration. ¹	An increase in impervious surfaces could lead to an increase in metals from stormwater runoff.
Common use pesticides, surfactants	Herbicides (glyphosate, diquat), insecticides, fungicides, adjuvants, surfactants (detergents, soaps)	Roads, railways, lawns, levees, golf courses, parks	These pollutants can be highly persistent and toxic upon entering aquatic environments, causing acute and chronic effects to salmonids and their invertebrate prey. ¹	Proposed Project is not expected to contribute to an increase in this pollutant.
Nutrients and sediment	Nitrogen, phosphorus fertilizers, fine-grained inorganic sediment	Fertilizer, soil erosion	Sediment quality impairments from siltation and excessive nutrients degrade spawning and rearing habitat by clogging substrates, reducing interstitial oxygen required by incubating eggs, and altering and reducing cover. Nitrates can also be toxic to fish. ¹	Proposed Project is not expected to contribute to an increase in this pollutant.

Pollutant Class ¹	Examples ¹	Urban Sources ¹	Potential Effects to Species	Effects from Project
Temperature and dissolved oxygen	Warm water, unvegetated exposed surfaces (soil, water, sediments)	Impervious surfaces, rock, soils (roads, parking lots, railways, roofs)	Elevated temperatures can lead to the following effects to salmonids: decreased supply of oxygen, disrupted metabolism, increased susceptibility to toxins, increased vulnerability to disease, reduced ability to avoid predators, and reduced food supply. ²	An increase in impervious surfaces could lead to an increase in temperature and decrease in dissolved oxygen.
Bacteria	Escherichia coli	Livestock waste, organic solids, pet waste, septic tanks	Increases in bacteria can lead to lower levels of oxygen which can negatively affect fish.	Proposed Project is not expected to contribute to an increase in this pollutant.

Notes:

1. WSDOT 2022
2. Ecology 2000

The quality of stormwater runoff would be affected by construction and operation of the Project. However, stormwater generated during construction and operations would be required to comply with state and county requirements and BMPs to avoid and minimize runoff of turbid water and contaminants, including the *Stormwater Management Manual for Western Washington* (SWMMWW; Ecology 2024) and the SCDM (Snohomish County 2021).

As a point of reference, stormwater management in compliance with the SWMMWW and the SCDM would exceed criteria developed in both the Federal-Aid Highway Program (FAHP) in the State of Oregon Biological Opinion and in the Standard Local Operating Procedures for Endangered Species (SLOPES) for Stormwater, Transportation or Utilities Biological Opinion. For example, SCDM requires stormwater detention through the 50-year storm event to ensure proposed flow rates do not exceed existing, whereas SLOPES only requires detention through 10-year events. SCDM also requires treatment of 72% of the rainfall from a 2-year storm (represents the 6-month event), which is greater than the FAHP/SLOPES biological opinions that generally require treatment of 50% of the rainfall from a 2-year storm.

Stormwater runoff generated by the Project would enter surface waters and cause minor effects on aquatic species receiving runoff. An increase of PGIS would cause an increase in pollutants in stormwater runoff, which would affect water quality in the Snohomish River (potentially extending approximately 12 miles downstream to Puget Sound) and could affect ESA-listed species as described above. These impacts would be minimized through the use of stormwater BMPs that would be installed to treat stormwater runoff from Project PGIS using technology to remove sediments and associated pollutants.

BMPs such as flow control and water quality treatment requirements would be implemented, as needed, to prevent an increase in pollutant discharges that could harm endangered species. The specific BMPs to be implemented will be determined during final design, but construction stormwater BMPs may include, but are not limited to, interceptor dikes and swales, vegetated strips, wattles, sediment traps, and construction stormwater filtration, as well as avoidance of water bodies during construction. Runoff from additional PGIS would be also treated, which would reduce water quality impacts to ESA-listed species. As described in Table 11, the main pollutants of concerns associated with this Project include 6PPD and metals. Infiltration, dispersion, and some biofiltration BMPs combined with sorption have the highest potential to reduce 6PPD and 6PPD-q, while dispersion and bioretention are effective for treating metals.

Although overall impacts to species from stormwater runoff are anticipated to be minor, it is understood that no stormwater treatment methods are 100% effective at removing all contaminants from stormwater runoff. For this reason, stormwater runoff is anticipated to have effects on ESA-listed species.

6.3 Effects to Critical Habitats

6.3.1 *Chinook Salmon, Puget Sound Evolutionarily Significant Unit Critical Habitat*

The designation of critical habitat is based on the life history and habitat needs of Chinook salmon and includes six PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 12 summarizes the three freshwater PBFs applicable to this Proposed Action and the potential Project effects on Chinook salmon PBFs.

Table 12
Potential Proposed Action Effects on Chinook Salmon Physical and Biological Features

PBFs	Effect from Proposed Action
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities. It could also have minor effects to natural cover from tree trimming and removal.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.

6.3.2 *Steelhead, Puget Sound Distinct Population Segment Critical Habitat*

The designation of critical habitat is based on the life history and habitat needs of steelhead and includes six PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 13 summarizes the three freshwater PBFs applicable to this Proposed Action and the potential Project effects on steelhead PBFs.

Table 13**Potential Proposed Action Effects on Steelhead Physical and Biological Features**

PBFs	Effect from Proposed Action
PBF 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities. It could also have minor effects to natural cover from tree trimming and removal.
PBF 3: Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.

6.3.3 *Killer Whale, Southern Resident Distinct Population Segment Critical Habitat*

Critical habitat for killer whale, Southern Resident DPS, is designated for areas containing the PBFs essential for the conservation of the species or that require special management considerations. PBFs include water quality, prey species, and passage conditions. Table 14 summarizes the PBFs applicable to this Project and the potential Project effects on killer whale PBFs.

Table 14**Potential Project Effect on Southern Resident Killer Whale Physical and Biological Features**

PBFs	Effect from Proposed Action
PBF 1: Water quality to support growth and development	The Project would have negligible effects on water quality due to an increase in stormwater runoff from new PGIS and potentially due to construction activities.
PBF 2: Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	The Project may affect Chinook salmon, the killer whales' favored food source. However, the Project is not anticipated to have significant effects from water quality to Chinook salmon, because stormwater BMPs would be implemented to reduce water quality effects.
PBF 3: Passage conditions to allow for migration, resting, and foraging	Killer whale passage within critical habitat would not be affected because no construction would occur within or near critical habitat.

6.3.4 *Bull Trout, Coastal-Puget Sound Distinct Population Segment Critical Habitat*

The designation of critical habitat is based on the life history and habitat needs of bull trout and includes nine PBFs necessary for their conservation in freshwater, estuarine, and nearshore marine habitats. Table 15 summarizes the PBFs applicable to this Proposed Action and the potential Project effects on bull trout PBFs.

Table 15
Potential Proposed Action Effect on Bull Trout Physical and Biological Features

PBFs	Effect from Proposed Action
PBF 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	The Project would have minor effects on water quality due to an increase in PGIS; however, infiltration of runoff would continue to contribute to groundwater recharge.
PBF 2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
PBF 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	The Project would not affect this PBF.
PBF 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	The Project would not affect this PBF.
PBF 5: Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	The Project would not affect this PBF.
PBF 6: In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	The Project would not affect this PBF.
PBF 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	The Project would not affect this PBF because flow control requirements would

PBFs	Effect from Proposed Action
	avoid or minimize any increase in stormwater runoff.
PBF 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
PBF 9: Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	The Project would not affect this PBF.

6.4 Interdependent and Interrelated Actions and Cumulative Effects

An interdependent activity is an action that has no independent utility apart from the Proposed Action. An interrelated activity is an action that is part of a larger action and depends upon the larger action for its justification. No significant interrelated or interdependent effects were identified for the Project.

Cumulative effects are effects of future state or private activities that are reasonably certain to occur within the Action Area (50 CFR 402). From an ESA perspective, the analysis of cumulative effects considers future nonfederal projects that do not require federal permits that may affect habitats and listed species in the Action Area. Future development projects that result in PGIS have the potential to occur in the Action Area. The effects of these actions could result in degraded riparian and freshwater habitat. However, state and local regulations and conservation plans are expected to reverse some of the cumulative effects that have already occurred as a result of human development and are intended to restore habitats for listed species and support their populations. There are no foreseeable future state or private activities in the vicinity of this Project that are reasonably certain to occur within the Action Area as a result of this Project.

7 Effects Determinations

For listed species, a key factor in making an effects determination and distinguishing between a significant and insignificant effect is determining if the effect would be significant enough to cause a take. "Take," as defined by the ESA, includes such activities that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct (ESA Section 3[19]). Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering; harass is further defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3).

7.1 Chinook Salmon, Puget Sound Evolutionarily Significant Unit

Based on the above analysis, the effect determination is that this Project **may affect, is likely to adversely affect** Chinook salmon.

This Project **may affect** Chinook salmon because of the following:

- Chinook salmon are known to spawn, rear, and migrate in the Snohomish River.

This Project **is likely to adversely affect** Chinook salmon because of the following:

- Chinook salmon may occur in the Action Area during construction and operation.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field. Runoff will discharge into the Snohomish River and eventually reach Puget Sound.
- Although runoff from existing and all new PGIS would be treated through the use of infiltration trenches, bioswales, and detention facilities, 100% of pollutants would not be removed; therefore, stormwater runoff would increase the total pollutant load to the Snohomish River and Puget Sound.

The potential for impacts to Chinook salmon are reduced because of the following:

- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction and operation on Chinook salmon.

7.1.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** Chinook salmon designated critical habitat.

This Project **may affect** Chinook salmon designated critical habitat because of the following:

- Designated critical habitat for Chinook salmon is present in the Action Area.

- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** Chinook salmon designated critical habitat because of the following:

- No work would occur in-water.
- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on Chinook salmon critical habitat.

7.2 Steelhead, Puget Sound Distinct Population Segment

Based on the above analysis, the effect determination is that this Project **may affect, is likely to adversely affect** steelhead.

This Project **may affect** steelhead because of the following:

- Steelhead are known to rear and migrate in the Snohomish River.

This Project **is likely to adversely affect** steelhead because of the following:

- Steelhead may occur in the Action Area during construction and operation.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field. Runoff will discharge into the Snohomish River and eventually reach Puget Sound.
- Although runoff from existing and all new PGIS would be treated through the use of infiltration trenches, bioswales, and detention facilities, 100% of pollutants would not be removed; therefore, stormwater runoff would increase the total pollutant load to the Snohomish River and Puget Sound.

The potential for impacts to steelhead are reduced because of the following:

- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction and operation on steelhead.

7.2.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Project **may affect, is not likely to adversely affect** steelhead designated critical habitat.

This Project **may affect** steelhead designated critical habitat because of the following:

- Designated critical habitat for steelhead is present in the Action Area.
- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.
- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** steelhead designated critical habitat because of the following:

- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on steelhead critical habitat.

7.3 Killer Whale, Southern Resident Distinct Population Segment

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on Southern Resident killer whale. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on Southern Resident killer whale are considered insignificant. Although the Project may affect, and is likely to adversely affect Chinook salmon (as described in Section 7.1), which is the Southern Resident killer whale's preferred prey, impacts are not expected to affect overall Chinook salmon populations.

7.3.1 Critical Habitat Effects Determination

Based on the above analysis, the Project would have **no effect** on Southern Resident killer whale critical habitat. Although the Project would discharge treated stormwater in an area that drains to waters that support Chinook salmon, it would not appreciably reduce the survival or recovery of Chinook salmon and would not, therefore, result in any population-scale reductions in the availability of this prey resource.

7.4 Bocaccio, Puget Sound/Georgia Basin Distinct Population Segment

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on bocaccio. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on bocaccio are considered insignificant.

7.5 Yelloweye Rockfish, Puget Sound/Georgia Basin Distinct Population Segment

Based on the analysis in Section 6, the effect determination is that the Project would have **no effect** on yelloweye rockfish. The Project Area is located approximately 12 miles upstream of the lower tidally influenced portion of the Snohomish River. Given the distance and stormwater treatment that would be implemented, the effects of stormwater on yelloweye rockfish is considered insignificant.

7.6 Bull Trout, Coastal-Puget Sound Distinct Population Segment

Based on the above analysis, the effect determination is that the Project **may affect, is likely to adversely affect bull trout**.

This Project **may affect** bull trout because of the following:

- Bull trout are known to rear and migrate in the Snohomish River.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field.

The Project **is likely to adversely affect** bull trout because of the following:

- Bull trout may occur in the Action Area during construction and operation.
- The Project includes a net increase of approximately 6 acres of new PGIS, which would increase stormwater runoff from Harvey Field. Runoff will discharge into the Snohomish River and eventually reach Puget Sound.

Although runoff from existing and all new PGIS would be treated through the use of infiltration trenches, bioswales, and detention facilities, 100% of pollutants would not be removed; therefore, stormwater runoff would increase the total pollutant load to the Snohomish River and Puget Sound. The potential for impacts to bull trout are reduced because:

- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on bull trout.

7.6.1 Critical Habitat Effects Determination

Based on the above analysis, the effect determination is that this Proposed Action **may affect, is not likely to adversely affect**, designated bull trout critical habitat because of the following:

This Project **may affect** bull trout designated critical habitat because of the following:

- Designated critical habitat for bull trout is present in the Action Area.
- The Project would have minor effects on water quality due to an increase in stormwater runoff from new PGIS.

- Construction activities could potentially lead to a spill or cause erosion that could affect water quality.

This Project **is not likely to adversely affect** bull trout designated critical habitat because of the following:

- Runoff from existing and all new PGIS would be treated through the use of infiltration trenches and a bioswale.
- Conservation measures and construction BMPs would be in place as described in Section 2.3 that would minimize effects from construction on bull trout critical habitat.

7.7 Marbled Murrelet

Based on the analysis in Section 6, the effect determination is that the Proposed Action would have **no effect** on marbled murrelet. Although it is possible that marbled murrelets could fly over the Action Area, any potential effects are negligible due to the presence of highways, existing airport use, and other disturbances. In addition, the nearest critical habitat is located approximately 12 miles west of the Project Area.

8 Essential Fish Habitat Assessment

The objective of this EFH assessment is to determine whether the Project “may adversely affect” designated EFH for relevant commercially, federally managed fisheries species within the Action Area. This section provides a description and assessment of EFH in the Project Area and the potential impacts on these habitats.

8.1 Essential Fish Habitat Background

The Sustainable Fisheries Act of 1996 (Public Law 104-297) amended the Magnuson-Stevens Act and requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries on activities that may adversely affect EFH.

EFH is defined as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 United States Code 1802(10)). Waters include aquatic areas (marine waters, intertidal habitats, and freshwater streams) and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate. Substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities. Necessary means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers a species’ full life cycle (50 CFR 600.10). The Magnuson-Stevens Act promotes the protection of these habitats through assessment and mitigation of activities that may adversely affect these habitats.

The EFH mandate applies to all species managed under a Fishery Management Plan. In Washington, Oregon, and California, there are three Fishery Management Plans covering groundfish, coastal pelagic species, and Pacific salmon. Federal agencies must consider the impact of a Proposed Action on all three types of EFH. The Action Area for the Project includes the EFH for Pacific salmon species (NMFS 2023d).

8.2 Potential Effects of the Proposed Project

The definition of Adverse Effect is “any impact that reduces quality or quantity of EFH, including direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.810).

For the Project, the effects have been discussed in the ESA effects analysis for Chinook salmon, steelhead, and bull trout and their respective critical habitats, and collectively these would apply to EFH. The potential effects of the Project include minor effects on water quality due to an increase in stormwater runoff from new PGIS and the removal of approximately five trees within the riparian zone. The Project would **not adversely affect** Pacific salmon EFH.

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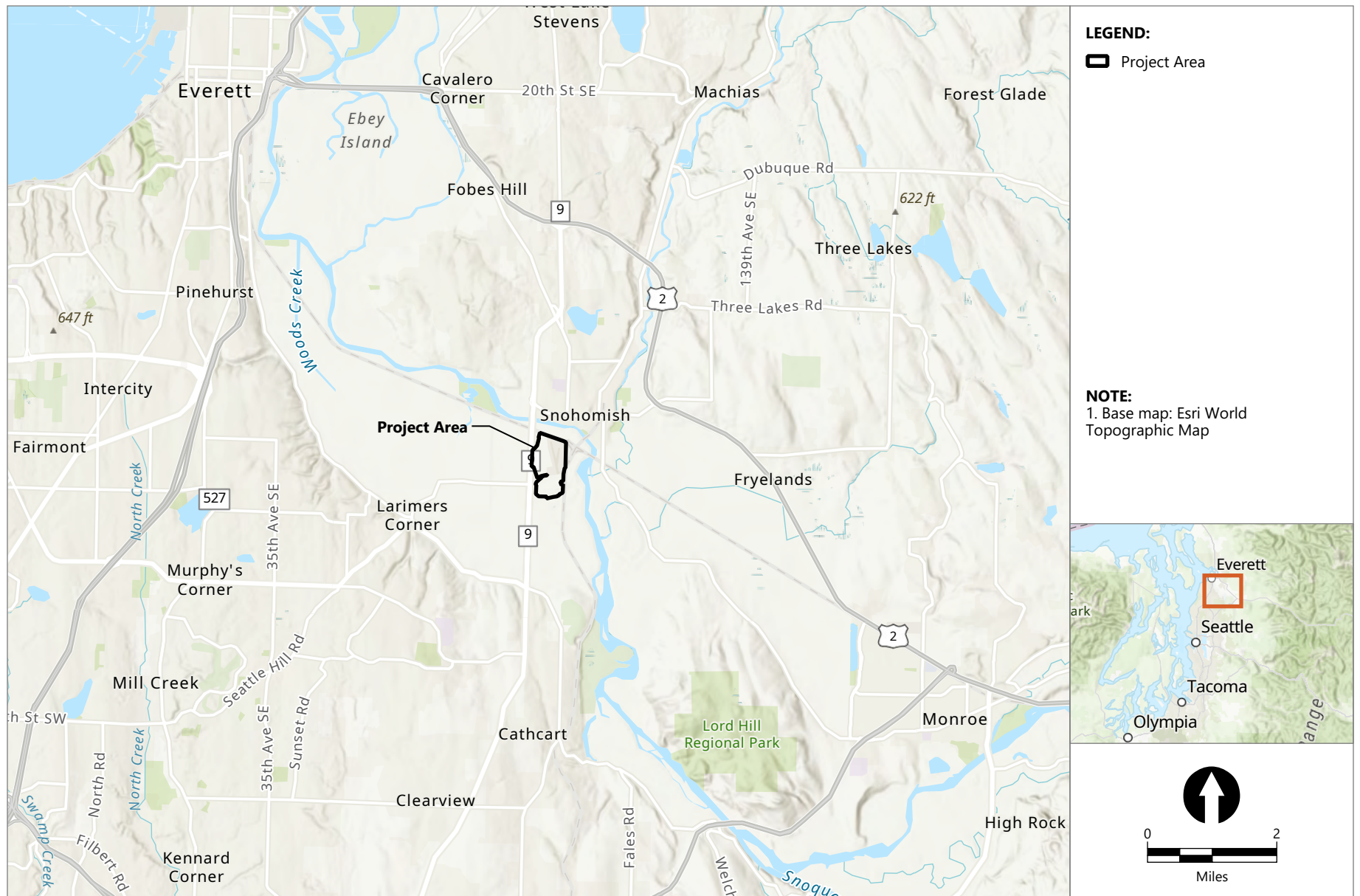
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Figures

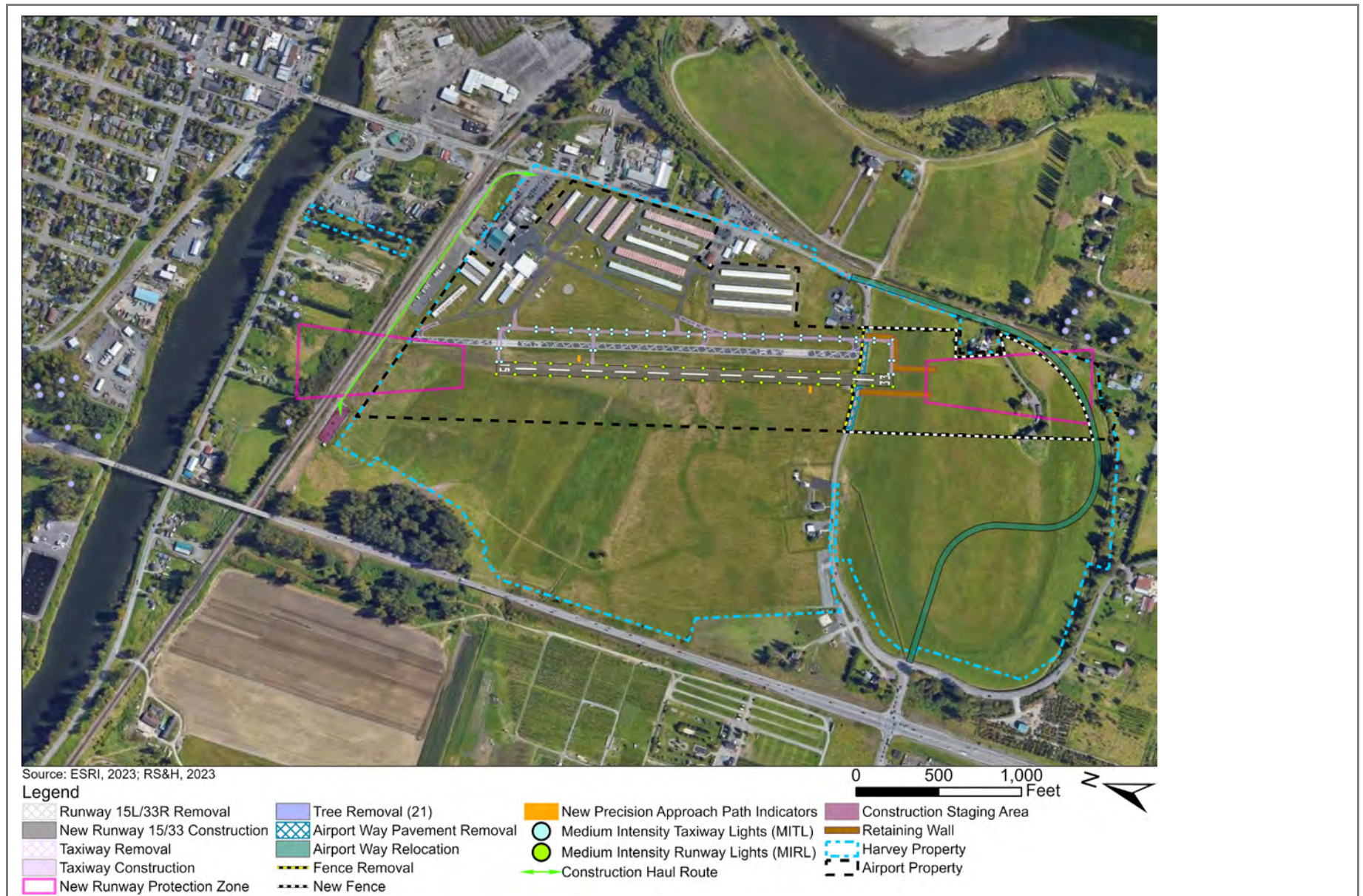


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Figure 1
Vicinity Map

Biological Assessment
 Harvey Field Runway Improvement Project

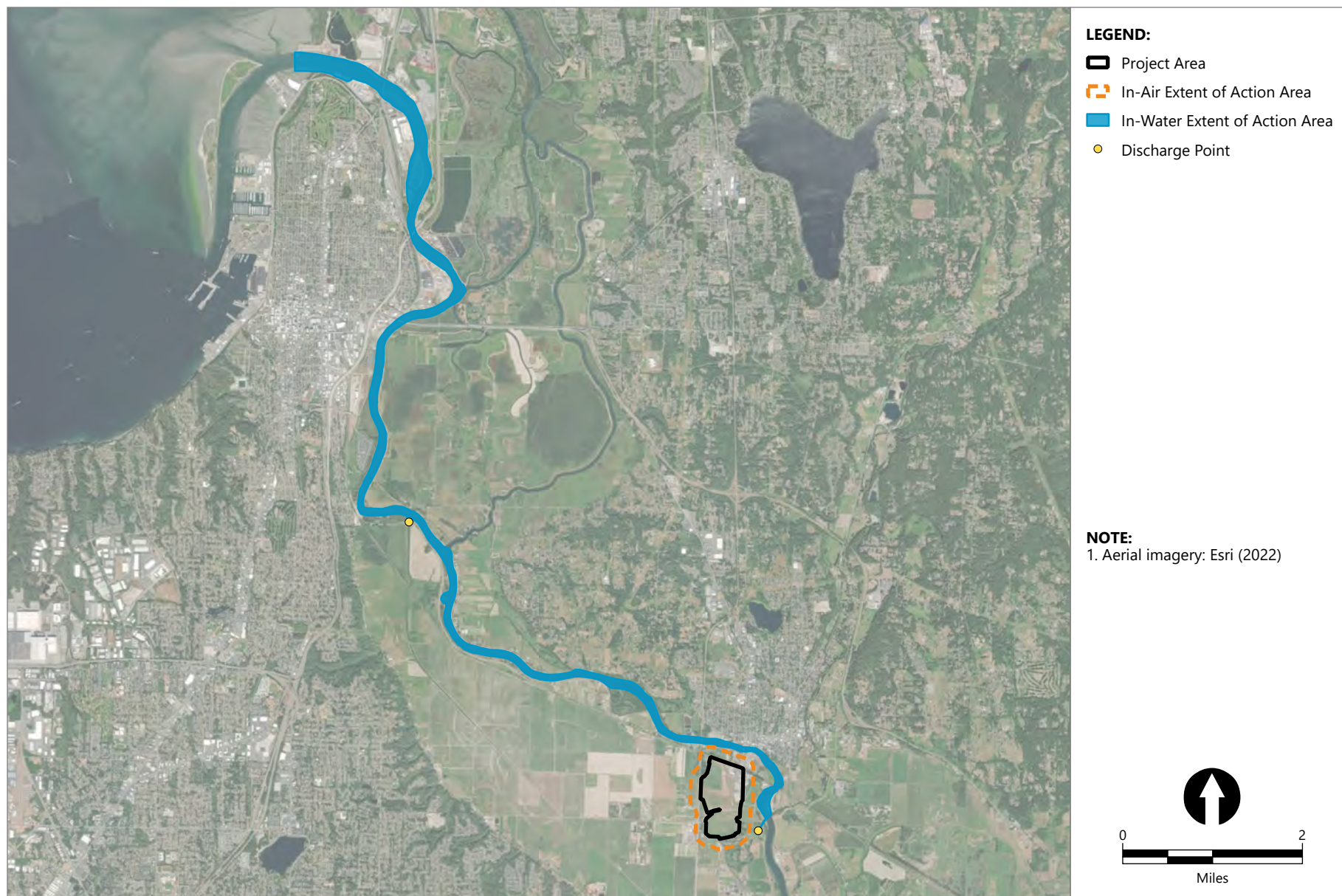


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Figure 2
Site Plan

Biological Assessment
Harvey Field Runway Improvement Project



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Figure 3
Action Area

Biological Assessment
Harvey Field Runway Improvement Project

Appendix A

Water Resources Analysis

SEPTEMBER 2024

***Harvey Field Runway Improvement
EA: Preliminary Water Resources
Design Report***



***Harvey Field Runway
Improvement EA:
Preliminary Water
Resources Design Report***

September 2024
Snohomish, WA
RS&H No.: 1047-0064-000



Prepared by RS&H, Inc. at the
direction of Harvey Field, Inc.

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Snohomish County
Executive Office

Dave Somers
County Executive
3000 Rockefeller Avenue
Everett, WA 98201
(425) 388-3411

September 6, 2016

Kandace Harvey
9900 Airport Way
Snohomish, WA 98290

Subject: Proposed Harvey Airfield Fill

Dear Ms. Harvey

Snohomish County Planning and Development Services (PDS) has concluded a preliminary review of your runway/taxiway expansion at Harvey Field. Preliminary PDS review indicates your proposal can meet Snohomish County Code (SCC) requirements for fill in the Flood Hazard Density Fringe pursuant to SCC 30.65.270. PDS review included your proposal to relocate Airport Way from its' current alignment to a new alignment on Harvey Field property. If final PDS approval is granted, Snohomish County will require the proposed right-of-way to be dedicated to Snohomish County through approval of Snohomish County Department of Public Works.

Please understand compliance is based on preliminary review of documents provided. Final approval cannot be granted until review of permit applications and construction documents show compliance with all applicable regulations.

I look forward to working with you through the County permitting processes. If you have questions please feel free to contact Randy Sleight at 425-388-3311, extension 2014, or myself at 425-388-3030.

Sincerely,

Tom Rowe
Special Project Director
Executive's Office, Snohomish County
425-388-3030
Tom.Rowe@snoco.org



Snohomish County

Michael McCrary, Director
Planning and Development Services
Long Range Planning

3000 Rockefeller Ave., M/S #604
Everett, WA 98201-4046
(425) 388-3311
www.snoco.org

Dave Somers
County Executive

July 21, 2022

Kandace Harvey
Harvey Airfield
9900 Airport Way
Snohomish, WA 98296

Re: Harvey Field Airport Improvement Proposal and Public Works Exemption

Dear Ms. Harvey,

The Department of Planning and Development Services (PDS) has reviewed the memo you provided from Julie Barrow of RS&H dated June 2, 2022 (the "Memo"). The purpose of the Memo is to demonstrate how a proposed airport improvement project for Harvey Field qualifies as a "public work" for an exemption from the maximum allowable density and obstruction limitations in density fringe areas under SCC 30.65.260(4). This letter provides information about relevant County Code provisions the Memo did not address. Specifically, the exemption for "public works" must be read within the context of the uses permitted in the density fringe area. Taken together, these code provisions do not support exempting Harvey Field's proposed airport improvements from the density and obstruction requirements in the County's flood hazard regulations.

Permitted uses in the density fringe area are specified in SCC 30.65.280. and SCC 30.65.260 allows an exemption from the maximum density and obstruction requirements in density fringe areas for the following uses: (1) water-dependent utilities; (2) dikes; (3) utility facilities; and (4) public works (subject to conditions). Each exempt use is separately identified as a permitted use in SCC 30.65.280.¹ Although "public works" are a permitted use under SCC 30.65.280(13), they are limited to roads, bridges, docks, and port facilities. SCC 30.65.280(13)(a)-(d). Therefore, the exemption from the maximum allowable density and obstruction requirements for "public works" under SCC 30.65.260(4) is limited to those permitted public works consisting of roads, bridges, docks, and port facilities. Airport² use is not included within this limited subset of public works permitted in the density fringe area.

Although not a public work, Harvey Field is a permitted use in the density fringe area under recently amended SCC 30.65.280. That code section provides, in relevant part:

The following uses are permitted in the density fringe area:

(14) In urban growth areas only, those uses permitted or conditionally permitted in the underlying zones under SCC 30.22.100, as long as the maximum allowable density and obstruction requirements of SCC 30.65.250 and 30.65.255 are not exceeded and all applicable standards and restrictions of the Shoreline Management Program in chapter 30.67 SCC are met.

¹ See SCC 30.65.280(7), (11), (12), and (13).

² The County Code defines "airport" as "any area of land or water designed and set aside for the landing and taking-off of aircraft, and includes its buildings and facilities, if any." SCC 30.91A.120.

In 2020, the County amended SCC 30.65.280(14), which significantly expanded the types of uses permitted in the density fringe area and specifically allowed for more commercial and industrial uses in the South Snohomish UGA density fringe area. Prior to the amendment, “airport” was not a permitted use in the density fringe area and Harvey Field was considered a “nonconforming use” subject to the requirements for nonconforming uses, including the prohibition against the expansion of the use.³ However, following the amendment of SCC 30.85.280(14), Harvey Field is now a permitted use in the UGA density fringe area: it is located within the South Snohomish UGA on property that is zoned industrial park (IP) where “airport” is a permitted use under SCC 30.22.100. As specified for uses permitted under SCC 30.85.280(14), any modifications to Harvey Field within the UGA must comply with the maximum allowable density and obstruction requirements of SCC 30.65.250 and 30.65.255, unless an exemption applies to those uses listed in SCC 30.65.260. “Airport” is not an exempt use listed in SCC 30.65.260.

The proposed airport improvement activities for Harvey Field appear to be development activities associated with an airport use and subject to the maximum allowable density and obstruction requirements of SCC 30.65.250 and 30.65.255. With the possible exception of the relocation of Airport Way (a county road), the proposed airport improvements do not qualify for an exemption under SCC 30.65.260. Please do not hesitate to contact me with additional questions.

Sincerely,


michael mccrary (Jul 21, 2022 15:13 PDT)

Michael McCrary, Director
425-388-3346 | M.McCrary@snoco.org

cc: Ken Klein, Executive Director, Office of the County Executive

³ See SCC 30.65.310 through .340.

From: [Dobesh, Michael](#)
To: [Barrow, Julie](#)
Subject: RE: Harvey Field Airport
Date: Friday, November 3, 2023 3:30:19 PM
Attachments: [image004.png](#)
[image006.png](#)
[image007.png](#)

Hi Julie,

It was my pleasure to talk with you and Nick. The only thing I would bring up now is that the shoreline CUP and variance *may* be required. We would verify permits/approvals required during the pre-application phase. If required they would be processed concurrently with other project permit applications.

Have a good weekend!

Michael Dobesh | *Division Manager*
[Snohomish County Planning and Development Services](#)
3000 Rockefeller Avenue M/S 604 | Everett, WA 98201
425-388-3819 | michael.dobesh@snoco.org

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From: Barrow, Julie <Julie.Barrow@rsandh.com>
Sent: Friday, November 3, 2023 2:03 PM
To: Dobesh, Michael <Michael.Dobesh@snoco.org>
Subject: RE: Harvey Field Airport



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Hi Michael,

Thanks for meeting with my colleague, Nick, and I yesterday. We found the call most helpful.

Our understanding from that call is as follows:

- Airport is located in Density Fringe floodplain, with airfield improvements occurring in Urban Shoreline Area and Airport Way relocation occurring in Resource Shoreline Area. Proposed airfield improvements meet Density Fringe Requirements for maximum density and obstruction; relocation of Airport Way is exempt from Density Fringe Requirements as it will be deeded to the County as a public work.
- Air Transportation Facilities are not a specified use under Table 1 of [SCC 30.67.430: Shoreline Allowed and Conditional Uses and Modifications](#). As a result, a **Shoreline**

Conditional Use Permit will be required through Snohomish County for design of Airfield improvements. Snohomish County will review and provide opinion of Conditional Use Permit, which will be forwarded to WA Department of Ecology for final approval.

- A **Shoreline Variance Permit** will be submitted to Snohomish County, which does allow for variance of Shoreline performance standards such as those identified in [SCC 30.67.535](#) (stating fill can only be placed in the floodplain for floodproofing / ecological restoration). The Variance permit will be closely tied to the Conditional Use Permit. Similarly, Snohomish County will review and provide opinion of the Variance Permit, which will be forwarded to WA Department of Ecology for final approval.
- Coordination with the County is encouraged as the Environmental Assessment (EA) and future airfield design is further developed to verify conformance to County Shorelines requirements.

Please let me know if you have any additional information you can share at this time.

Thanks, and have a great weekend.
Julie

Julie Barrow

Environmental Specialist
4582 South Ulster Street, Suite 1100, Denver, CO 80237
O 303-409-7940 | M 408-858-4913

Julie.Barrow@rsandh.com
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From: Dobesh, Michael <Michael.Dobesh@snoco.org>
Sent: Thursday, November 2, 2023 11:35 AM
To: Barrow, Julie <Julie.Barrow@rsandh.com>
Subject: RE: Harvey Field Airport

I'm available for the next 25 minutes if you'd like to give me a call.

Michael Dobesh | *Division Manager*
[Snohomish County Planning and Development Services](#)
3000 Rockefeller Avenue M/S 604 | Everett, WA 98201
425-388-3819 | michael.dobesh@snoco.org

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From: Barrow, Julie <Julie.Barrow@rsandh.com>
Sent: Thursday, November 2, 2023 9:55 AM
To: Dobesh, Michael <Michael.Dobesh@snoco.org>

Cc: McCrary, Michael <Michael.McCrary@co.snohomish.wa.us>; Curran, Sean <Sean.Curran@co.snohomish.wa.us>
Subject: RE: Harvey Field Airport



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Hi Michael,

Thank you for the response email.

My colleague and I have just one more clarifying question for you. Would you be able to hop on a 15-minute call with us today to discuss please? If so, can you please provide some times that work and I can send out the meeting invite?

Thanks,
Julie

Julie Barrow

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From: Dobesh, Michael <Michael.Dobesh@snoco.org>
Sent: Wednesday, November 1, 2023 11:57 AM
To: Barrow, Julie <Julie.Barrow@rsandh.com>
Cc: McCrary, Michael <Michael.McCrary@co.snohomish.wa.us>; Curran, Sean <Sean.Curran@co.snohomish.wa.us>
Subject: RE: Harvey Field Airport

Hi Julie,

Compliance with the shoreline regulations is required. It's possible that a shoreline variance could be required for fill, but it will depend on specifics of the project and other sections of the shoreline code. As an example the shoreline code contemplates fill for transportation facilities, such as SCC 30.67.590(1)(f) which states that bridge approach fills shall not encroach into the floodway of a review, so fill would be allowed in the floodplain outside of the floodway (note that I'm using this as an example only and am not stating that airport facilities are transportation facilities under the SMP).

At this time we really don't have enough information to provide specifics for all aspects of permitting. A formal pre-application conference is strongly encouraged prior to submitting permit applications.

Thank you.

Michael Dobesh | *Division Manager*

[Snohomish County Planning and Development Services](#)

3000 Rockefeller Avenue M/S 604 | Everett, WA 98201

425-388-3819 | michael.dobesh@snoco.org

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From: Farris, Gregg <GFarris@co.snohomish.wa.us>

Sent: Tuesday, October 31, 2023 3:59 PM

To: Barrow, Julie <Julie.Barrow@rsandh.com>

Cc: McCrary, Michael <Michael.McCrary@co.snohomish.wa.us>; Dobesh, Michael <Michael.Dobesh@snoco.org>

Subject: RE: Harvey Field Airport

Hi Julie,

All decisions related to the applicability of County code to proposed new development is handled by the County's Planning and Development Services department. I have cc'd Mike McCrary and Michael Dobesh at PDS in case you want to follow up with them. Thanks.

Gregg Farris, P.E. | *Surface Water Utility Director*

[Snohomish County Conservation and Natural Resources](#) | [Surface Water Management](#)

3000 Rockefeller Ave., M/S 303 | Everett, WA 98201

O: 425-388-6454 | C: 425-508-8698 | F: 425-388-6455 | gfarris@snoco.org

REMOTE WORK OFFICE HOURS: Mon-Thu, 8:30 a.m. to 5:30 p.m., Fri 8:00 a.m. to 3:00 p.m.

IN-OFFICE HOURS: None

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From: Barrow, Julie <Julie.Barrow@rsandh.com>

Sent: Tuesday, October 31, 2023 9:58 AM

To: Farris, Gregg <GFarris@co.snohomish.wa.us>

Subject: Harvey Field Airport

CAUTION. This email originated from outside of this organization. Please exercise



caution with links and attachments.

Hello Gregg,

RS&H is preparing an environmental assessment for proposed future improvements at Harvey Field (Airport). The entirety of the Airport and the proposed improvements are within the Density Fringe of the Snohomish River. A Master Plan prepared in 2018 verified proposed developments at the Airport comply with Density Fringe development limits as prescribed in Snohomish County Code (SCC) 30.65. The proposed improvements being analyzed in the environmental assessment carries forward the improvements recommended by the Master Plan, which includes fill in Density Fringe, but complies with density and obstruction limits. The proposed improvements would have a net cut of approximately 20,000 CY.

According to Snohomish County GIS data, the Airport is located in the Urban and Resource Shoreline areas and is additionally located in the Density Fringe Floodplain and City of Snohomish UGA. According to [SCC 30.67.020](#), 30.67 "Shoreline Management Program," is applicable for all shoreline areas, including the 100-year floodplain. Per [SCC 30.67.535](#) 1(a), within Shoreline Areas, fill is an allowed use in Urban shoreline areas only for the purpose of flood-proofing a structure or part of an ecological restoration/enhancement project.

This limitation appears to be in conflict with the Density Fringe development criteria in SCC 30.65. Given that the Density Fringe (which is within the 100-year floodplain) is always within the Shoreline Area, the two criteria would be in conflict.

RS&H is requesting clarification as to which development criteria applies in this case. RS&H would like to assume that adhering to the Density Fringe limitations in SCC 30.65 is allowable for this project.

Please let me know if you have any questions.

Thanks in advance for your assistance.
Julie

Julie Barrow

Environmental Specialist
4582 South Ulster Street, Suite 1100, Denver, CO 80237
O 303-409-7940 | M 408-858-4913
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Gentile, Nicholas

From: Brooke Eidem <Eidem@SnohomishWA.gov>
Sent: Monday, February 12, 2024 11:50 AM
To: Barrow, Julie
Cc: Carroll, Brendan; Gentile, Nicholas; Full, David; kharvey@harveyfield.com; Logan, Ilon (FAA); McCrary, Michael; Heather Thomas
Subject: Re: Harvey Field EA - City SMP Permitting

Good morning Julie,

The Harvey Airfield is identified as "Optional Jurisdictional Limits" in the Shoreline Master Program and "Urban Growth Area" in the Shoreline regulations of Chapter 14.250 SMC. This site is within the UGA of Snohomish, which I believe is why it is identified that way. However until annexation it remains under the jurisdiction of Snohomish County and subject to their regulations. The City will, of course, be interested in any project or site modification that could affect the floodplain, flood storage, or other environmental factors in the area.

Thank you,

Brooke

From: Julie <Julie.Barrow@rsandh.com>
Sent: Friday, February 9, 2024 10:53 AM
To: Brooke Eidem <Eidem@SnohomishWA.gov>
Cc: Carroll, Brendan <Brendan.Carroll@rsandh.com>; Gentile, Nicholas <Nicholas.Gentile@rsandh.com>; Full, David <David.Full@rsandh.com>; kharvey@harveyfield.com <kharvey@harveyfield.com>; Logan, Ilon (FAA) <Ilon.Logan@faa.gov>
Subject: Harvey Field EA - City SMP Permitting

CAUTION : This email originated from outside the City of Snohomish.

Hello Ms. Eidem:

We are performing an environmental assessment for a proposed runway improvement project to the Harvey Field Airport. As part of that environmental assessment, we are evaluating potential impacts to shoreline resources and the implications of the Shoreline Management Act. While the proposed project lies outside City of Snohomish limits, per the 2021 City Comprehensive Plan, Page 5-5, the proposed project would fall within the "Optional Jurisdiction" of the City's Shoreline Management Program. It appears, this is the case because the proposed project is within the floodplain of a reach of the Snohomish River within City limits, but the proposed project is within a portion of the floodplain that lies beyond City limits.

In our review, we could not find guidance related to the applicability of the Shoreline Management Program for "Optional Jurisdiction" areas.

This proposed project does fall under the jurisdiction of the Snohomish County Shoreline Management Program. Can you please confirm that the City will defer jurisdiction of the Shoreline Management Program and all associated permitting to Snohomish County?

Please let me know if you have any questions or would like to set up a quick call to discuss.

Thanks,
Julie

Julie Barrow

Environmental Specialist
4582 South Ulster Street, Suite 1100, Denver, CO 80237
O 303-409-7940 | M 408-858-4913
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June 6, 1991

Snohomish County ASCS Committee
630 Vernon Road 1-A
Everett, Washington 98205

To Whom It May Concern:

The Hanson Farm (location where Frank Bueler resides) has been damaged twice by floods. Once in 1975, and again in 1990. Prior to 1975, there was an open ditch to drain water from Frank's place, through Thompson's to Bat Slough, and then through a tube to the Snohomish River. This open ditch drained the Thompson place, Bernard Houck's adjacent field, Frank's place, Chris Beglinger's, Bailey's, Harvey's, the Springetti Road, and the road and houses south of Frank's place.

After being filled with silt from the flood of 1975, this open ditch was replaced by an 18" main tile line with two 6" lateral lines. The lateral lines are to drain Bernard Houck's field and Thompson's field. This project was designed by SCS. The tiles were installed without gaskets to improve drainage. Sometime between 1975 and 1990, this main tile line was replaced, as the original design was faulty in that the loose fitting tile allowed soil (sandy loam) from Thompson's field to enter the tile and cause erosion in the field. The next SCS design called for an 18" tile line with gasket or sealed joints. The damage to the tile line in 1990 was confined to a 30 foot section that collapsed and the outlet pipe was washed out. As we pointed out before, this tile line drains all the adjacent land into Bat Slough and is located on the Thompson and railroad land.

Frank's place was damaged in 1975 with silt deposits on the high ground north of the section line. This line is between Frank's house and his northern neighbor and extends to the center line of the Marsh Road to the west. This silt was moved from this high ground to the northern lower ground. At that time, the northern lower ground was used for pasture. The 1975 flood came through a hole in the dike near Houck's old barn. The majority of the water came onto Frank's land through the northern railroad trestle. As a result, the silt deposit occurred on the northern high ground.

The 1990 flood came through, over, and around the southern trestle. This flood deposited silt on the high ground south of the section line, along the south railroad trestle on the low ground located there, and it filled the open ditch around the perimeter of Frank's place. This open ditch collects the run off from Frank's place, Beglinger's, Bailey's, Harvey's, Springetti Road, and the road and houses south of Frank's place, and carries it to the previously referred to tile line. This perimeter ditch was not previously damaged by flood. Since the direction of flow was different for each of the mentioned floods, the damage occurred in different places on Frank's land.

Sincerely,

Frank Bueler
Mike Bueler

Exh 4-2

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CHAPTER 1

INTRODUCTION AND PURPOSE

1.1 INTRODUCTION

Harvey Field, Inc. (Client) contracted RS&H, Inc. to perform an Environmental Assessment (EA) for the Runway Improvement Project (Proposed Action) at Harvey Field (Airport). The Airport is privately owned and operated by Kandace Harvey (Airport Sponsor) and located in Snohomish County (County), Washington, approximately 25 miles northeast of the City of Seattle. The Proposed Action includes the construction of proposed Runway 15-33, a new parallel taxiway, and relocation of Airport Way, as well as associated development to support the new paved runway and parallel taxiway. Additional details on the Proposed Action can be found in **Section 1.5** of the EA narrative. The sections below describe the contents of this report as they apply to elements discussed in the EA narrative.

1.2 SURFACE WATER

RS&H has reviewed and documented existing surface water quality conditions in the study area. This report evaluates the hydrologic impact of the Proposed Action under the EA in order to meet requirements laid out by the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), Federal Aviation Administration (FAA), Endangered Species Act (ESA), and the Washington Department of Ecology. RS&H analyzed the changes in peak runoff flow rates and runoff volumes between existing and proposed conditions under the Proposed Action. Drainage analysis within this report was performed in accordance with the Snohomish County Drainage Manual (SCDM) Volume III – Hydrologic Analysis and Flow Control Best Management Practices (BMPs), dated July 2021. Currently, in the existing conditions, there are only water quality facilities at the Airport. In the absence of original design information, RS&H estimated the treatment capacities of these stormwater facilities by applying the water quality storm event to their respective contributing areas. It is assumed that the original design of these stormwater facilities was intended to treat these calculated water quality volumes.

1.3 GROUNDWATER

The Proposed Action and all cumulative development projects are required to comply with all applicable existing regulations that prevent exceedances in groundwater quality standards and maintain groundwater recharge. These groundwater regulations include the federal Safe Drinking Water Act (SDWA) and the Washington State Groundwater Quality Standards.

1.4 FLOODPLAINS

RS&H has reviewed and documented existing floodplains in the study area and evaluated potential impacts from encroachment or alterations of the floodplains. RS&H also evaluated Snohomish County Code (SCC) Density Fringe Requirements for maximum allowable density and maximum allowable obstruction. Additionally, Components of the Proposed Action would be designed based on guidance from Executive Order (EO) 14030 and EO 13690, effective May 20, 2021, which declares that federally funded projects will be subject to the Federal Flood Risk Management Standard (FFRMS). The intent of FFRMS is to ensure federally-funded projects last as long as intended based on local climate resiliency studies. RS&H has researched local adaptation activities to ascertain the extent of regional efforts, status, and data sharing opportunities associated with climate resiliency for the Proposed Action. These resources include an assessment prepared by Washington Coastal Resilience Project (WCRP) which analyzes localized sea level rise projections for varying climate scenarios that consider coastal inundation

hazard composites including low-lying areas, areas affected by storm surge, and flood zones. This report defines the readily available data regarding sea level rise and evaluates potential hazards and impacts adjacent to the Proposed Action and on critical infrastructure associated with the Proposed Action.

CHAPTER 2

SURFACE WATERS

2.1 SITE HYDROLOGY

The Study Area is within the Snohomish River-Frontal Possession Sound watershed (Hydrologic Unit Code (HUC): 171100110203). The Study Area has two primary stormwater basins with distinct outlet points, designated the North Basin and South Basin. See **Figure 1**. Stormwater runoff from the North Basin generally flows off airfield pavements into vegetated infields and ditches. Stormwater runoff is then collected in underground storm sewer and discharged off-site from a culvert under State Route 9 to the west. Runoff generated from the airfield flows through a series of grass-lined drainage ditches and eventually discharges into the Snohomish River at a pump station several miles downstream of the Airport. A portion of the stormwater runoff generated from the northern portion of Airport Property is conveyed to water quality facilities which provide water quality treatment of stormwater runoff for frequent, low flow runoff-producing precipitation events. There are three water quality facilities located within or immediately adjacent to the Study Area, one (1) bioswale and two (2) sets of infiltration trenches. Descriptions of these water quality facilities are as follows:

- Bioswale – vegetated channel designed to convey stormwater while removing pollutants
- Infiltration Trench – a trench filled with stone that receives runoff from adjacent upstream surfaces and allows water to infiltrate into the ground prior to leaving the site

Stormwater runoff from the South Basin generally sheet flows off paved roads and into Hanson Slough, which is a low laying wetland area. Runoff is then discharged off-site to the southeast to Batt Slough through an existing 18" culvert with two 6" laterals. Runoff from the South Basin eventually discharges to the Snohomish River to the east. There are currently no existing water quality facilities in the southern portion of Airport Property.

Due to existing low topographic relief across the site, the existing Airport Way alignment would continue to serve as a drainage divide and the boundaries for the North and South basins in would be unaltered in proposed conditions. Drainage basin boundaries and outfalls will remain unchanged in proposed conditions. Proposed changes in hydrologic conditions and stormwater system under the Proposed Action can be seen in **Figure 2**.

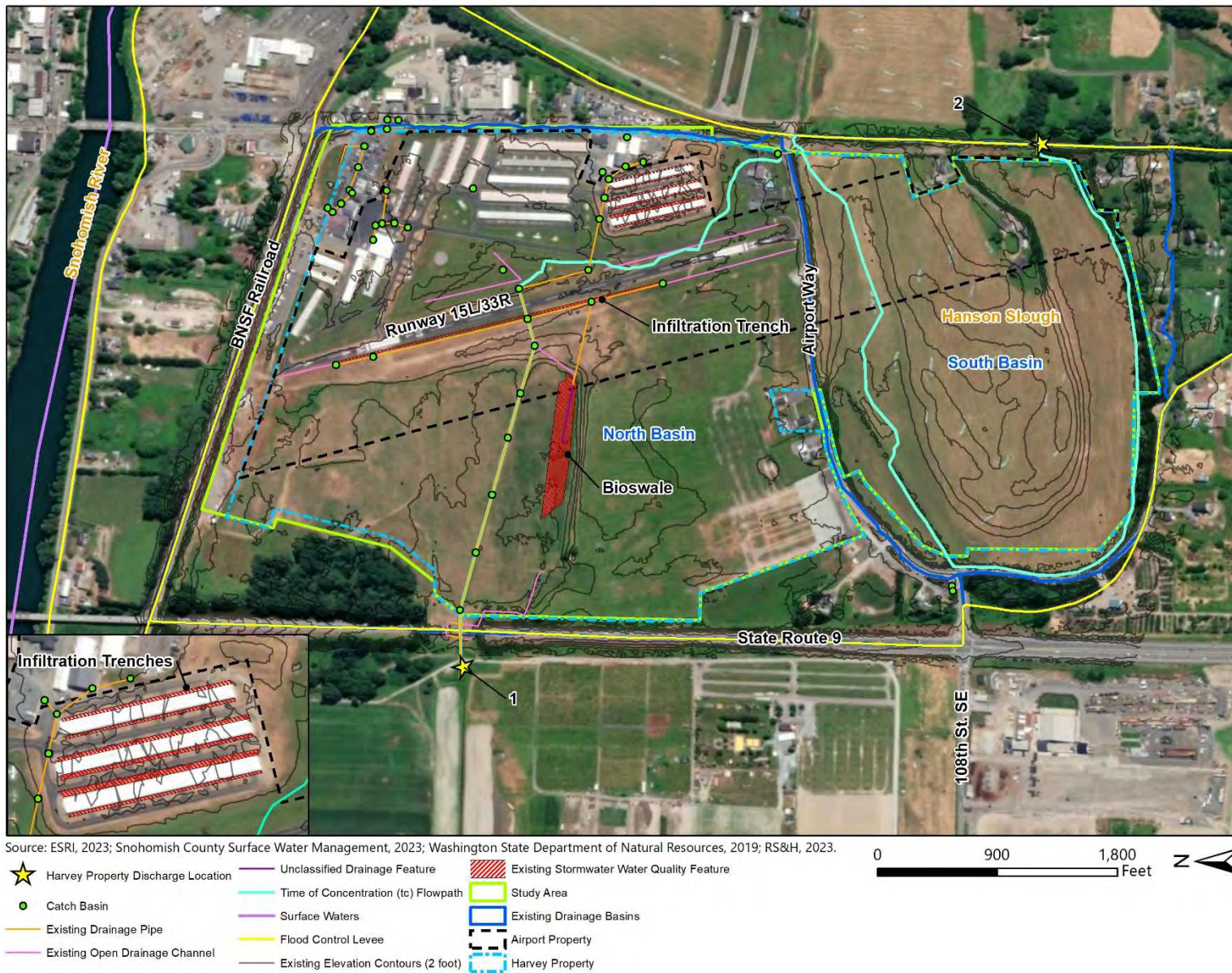
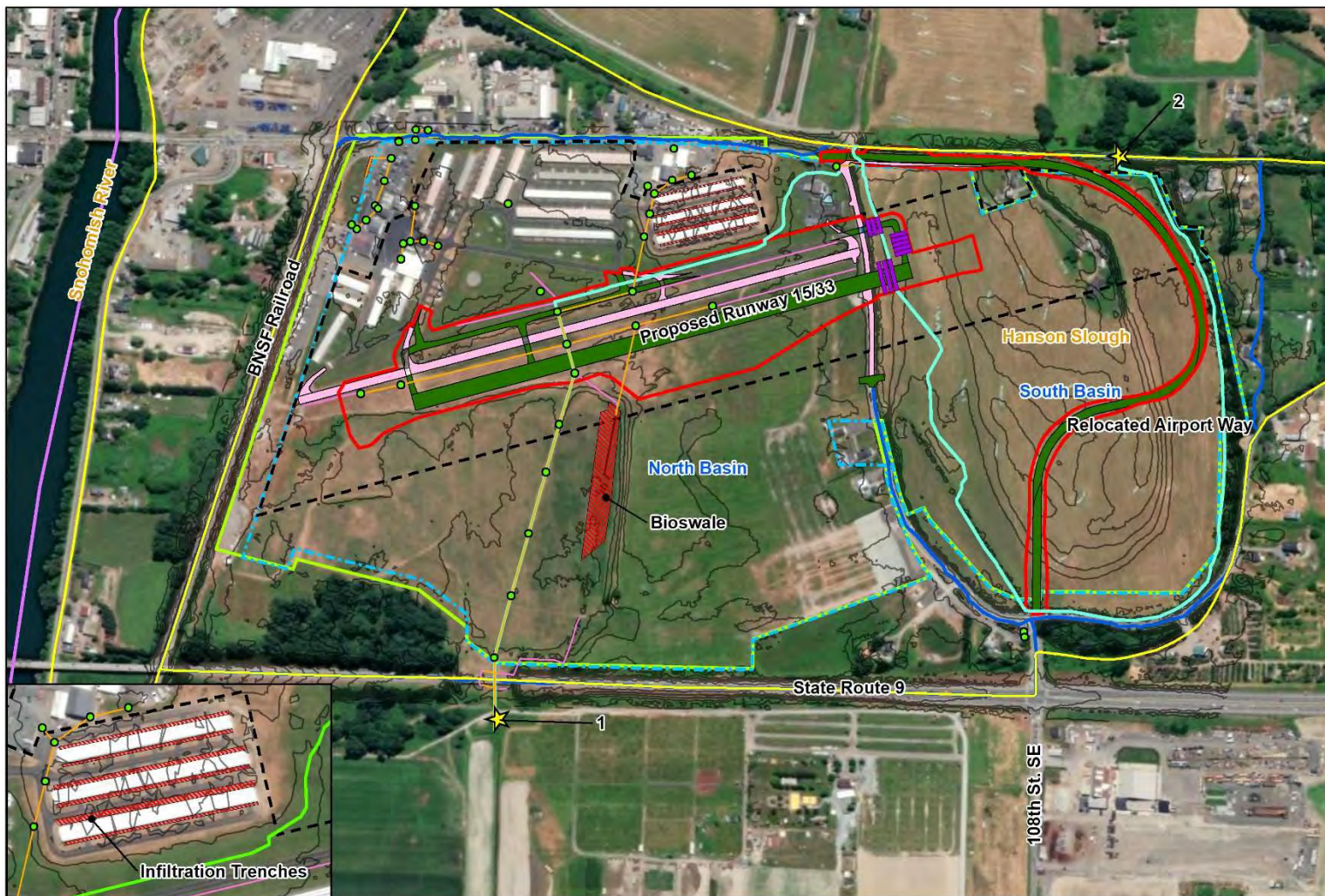


FIGURE 1: EXISTING HYDROLOGIC CONDITIONS



Source: ESRI, 2023; Snohomish County Surface Water Management, 2023; Washington State Department of Natural Resources, 2019; RS&H, 2023.

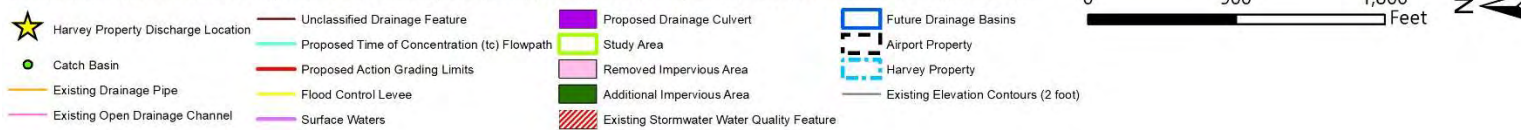


FIGURE 2: PROPOSED HYDROLOGIC CONDITIONS

2.2 COMPLIANCE WITH REGULATORY REQUIREMENTS

2.2.1 Snohomish County

Chapter 2 of the SCDM Volume I – Minimum Technical Requirements sets forth Nine Minimum Requirements (MRs) for new development and redevelopment projects. The Proposed Action could be categorized as a new development project because the site has less than 35% hard surface coverage in the existing condition. The nine MRs are as follows:

1. *Preparation of a stormwater site plan**
2. *Stormwater pollution prevention plan (SWPPP)^*
3. *Water pollution source control for new development activities*
4. *Preservation of natural drainage system or outfalls and provision of off-site mitigation*
5. *On-site stormwater management*
6. *Runoff treatment*
7. *Flow Control requirements for new development*
8. *Stormwater discharge to wetlands*
9. *Inspection, operation, and maintenance requirements**

*To be completed in the design phase

^To be completed by the contractor prior to construction phase

For the purposes of this analysis, the focus will be on MRs 3 through 8 as they impact the proposed stormwater improvements. The following sections briefly describe these requirements and their applicability to this project.

2.2.1.1 MR 3: Water Pollution Source Control for New Development Activities

MR 3 requires the implementation of source control best management practices (BMPs) during construction and on the developed site following construction. SCDM Volume IV provides specific guidance regarding which source control BMPs should be implemented. All known, available and reasonable source control BMPs are required:

- *Source control BMPs in accordance with SCDM Volume IV, Chapters 3 and 4 shall be applied during construction if any pollution-generating activities are performed on the site during construction; and,*
- *Source control BMPs in accordance with SCDM Volume IV, Chapter 5 shall be selected, designed, and constructed if any pollution-generating activities or uses are proposed for the developed site following construction.*

Both types of source control BMPs listed above would be implemented concurrently with the Proposed Action as soil disturbance would occur during construction, and aircraft maintenance and fueling would occur post-construction. Viable source control BMPs that could be implemented on site are as follows:

- *Design loading/unloading areas with berms, sloping, etc. to prevent run-on of stormwater*
- *Prepare a Spill Control Plan (SCP)*
- *Install Stabilized Construction Entrance/Exit*
- *Provide Temporary and Permanent Seeding/Sodding*

2.2.1.2 MR 4: Preservation of Natural Drainage System or Outfalls and Provision of Off-Site Mitigation

MR 4 dictates the preservation of natural drainage systems and outfalls and provision of off-site mitigation. The following elements dictate if this minimum requirement is met:

- *Natural drainage patterns occurring over the past 10 consecutive years shall be maintained*
- *Discharges from the project site shall occur at natural locations*
- *The manner by which runoff is discharged from the project site shall not cause off-site drainage impacts*

The Proposed Action would not modify drainage boundaries nor existing stormwater outfalls. Additionally, proposed conditions peak flow rates at stormwater outfalls would not exceed those of existing conditions which would minimize off-site drainage impacts. As a result, the Proposed Action would meet the requirements of MR 4.

2.2.1.3 MR 5: On-site Stormwater Management

MR 5 requires implementation of on-site permanent stormwater facilities to meet specific Low Impact Development (LID) performance standards. SCDM Volume I, Section 2.5.5 provides specific guidance regarding which permanent stormwater facilities should be implemented. MR 5 is applicable to all projects unless a project qualifies for an exception as defined by the SCC. Additionally, projects that are exempt from MR 7 do not have to achieve the LID performance standards, nor consider bioretention, rain gardens, permeable pavement, and full dispersion. RS&H determined that the Proposed Action is exempt from MR 7, thus the facilities listed above would be considered for the site. See **Section 2.2.1.5** of this document for additional information regarding the applicability of MR 7.

As the Proposed Action is exempt from MR 7, the following permanent stormwater facilities would be implemented, if feasible:

- *Post-Construction Soil Quality and Depth; and*
- *Concentrated Flow Dispersion or Sheet Flow Dispersion*

2.2.1.4 MR 6: Runoff Treatment

MR 6 dictates that stormwater treatment facilities shall be provided for each discharge area in which the following criteria are met:

- *The total of pollution-generating hard surface is 5,000 square feet or more; or*
- *The total of pollution-generating pervious surfaces is 0.75 acres or more.*

The Proposed Action would meet both criteria, so stormwater runoff from disturbed areas would be treated by future permanent stormwater facilities. The Airport is under the jurisdiction of the Snohomish County Phase 1 Municipal Separate Storm Sewer System (MS4) permit and is required to comply with standards of pollutant discharge set forth in the permit, including adherence to water quality criteria established in the SCDM. The procedures set forth in the SCDM Volume I, Chapter 4, Section 4.3 determines the specific type of stormwater treatment required for the project. SCDM Volume V, Chapter 4, Section 4.1 provides requirements for design storm volumes and flow rates.

2.2.1.5 MR 7: Flow Control Requirements for New Development

According to the SCDM Volume III, Section 2.2.2, flow control measures to reduce peak flow rates to pre-developed (that is, forested, uninhabited) conditions are required for most developments. However, flow control is not required for areas that discharge through a MS4 to a tidal waterway and where additional site-specific criteria are met. The Snohomish River, downstream of the confluence of the Snoqualmie River and the Skykomish River, is considered a tidal waterway. To be exempt from flow control requirements, a development must also meet all of the following criteria:

- *Not divert drainage from any waterbody with specific classification from the Washington State Department of Ecology;*
- *Have a contributing area that is drained by a conveyance system comprised of entirely manmade structures, such as pipes and ditches;*
- *Have sufficient hydraulic capacity to convey runoff from future build-out conditions; and,*
- *Have adequate stabilization of erodible manmade conveyance system elements.*

These criteria are all met for the Study Area, thus flow control to pre-developed runoff rates would not be required for the Proposed Action.

2.2.1.6 MR 8: Stormwater Discharge to Wetlands

Per MR 8, projects shall employ permanent stormwater facilities to reduce impacts of stormwater runoff to wetlands. The North Basin and South Basin both discharge to wetlands, which can be seen in **Figure 3** below, with detailed information found in the Wetlands Report.

The Level of Wetland Protection, including continuous simulation modeling, would be determined in the design phase of the Proposed Action. However, it is anticipated that the Proposed Action would be able to meet all requirements of the Level of Wetland Protection application package, including:

- *General protection of wetlands*
- *Protection from pollutants through the use of construction stormwater BMPs, source control BMPs, LID practices and principles, and water quality facilities*
- *Wetland Hydroperiod Protection: required as Study Area is in a Critical Aquifer Recharge Area (CARA) with high sensitivity to contamination. See **Section 2.7** of this document for more detailed discussion.*
- *No permanent stormwater facilities are proposed in wetlands or their associated buffer zones*

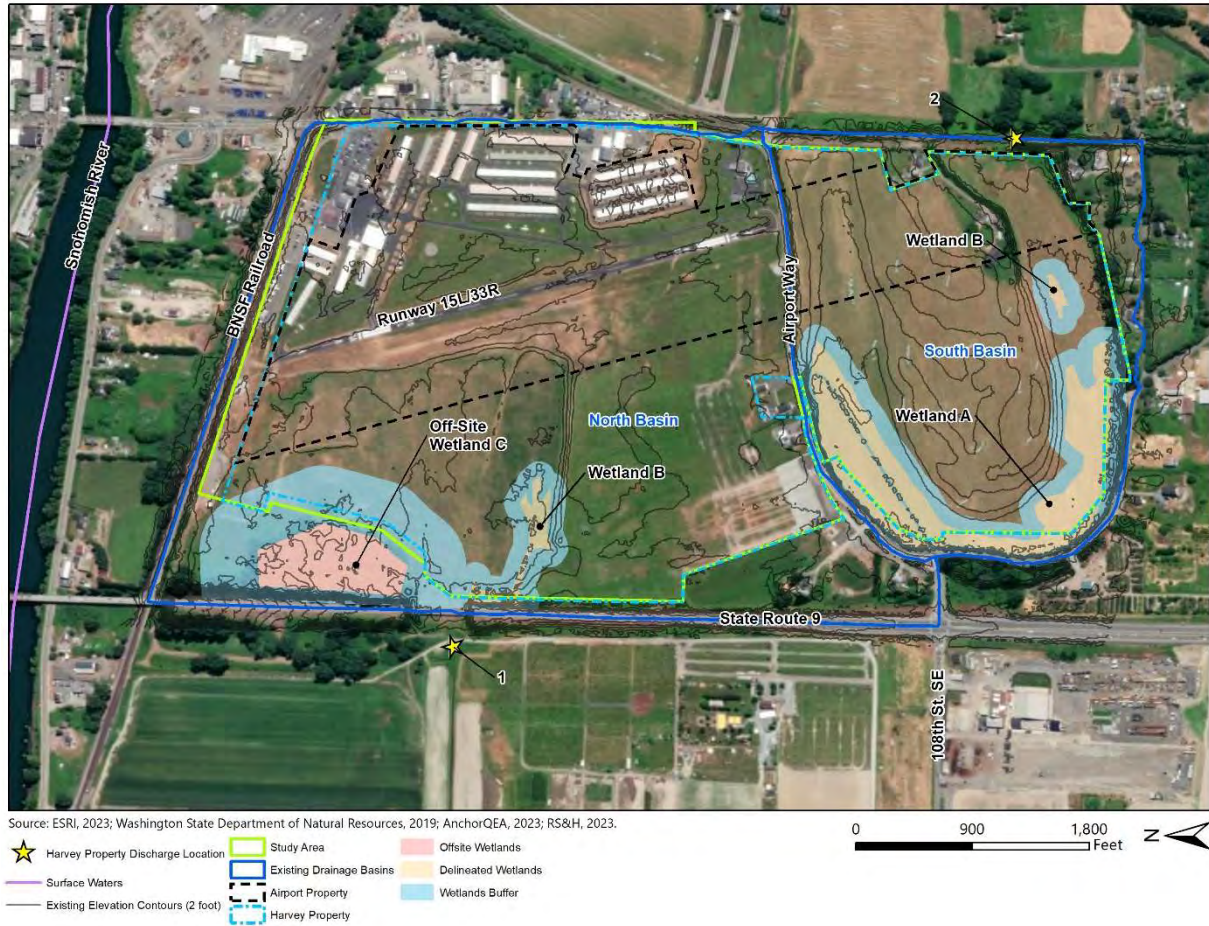


FIGURE 3: EXISTING DRAINAGE BASINS AND DELINEATED WETLANDS

2.2.2 Marshland Flood Control District

The off-site drainage ditches and pump station downstream from the project site are owned by the Marshland Flood Control District (FCD). See **Figure 4** for Marshland FCD boundaries. The Marshland FCD has the authority to engage in flood control activities necessary to prevent inundation or flooding from water bodies and take actions necessary to protect life and property from inundation or flow of flood waters, stormwaters, or surface waters. To minimize impacts to downstream properties and drainage infrastructure owned by the Marshland FCD, the stormwater improvements Proposed Action will ensure that peak flow rates from proposed conditions are less than or equal to those in existing conditions, regardless of the applicability of Snohomish County flow control requirements.

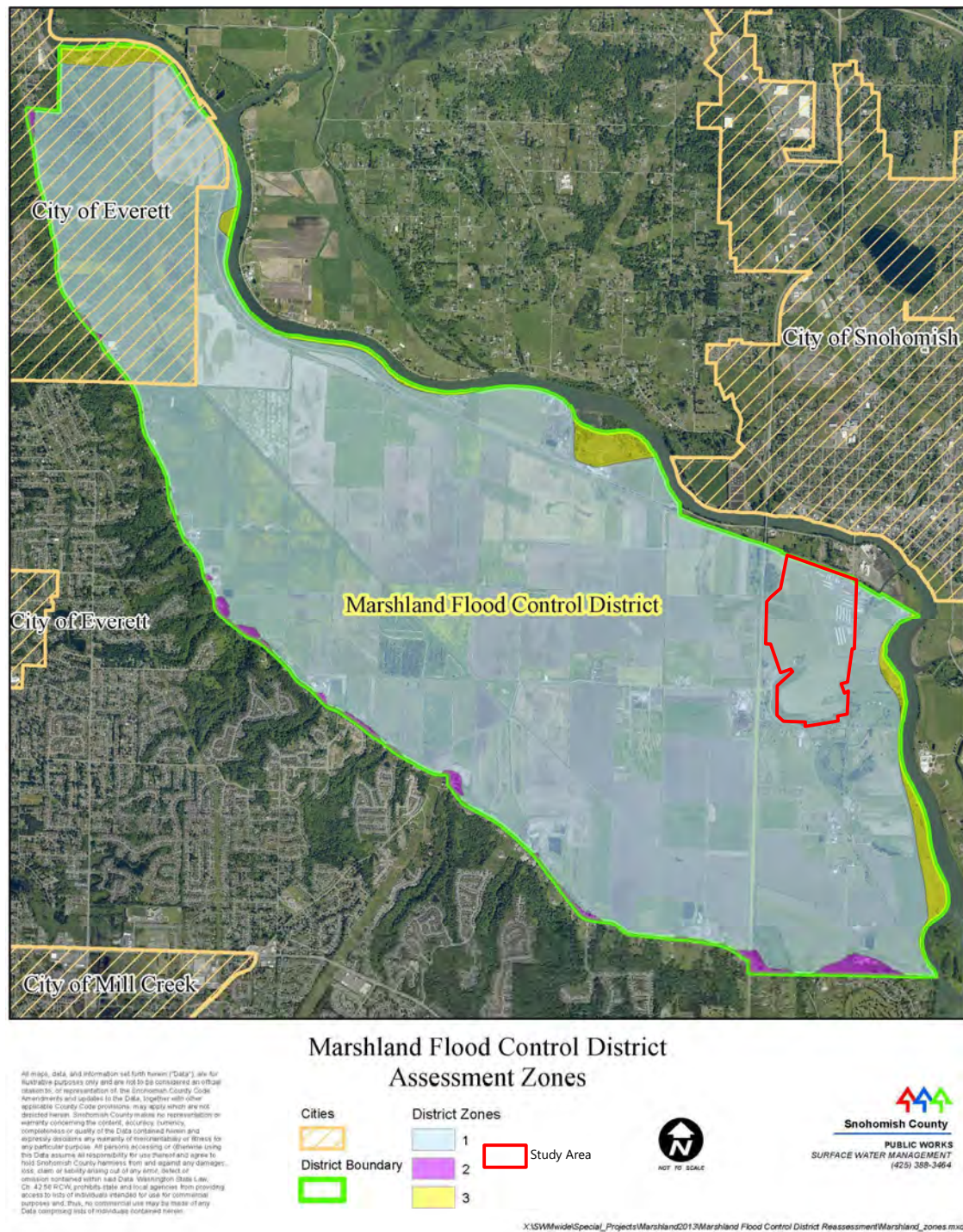


FIGURE 4: MARSHLAND FCD JURISDICTIONAL BOUNDARIES

2.2.3 Endangered Species

Projects that require federal permits and/or utilize federal funding are required to address the potential project impacts on federally listed threatened or endangered species and their designated or proposed critical habitat under Section 7 of the ESA and to address impacts to Essential Fish Habitat under the

Magnuson-Stevens Fisheries Management and Conservation Act. Multiple threatened or endangered fish species are documented in the Snohomish River. Due to the presence of endangered species in the Snohomish River, permanent stormwater improvements under the Proposed Action will be designed to have proposed conditions peak flow rates are less than those in existing conditions to assist in mitigate potential hazards to endangered species. A combination of flow control and permanent infiltration facilities would prevent an increase of pollutant discharge to surface waters which could adversely impact these species (Jviation, 2018).

2.3 WATER QUANTITY

RS&H utilized Technical Release 55 (TR-55) method, as described in the *Urban Hydrology for Small Watersheds TR-55 Manual*, to determine the difference in peak discharge rate resulting from the Proposed Action in the two drainage basins. The SCDM requires this runoff calculation method for projects over 25 acres. The TR-55 manual was developed by the Natural Resources Conservation Service (NRCS), a branch of the United States Department of Agriculture (USDA). The TR-55 method utilizes site topography, time of concentration (t_c), land cover, and soil type to delineate drainage basins and determine the site stormwater runoff.

2.3.1 Drainage Basins

RS&H delineated the existing drainage basins using existing LiDAR data from the Washington State Department of Natural Resources (DNR) and levee data provided by the Federal Emergency Management Agency (FEMA). Proposed drainage basins were unchanged from existing basins based on preliminary grading for the Proposed Action and lack of impact on existing levees. RS&H determined existing and proposed land covers for drainage basins utilizing aerial imagery (Maxar 2023) and the Proposed Action improvements. **Tables 1** and **2** summarize the land cover in existing and proposed drainage basins.

TABLE 1: NORTH DRAINAGE BASIN IMPERVIOUS COVER SUMMARY

Conditions	Discharge Location*	Area (acres)	Impervious Area (acres)	Percent Impervious
Existing	1	178.68	27.59	15.4%
Proposed	1	178.68	30.05	16.8%
Net Change			2.46	1.4%

*See **Figure 1** and **Figure 2** for existing and proposed hydrologic conditions, respectively.

TABLE 2: SOUTH DRAINAGE BASIN IMPERVIOUS COVER SUMMARY

Conditions	Discharge Location*	Area (acres)	Impervious Area (acres)	Percent Impervious
Existing	2	84.16	3.01	3.6%
Proposed	2	84.16	6.35	7.5%
Net Change			3.34	4.0%

*See **Figure 1** and **Figure 2** for existing and proposed hydrologic conditions, respectively.

2.3.2 Time of Concentration (t_c)

T_c is the time it takes runoff to travel from the hydraulically most distant point in the watershed or basin to the point of interest and is used in calculating the peak runoff rate. RS&H calculated the T_c for each existing and proposed drainage basin utilizing the NRCS Runoff Method. T_c flow paths for existing basins were determined using existing LiDAR elevation data and stormwater infrastructure data collected from the Snohomish County Drainage Inventory. The Snohomish County Drainage Inventory indicated that Corrugated Metal Pipe (CMP), High-density Polyethylene Pipe (HDPE), and Reinforced Concrete Pipe (RCP) are present on site. T_c for proposed conditions accounts for changes in hydrology based on preliminary proposed grading. The Manning's roughness coefficients (n) used in time of concentration calculations are shown in **Table 3** below. See **Attachment I-1** for T_c calculations.

TABLE 3: MANNING'S N VALUES

Material	Manning's n
Corrugated Metal Pipe (CMP)	0.024
High-density Polyethylene Pipe (HDPE)	0.012
Reinforced Concrete Pipe (RCP)	0.013

Source: Snohomish County Engineering Design and Development Standards, Table 5-2

2.3.3 Soils, Land Cover, and Curve Number

Soil type and land cover within the Study Area impact the amount of runoff produced by rainfall. These site characteristics can be used to determine runoff curve numbers (CN) for the site, which indicate the site's runoff potential. RS&H utilized NRCS resources to determine the types of soil found on site at the Airport. Soils on site consist of Puget Silty Clay Loam, Sultan Silt Loam, and Puyallup Fine Sandy Loam. Puget Silty Clay Loam and Puyallup Fine Sandy Loam are part of Hydrologic Soil Group (HSG) A and Sultan Silt Loam is part of HSG C. Soils in HSG A have high infiltration rates while soils in HSG C typically have moderately low infiltration rates. See **Attachment I-2** for NRCS Soils Report. **Table 4** below presents the soil types, land covers, and CN values for the site.

TABLE 4: LAND COVER AND CURVE NUMBER VALUES

Soil Type	Land Cover Description	Curve Number (CN)
Hydrologic Soil Group A	Good Condition (ground cover >75 percent and lightly or only occasionally grazed)	39
Hydrologic Soil Group C	Good Condition (ground cover >75 percent and lightly or only occasionally grazed)	74
Impervious	Paved Area, Roofs	98

Source: SCDM Volume III, Table 3-2.

2.3.4 Rainfall Depths

RS&H determined local rainfall depths using isopluvial maps from in the *SCDM Volume III, Appendix III-A and NOAA Atlas 2, Volume IX*. The SCDM requires analysis for runoff rates from the 2-, 10-, 50-, and 100-year, 24-hour storm events. Rainfall depths for these design storms are provided in **Table 5** below.

TABLE 5: RAINFALL DEPTH

Design Storm	Rainfall Depth (inches)
2-Year	1.9
10-Year	2.6
50-Year	3.3
100-Year	3.7

2.3.5 Peak Discharge

Using the TR-55 method with the variables as described in the above sections, RS&H determined peak discharge values across existing and proposed basins. Without permanent stormwater facilities for attenuation, the Proposed Action would increase stormwater runoff in both Airport drainage basins across each design storm analyzed. **Table 6** and **Table 7** below present the peak discharges and increases in peak discharge across each basin for the three design storms analyzed. See **Attachment I-3** for existing hydrologic conditions, CN and Peak Discharge calculations.

TABLE 6: NORTH BASIN PEAK DISCHARGE SUMMARY

Condition	Area (acres)	Time of Concentration (minutes)	Curve Number Value	2-Year Peak Discharge (cubic feet per second [cfs])*	10-Year Peak Discharge (cfs)*	50-Year Peak Discharge (cfs)*	100-Year Peak Discharge (cfs)*
Existing	178.68	55	72.55	3.49	9.30	21.18	31.02
Proposed	178.68	53.7	72.73	3.63	9.41	21.67	31.64
Net Change				+0.14	+0.11	+0.49	+0.62

*Peak Discharge Equation: $Q_p = q_u \cdot A_m \cdot Q \cdot F_p$

q_u = Unit Peak Discharge (from TR-55 Manual), A_m = Drainage Area, Q = Runoff, F_p (Pond and Swamp Adjustment Factor) = 1

TABLE 7: SOUTH BASIN PEAK DISCHARGE SUMMARY

Condition	Area (acres)	Time of Concentration (minutes)	Curve Number Value	2-Year Peak Discharge (cubic feet per second [cfs])*	10-Year Peak Discharge (cfs)*	50-Year Peak Discharge (cfs)*	100-Year Peak Discharge (cfs)*
Existing	84.16	134.6	72.44	1.46	3.66	7.79	10.49
Proposed	84.16	143.4	73.43	1.61	3.99	8.34	11.16
Net Change				+0.15	+0.33	+0.55	+0.67

*Peak Discharge Equation: $Q_p = q_u \cdot A_m \cdot Q \cdot F_p$

q_u = Unit Peak Discharge (from TR-55 Manual), A_m = Drainage Area, Q = Runoff, F_p (Pond and Swamp Adjustment Factor) = 1

2.3.6 Future Design Considerations

SCDM Volume III – Hydrologic Analysis and Flow Control BMPs, identifies the general requirements for stormwater quality facilities and may be used in final design to treat the volumes shown in **Table 8** below. Proposed permanent stormwater facilities should be designed to be less than or equal to the existing conditions flow rates discussed in **Section 2.3.5** of this document. Proposed permanent stormwater facilities may also be designed to provide some treatment, thus contributing to the necessary water quality volumes discussed in **Section 2.4.1** of this document. The increases in peak flow rates and required water quality volumes as a result of the Proposed Action are considered minor and could likely be mitigated through minor alterations of existing stormwater facilities or modifications to the existing stormwater system. Due high aquifer sensitivity in the Study Area, infiltration facilities utilizing perforated underdrains are prohibited in the Study Area (see discussion in Section 3.1). If new permanent stormwater facilities are necessary to be required in final design, the following permanent stormwater facilities are approved in SCDM Volume III to meet the flow control requirements:

- Detention Ponds
- Detention Pipes
- Detention Vaults

These permanent stormwater facilities should be designed to not interfere with known groundwater elevations and to limit standing water requirements to those outlined in FAA Advisory Circular (AC) 150/5200-33C, *Hazardous Wildlife Attractants on or Near Airports*. Additionally, in final design, detailed

hydrologic modeling may show that the existing Hanson Slough, located in the South drainage basin, acts as a storage area for stormwater detention and assists in meeting flow control requirements for the South Basin.

2.4 WATER QUALITY

2.4.1 Calculations

SCDM Volume III, Section 2.3.1 identifies the design storm for volume-based treatment facility sizing is the 6-month, 24-hour rainfall depth, which can be calculated as 72% of the 2-year, 24-hour storm rainfall depth. Utilizing the runoff depth from the 6-month, 24-hour design storm applied across the drainage basin area yielded a water quality volume. RS&H used the TR-55 method to determine the runoff depth and total disturbed area for each basin to calculate the water quality volumes in each basin under proposed conditions. Note that some runoff from the airport is currently not treated and is not within the proposed grading limits. As this runoff is not treated in the existing condition, water quality volumes were calculated just for the disturbed area associated with the Proposed Action. Runoff generated from storm events greater than the water quality storm event would discharge through existing stormwater outfalls, shown in **Figure 1** and **Figure 2**. See **Attachment I-4** for water quality volume calculations.

The North Basin has three water quality facilities in place to treat stormwater runoff: a bioswale, an infiltration trench for the runway, and multiple infiltration trenches for a set of hangars towards the southeast corner of the Airport. These water quality facilities can be seen in **Figure 2**, with contributing areas for the existing water quality facilities shown in **Figure 5**. RS&H calculated treatment volumes for each water quality facility based on contributing area, land cover, and runoff (**Table 8** below) to estimate the current capacity of these permanent stormwater facilities. See **Attachment I-5** for water quality volume calculations and existing stormwater facility contributing areas. The Proposed Action would require removal of the existing infiltration trench that treats stormwater from a portion of the existing runway and the grass area adjacent to the west of the runway. This volume must be treated in the proposed conditions in addition to the treatment volumes provided in **Table 9** below, amounting to a necessary water quality volume of 0.24 acre-feet for the North Basin and 0.06 acre-feet for the South Basin. See **Figure 6** for proposed water quality treatment facility contributing areas. The functionality of other existing stormwater facilities should be confirmed in final design.

TABLE 8: EXISTING STORMWATER BMP WATER QUALITY VOLUMES

Existing Stormwater Facilities	Contributing Area (square feet)	Runoff, Q (inches)	Available Treatment Volume (cubic feet)	Available Treatment Volume (acre-feet)
Facility 1 – Bioswale	927,808	0.107	8,273	0.19
Facility 2 – Runway Infiltration Trench	373,600	0.073	2,273	0.05
Facility 3 – Hangar Infiltration Trenches	134,549	0.372	4,171	0.10

Note: $V \text{ (cf)} = A \cdot Q / 12$

TABLE 9: REQUIRED WATER QUALITY VOLUMES FOR DISTURBED AREAS

Basin	Disturbed Area (acres)	Water Quality Volume (cubic feet)	Water Quality Volume (acre-feet)	Demolished Existing Water Quality Volume (acre-feet)	Total Required Water Quality Volume (acre-feet)
North	26.49	8,269	0.19	0.05	0.24
South	7.86	2,768	0.06	-	0.06



FIGURE 5: EXISTING WATER QUALITY TREATMENT CONTRIBUTING AREAS

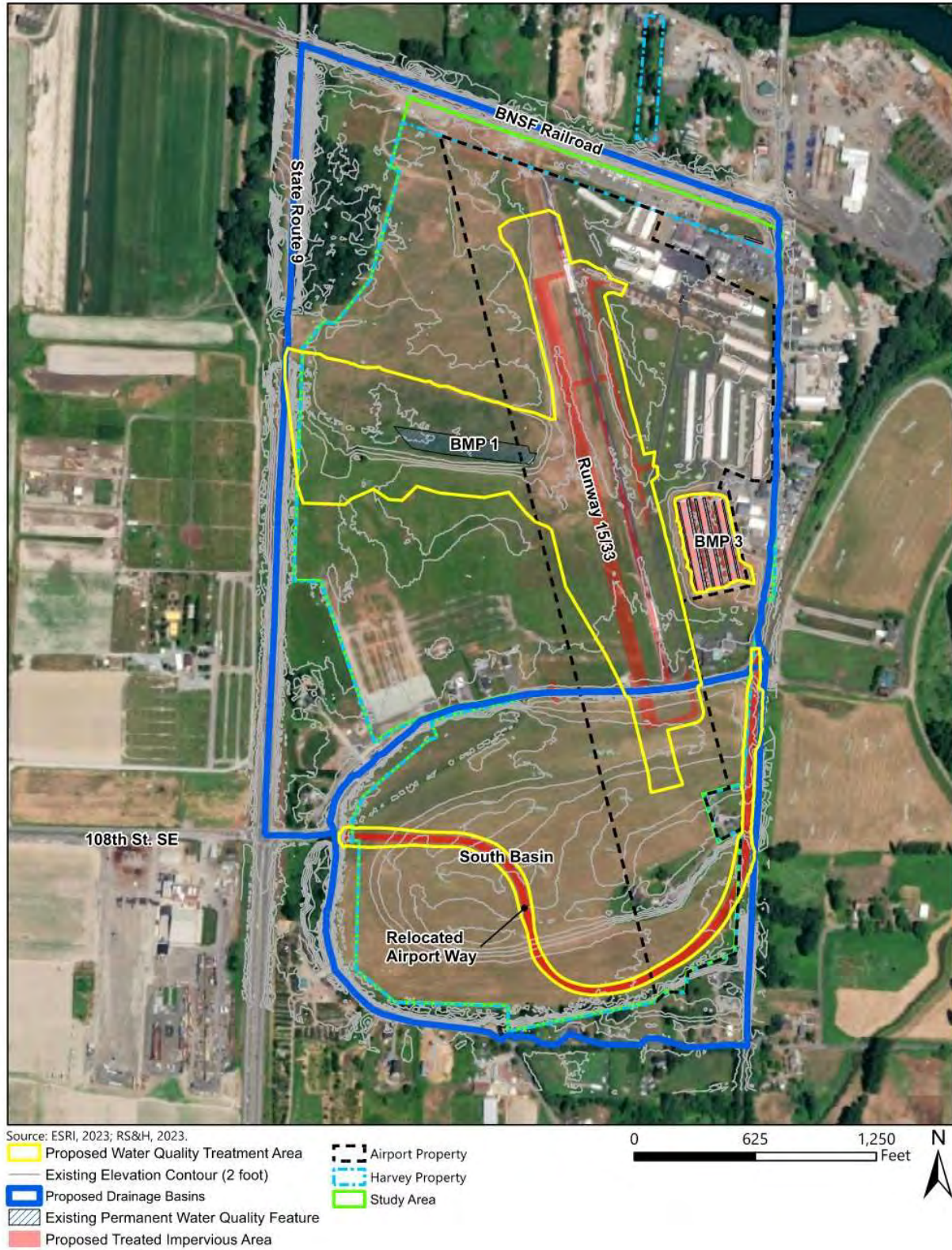


FIGURE 6: PROPOSED WATER QUALITY TREATMENT CONTRIBUTING AREAS

2.4.2 Future Design Considerations

SCDM Volume V – Runoff Control BMPs, dated July 2021 identifies the general requirements for stormwater quality facilities and may be used in final design to treat the volume provided in **Section 2.4.1** of this document. Existing stormwater facilities to remain would be expanded or new stormwater facilities would need to be installed. These facilities should be designed to accommodate the treatment volumes calculated in this section and can account for the treatment volume already provided by existing stormwater facilities that are not demolished. As discussed in Chapter 3 of the EA Narrative, surface water quality standards for temperature, Dissolved Oxygen (DO), pH, turbidity, and E. Coli apply to the site. Viable water quality facilities to remove pollutants and decrease overall turbidity are as follows:

- Biofiltration Swale
- Pretreatment settling basins
- Filtration
- Bioretention

These water quality facilities should be designed to limit standing water and to not interfere with known groundwater elevations.

CHAPTER 3
GROUNDWATER

3.1 REGULATORY REVIEW

Relevant local, state, and federal regulations and statutes pertaining to groundwater include:

- Safe Water Drinking Act (SDWA)
- Chapter 173-200 Washington Administrative Code
- Chapter 90.48 RCW: Water Pollution Control
- Chapter 90.54 RCW: Water Resources Act of 1971

The Washington State Department of Ecology has developed Groundwater Quality Standards which protect both existing and future beneficial uses of groundwater resources in Washington State. These standards specifically identify potential groundwater contaminants and discharge criteria for each. An antidegradation policy is also enacted for non-permitted activities which have the potential to contaminate groundwater quality and is designed to ensure the protection of the State's groundwater resources and natural environment. Under this policy, groundwater resources should be protected as a potential source of drinking water which recognizes the future need of new potential drinking water sources. These measures prevent the degradation of groundwater resources beyond thresholds which are to not be exceeded as the result of proposed development. Additionally, groundwater which is hydraulically connected to a surface water body must abide by standards established in the Water Quality Standards for Surface Water of the State of Washington, which similarly have an antidegradation policy to restore and maintain the highest possible quality of surface waters of Washington.

3.2 GROUNDWATER RECHARGE

Under the Washington groundwater regulations, all groundwater resources should be protected as a potential source of drinking water, and thus measures must be taken to prevent the degradation of groundwater resources as a result of the Proposed Action. Soils on the site consist of HSG A soils and HSG C. Soils in HSG A have high infiltration rates while soils in HSG C typically have moderately low infiltration rates. See **Attachment I-3**. The amount of exposed HSG A soil increased by 0.2% of the total drainage area due to the Proposed Action because of demolition of impervious surfaces that were previously covering HSG A soils. The amount of exposed HSG C soil decreased by 1.8% of the total drainage area due to new impervious surfaces associated with the Proposed Action. As a result, groundwater infiltration and recharge rates are anticipated to be altered after project completion. However, per Snohomish County regulations for water quality (**Section 2.4** of this document), treatment must be provided for disturbed areas. Groundwater recharge rate would not be substantially affected due to additional stormwater runoff discharging to the Snohomish River, which is hydraulically connected to groundwater beneath the Study Area (Cardno, 2019).

The County has established CARAs to safeguard public health, safety, and welfare and protect groundwater resources. CARAs include sole source aquifers, Washington State Department of Health (WSDOH) wellhead protection areas, and areas that are sensitive to aquifer contamination as established by the U.S. Geological Survey (USGS). The Study Area is in an area with high aquifer sensitivity due to low depth to groundwater (see **Figure 7**). Aquifer sensitivity is defined by the relative ease with which a contaminant could hypothetically migrate to groundwater, accounting for parameters such as average annual groundwater recharge and depth to groundwater. Aquifer sensitivity does not account for the influence of human activities nor the actual vulnerability of an aquifer to contamination. As a result,

aquifer sensitivity and aquifer vulnerability are not necessarily correlated. Proposed development in CARAs in the County has a sequential order of preference to avoid and minimize impacts, as shown below:

- Avoiding impacts altogether by not taking a certain action or parts of an action; or when avoidance is not possible;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation or by taking affirmative steps, such as project redesign, relocation, or timing, to avoid or reduce impacts; and
- Mitigation for the impacts to the CARA

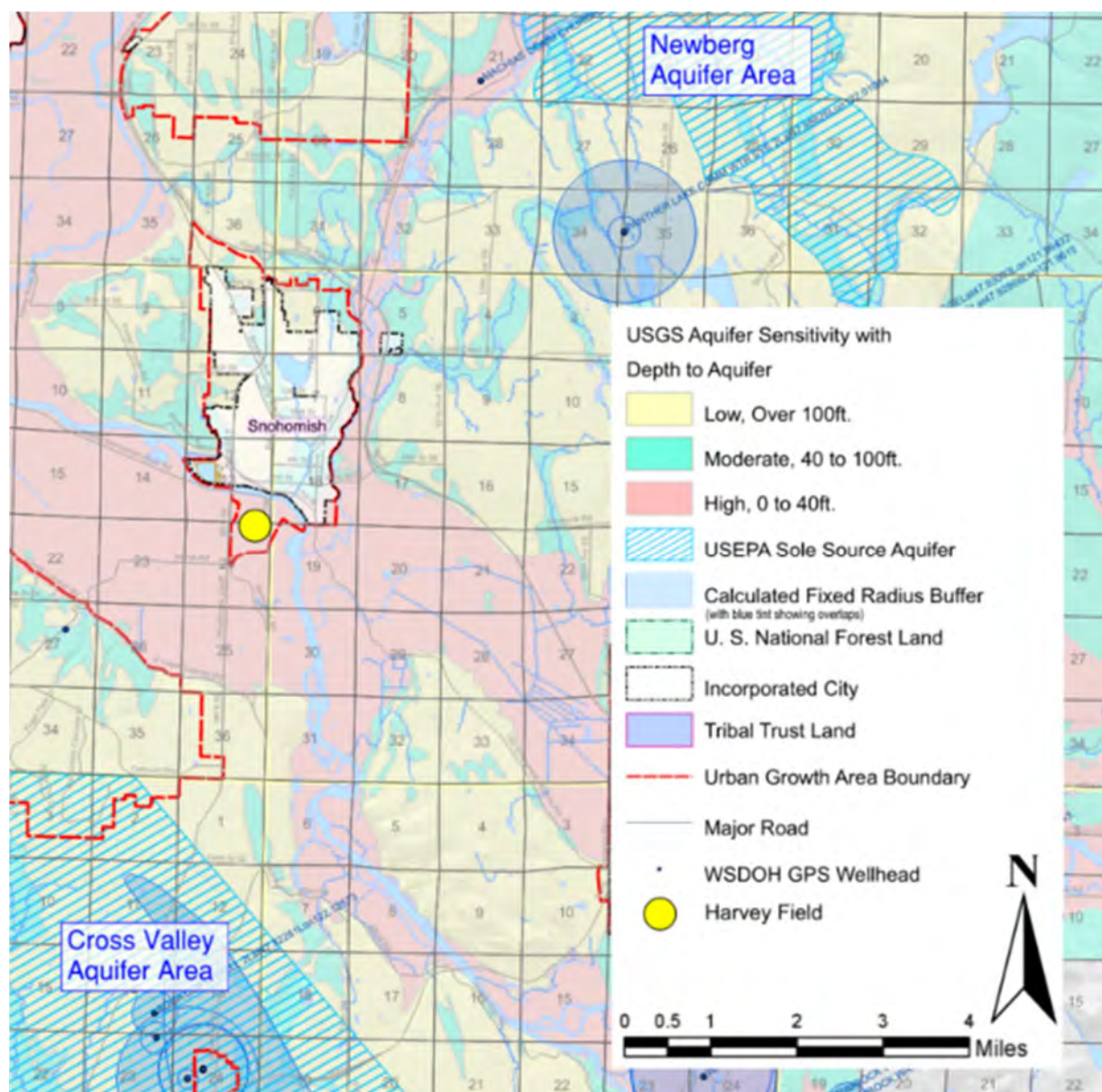


FIGURE 7: CRITICAL AQUIFER RECHARGE AREAS IN SNOHOMISH COUNTY

3.3 GROUNDWATER QUALITY

The Proposed Action and all cumulative development projects are required to comply with all applicable existing regulations that prevent exceedances in groundwater quality standards. As groundwater in the Study Area is hydraulically connected to the Snohomish River, the Surface Water Quality Standards for the waterway apply to the groundwater. As a result, as long as water quality facilities are installed to address surface water pollution concerns, the Proposed Action would be unlikely to cause or increase groundwater contamination and therefore would have no effect on groundwater.

CHAPTER 4 FLOODPLAINS

4.1 INTRODUCTION

Floodplains are delineated by the Federal Emergency Management Agency (FEMA) and are reported on Flood Insurance Rate Map (FIRM) panels. The Study Area is located in Snohomish County, FIRMs 1061G and 1065G (2020). The Proposed Action would encroach on FEMA-designated floodplains and Snohomish County-designated Density Fringe Area. The Density Fringe Area designation was established to regulate development in areas of high flood damage potential where conventional floodwater areas cannot be established. The Density Fringe Area is listed as having permitted development use of public works, limited to roads, bridges, docks, and port facilities (Snohomish County, 2015). The relocation of Airport Way is considered a public works project under these rules as the roadway will be deeded to Snohomish County upon completion. Additionally, per correspondence with Snohomish County, airfield improvements under the Proposed Action qualify as an approved land use and thus must meet the development criteria for the Density Fringe area.

Development within the Density Fringe areas must meet the following criteria in order to be permitted:

1. Maximum allowable density – land area occupied by any use or development that will displace floodwater shall not exceed two percent of the land area of that portion of the lot located in the density fringe area
2. Maximum allowable obstruction – The maximum width of all new construction shall not exceed 15 percent of the length of a line drawn perpendicular to the known floodwater flow direction at the point where the development is located. The length of said line shall not extend beyond the property boundary or edge of density fringe area, whichever is less.

The development criteria above are established by Snohomish County to prevent a cumulative increase in the BFE of the Density Fringe area of more than one foot.

Per the SCC, maximum allowable density and obstruction limitations shall not apply to public works projects that demonstrate that the floodwater displacement effects considered with the maximum floodwater displacement allowed per the SCC do not cause a cumulative increase in the BFE of more than one foot (Snohomish County, 2015). Thus, the relocation of Airport Way will not be considered during the evaluation of the maximum allowable density and maximum allowable obstruction for the study area.

RS&H determined proposed Runway 15-33 meets all of the above criteria. Floodplain hydraulic modeling, conducted in the 2018 Master Plan with a design consistent with the Proposed Action, confirms that the implementation of the Proposed Action, including the relocation of Airport Way, would result in a change in the 100-year (1 percent-annual-chance) BFE of 0.00 feet. Earthwork volumes, which affect flood storage and BFE, for the Proposed Action can be seen in **Attachment I-6**.

A major factor contributing to the development of established BFEs is the amount of water that would overtop existing levees in the Snohomish River in a flood event. As the Proposed Action would have no effects on water levels in the Snohomish River, the amount of floodwater entering the Harvey Field flood storage area (**Figure 8**) as the result of overtopping levees would not change.

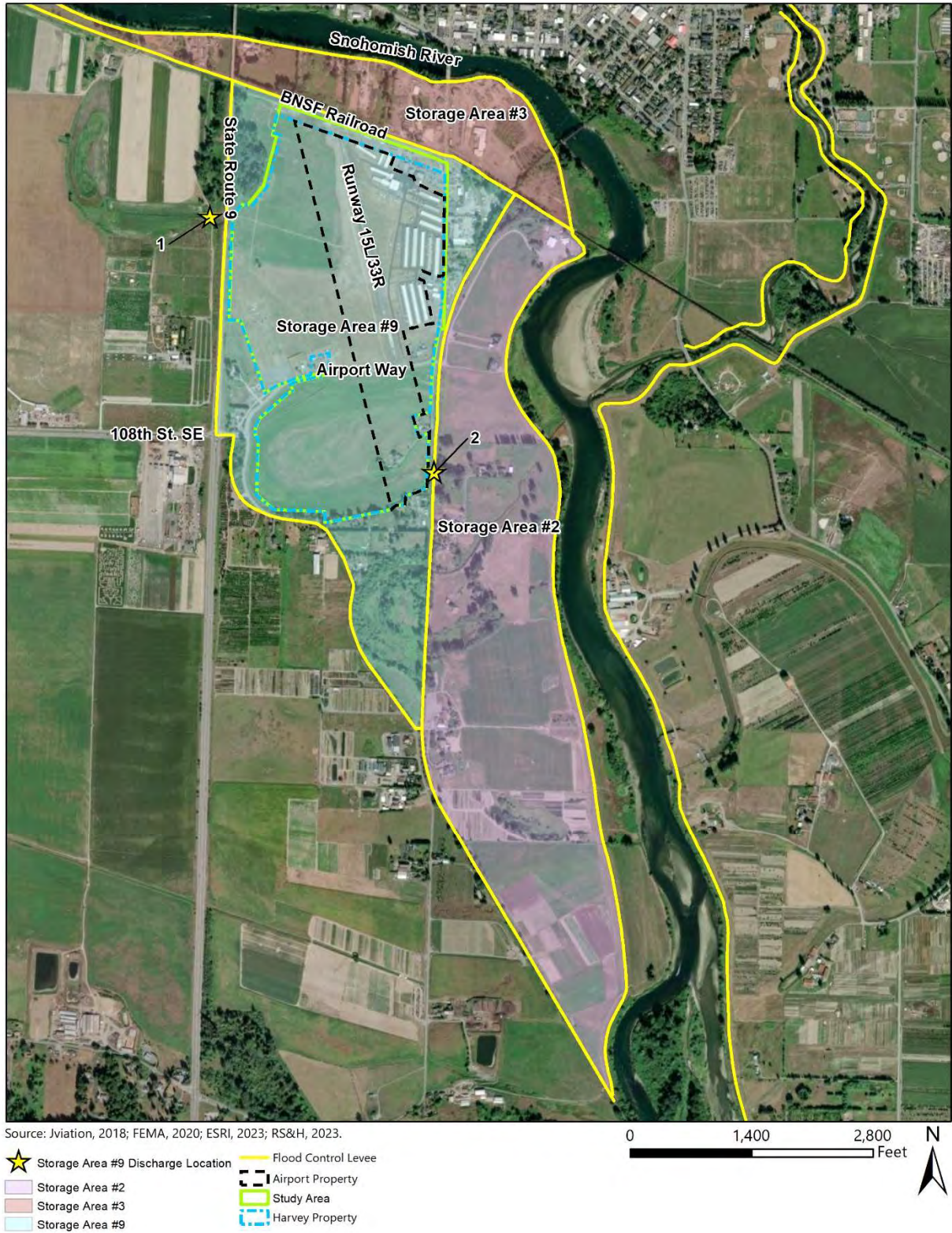


FIGURE 8: FLOOD STORAGE AREAS

4.2 MAXIMUM ALLOWABLE DENSITY CRITERIA

The maximum allowable density requirement for the study area must be evaluated as construction of the runway and the extension of the parallel taxiway qualify as permitted land use. The purpose of this criteria is to maintain the maximum amount of storage area in the Density Fringe area as possible, thus portions of the site that are currently located beneath the 100-year flood elevation were considered. The 100-year flood elevation at Harvey Field is 26.63 feet with a vertical datum of NAVD88. The Study Area is lower than this elevation, so the maximum allowable density criteria apply across the entire Harvey Property. This criterion is solely based on land area, so any cut volume associated with the site cannot work to offset the impacts of construction. The area that will displace floodwater, as mentioned in the criteria, is the fill footprint across the entire Harvey Property.

The maximum allowable density for the Harvey Property was evaluated based on the guidance outlined in SCC 30.65.250. The land area occupied by the Proposed Action that would displace floodwater, i.e. areas of fill, is equivalent to 3.29 acres. The entire Harvey Property is located in the Density Fringe area, which has an area of 203.65 acres. The area of fill makes up approximately 1.62% of the total Harvey Property area, thus the two percent allowable threshold would not be exceeded, and the criteria would be met **(Figure 9)**.



FIGURE 9: PROPOSED ACTION CUT/FILL AREAS

4.3 MAXIMUM ALLOWABLE OBSTRUCTION CRITERIA

The maximum allowable obstruction for the site was evaluated per the steps outlined in SCC 30.65.255. These steps are as follows:

1. Determine the general floodplain flow direction
2. Draw a line perpendicular to the flow direction
3. Draw the line where it intersects the largest width of new construction as a percentage of property width.
4. Sum of fill widths/total property width must be less than 15 percent.

Given that the Harvey Property is in an area with many surrounding levees, during a levee overtopping in a flood event the floodplain flow can be multidirectional and therefore cannot be defined into a single direction of floodplain flow. In order to ensure this criterion would be met, RS&H evaluated two possible general floodplain flow directions consistent with the 2018 Airport Master Plan. These floodplain flow directions are East to West and South to North. The execution of steps 1 through 3 as indicated above are presented in **Figure 10** and **Figure 11**. In order to meet obstruction limitations outlined in SCC 30.65.255, the Proposed Action would utilize concrete box culverts. As shown in **Figure 10** and **Figure 11** below, an array of 20-foot span concrete box culverts along the southern end of Proposed Runway 15-33 would allow the free flow of the floodwaters through the Study Area, and are not considered as fill areas for purposes of calculating the floodplain obstruction. The height of these culverts will be finalized in the design phase.

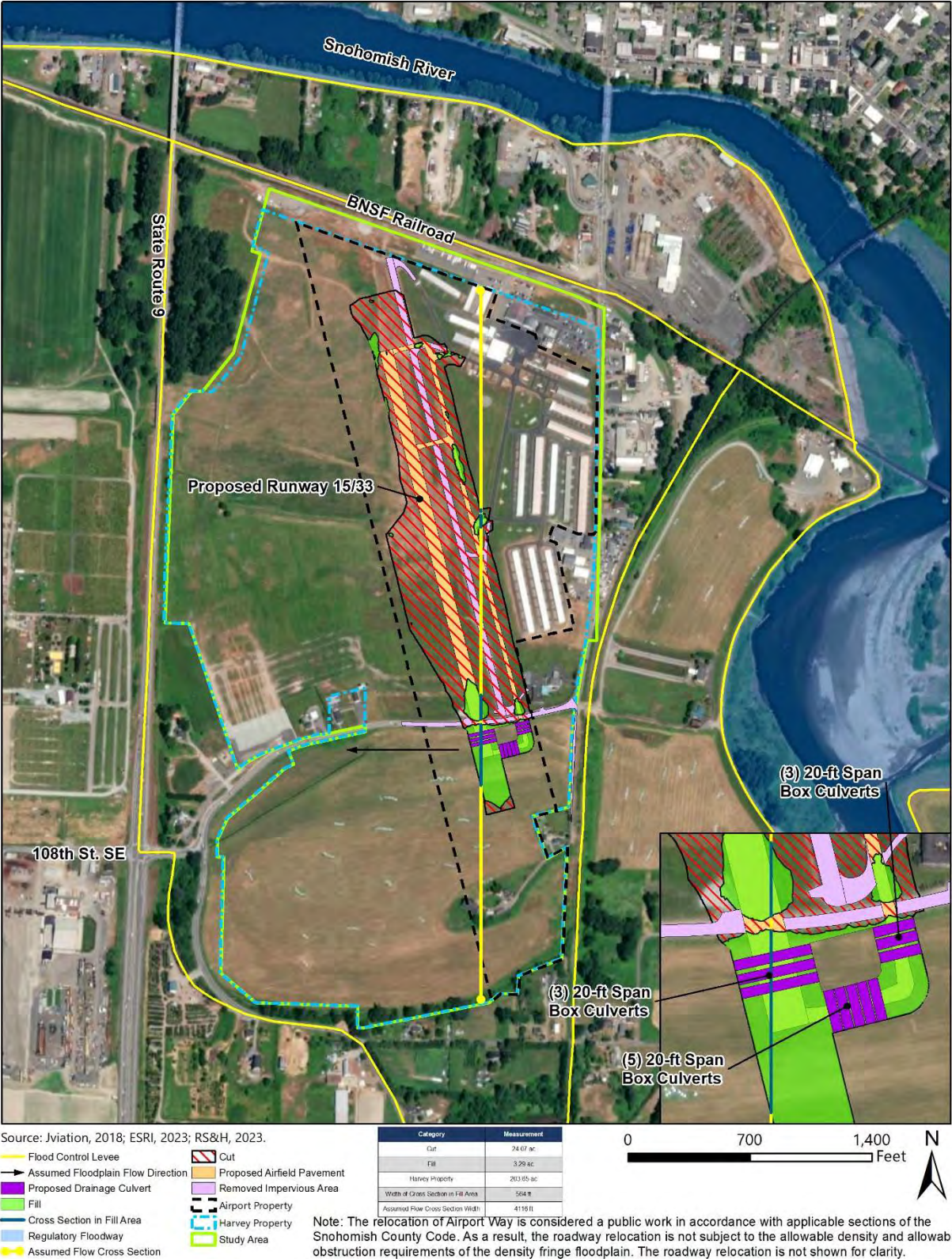
These culverts are consistent with a new runway design proposed in the 2018 Master Plan and would result in a Proposed Action that does not exceed 15 percent obstruction limit for the lines perpendicular to the direction of flow. **Table 10** and **Table 11** below summarizes all relevant widths for each Scenario as well as the flow obstruction percentage.

TABLE 10: EAST TO WEST FLOW DIRECTION - OBSTRUCTION CALCULATION RESULTS

Feature	Width (feet)	Percent of Property Width
Property Width	1,846	--
New Fill	360	19.5%
Culvert Openings	100	5.4%
Fill – Culvert Openings	260	14.1%

TABLE 11: NORTH TO SOUTH FLOW DIRECTION - OBSTRUCTION CALCULATION RESULTS

Feature	Width (feet)	Percent of Property Width
Property Width	4,116	--
New Fill	564	13.7%
Culvert Openings	60	1.5%
Fill – Culvert Openings	504	12.3%



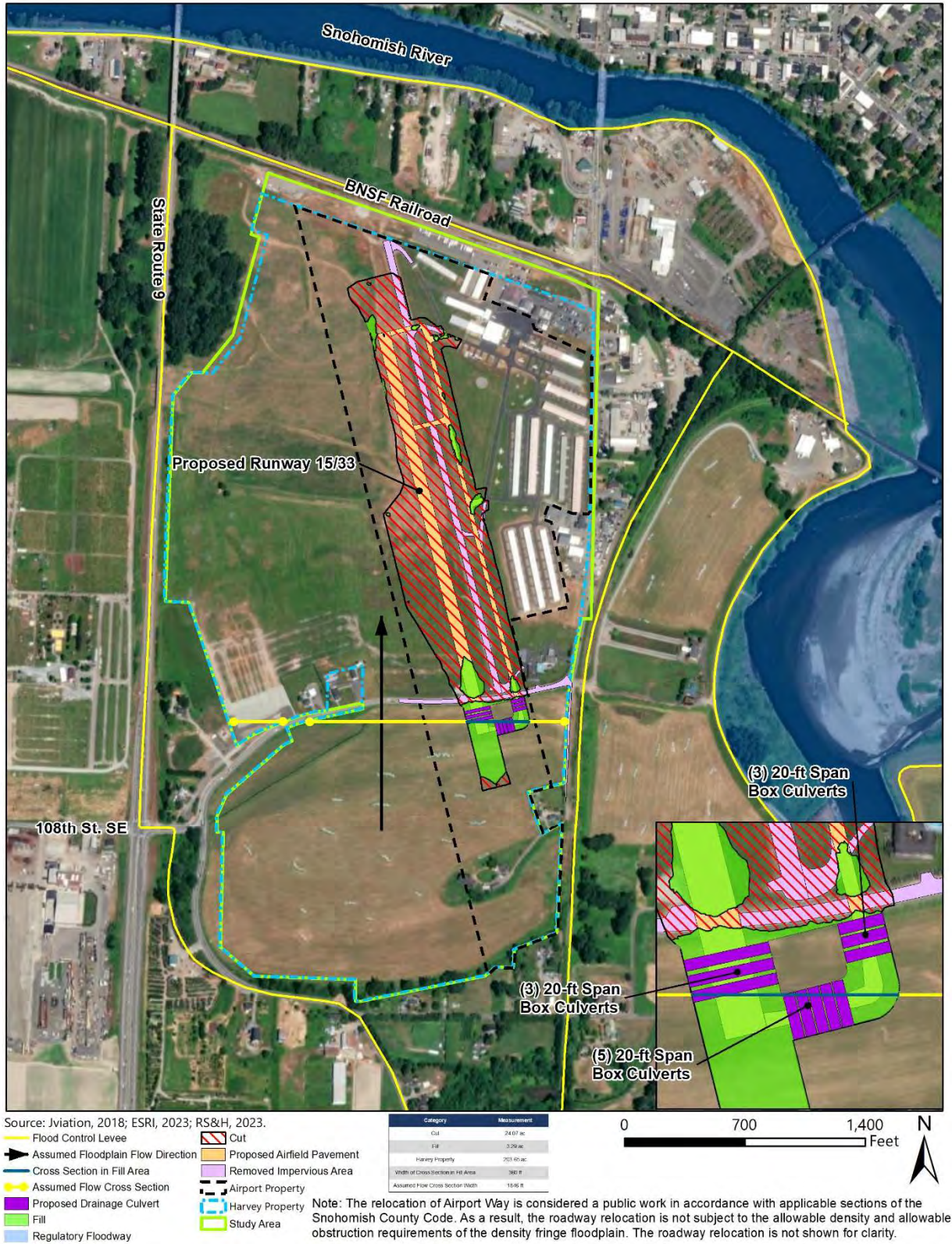


FIGURE 11: ALLOWABLE OBSTRUCTION - FLOW PARALLEL TO FLOOD CONTROL LEVEES

4.4 CLIMATE RESILIENCY

4.4.1 Federal Risk Management Standard (FFRMS)

Washington's coastal areas are at risk due to expected sea level rise associated with the changing climate. Sea level rise is expected to exacerbate existing risks and vulnerabilities, including storm surge and flooding. Components of the Proposed Action would be designed based on guidance from EO 14030 and EO 13690, effective May 20, 2021. Federally funded projects will be subject to the FFRMS which will increase the resilience of infrastructure for flooding events caused by climate disasters. Furthermore, FAA Desk Reference 1050.1F, Section 3.5 provides guidance projects "should include a discussion of the extent to which the Proposed Action or alternatives(s) could be affected by future climate conditions, based on published sources applicable to the study area." RS&H has researched local adaptation activities associated with climate resiliency and has obtained sea level rise projections for varying climate scenarios that consider coastal inundation hazard composites including low-lying areas, areas affected by storm surge, and flood zones.

4.4.2 Sea Level Rise

FAA Order 1050.1F does not provide a significance threshold for sea level rise, nor does it provide factors to consider. However, information regarding the potential impacts from sea level rise on the Proposed Action is provided to meet the intent of EO 14030.

The Washington Coastal Resilience Project (WCRP) developed projections of relative sea level rise for multiple greenhouse gas (GHG) emissions scenarios. The study investigated relative sea level rise based on projected GHG scenarios Representative Concentration Pathway (RCP) 4.5 and RCP 8.5, scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). RCP 4.5 is described as the intermediate scenario, where emissions peak around 2040 and then decline. RCP 8.5 assumes an increase in greenhouse gas emissions throughout the 21st century without effective climate change mitigation policies. WCRP also took probabilities of exceedance, based on the individual aspects of sea level rise, into account for each scenario. **Table 12** below presents the 1 percent probability of exceedance for the RCP 8.5 scenario, which will be the most conservative set of projected sea level rise for Snohomish County. The proposed runway is anticipated to have a full useful life of 30 years, which includes expected pavement reconstruction after 20 years to extend the useful life another 10 years. Considering this useful life, a 2060 projection and RCP 8.5 scenario will be considered in the analyses (FAA AC 150/5320-6G, Section 3.11.3.1.2.).

TABLE 12: 1 PERCENT EXCEEDANCE PROBABILITY SEA LEVEL RISE PROJECTIONS

Year	Projected Sea Level Rise (ft)
2040	1
2060	1.9
2080	3.3
2100	5

4.4.3 Extreme Coastal Water Level

WCRP developed additional guidance for assessing exposure to future coastal flooding during extreme weather events, including high tides, surge, and wave run-up. Many of these processes can occur concurrently, yielding an extremely elevated sea surface and higher likelihood that water will travel up the shoreline and further inland. These guidelines include projections of extreme still water level (SWL) and extreme total water level (TWL). SWL is the coastal water due to all processes except wave run-up on the shoreline while TWL is the maximum elevation that water reaches on the shoreline due to all processes. Extreme water levels during future events can be expressed as the following:

$$\text{Future Extreme Water Level} = \text{Relative SLR} + \text{Astronomical Tide Height} + \text{Storm Surge} + \text{Wave Run-up}$$

To develop extreme SWL and TWL scenarios, the WCRP utilized a return frequency framework to estimate the likelihood that the various components contributing to extreme water level would coincide (WCRP, 2019). Unlike other areas in Washington State, TWL estimates for extreme events are not yet available for Puget Sound due to its geographic complexity. However, throughout most of the Puget Sound, waves are small enough that they are unlikely to dramatically change the expected pattern of extreme water level. To verify this, WCRP assessed the 100-year TWL using historical wave heights for a location near Tacoma, Washington and found that the TWL is 3.6 feet relative to the local mean higher high water tidal datum. The 100-year SWL for the Puget Sound is 3.2 feet relative to the MHHW, indicating that wave run-up has a small impact on the TWL in the area. Since this difference only amounts to a few inches, and the Study Area is approximately 8 miles inland, the SWL estimates are adequate to characterize the coastal flood risk. **Table 13** provides the WCRP estimates for the extreme SWL for the Puget Sound. **Table 14** provides the resulting SWL values for the projected sea level rise for Snohomish County.

TABLE 13: EXTREME STILL WATER LEVEL BY ANNUAL EXCEEDANCE PROBABILITY AND SEA LEVEL CHANGE

Sea Level Change (feet)	50% Annual Exceedance Probability (AEP) Still Water Level (SWL)	20% AEP SWL	5% AEP SWL	2% AEP SWL	1% AEP SWL
0	2.2	2.6	2.9	3.1	3.2
0.5	2.7	3.1	3.4	3.6	3.7
1.0	3.2	3.6	3.9	4.1	4.2
1.5	3.7	4.1	4.4	4.6	4.7
1.9*	4.1*	4.5*	4.8*	5.0*	5.1*
2.0	4.2	4.6	4.9	5.1	5.2
2.5	4.7	5.1	5.4	5.6	5.7
3.0	5.2	5.6	5.9	6.1	6.2
3.3*	5.5*	5.9*	6.2*	6.4*	6.5*
4.0	6.2	6.6	6.9	7.1	7.2
5.0	7.2	7.6	7.9	8.1	8.2

*Values were calculated by interpolating between established estimates

TABLE 14: 1 PERCENT EXCEEDANCE PROBABILITY SEA LEVEL RISE AND EXTREME STILL WATER LEVEL ESTIMATES

Year	Sea Level Rise (feet)	Extreme Still Water Level (feet)
2040	1	4.2
2060	1.9	5.1
2080	3.3	6.5
2100	5	8.2

4.4.4 Levee Overtopping

The National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management compiled existing surface data, mean higher high water (MHHW) tidal datum data, hydrological connectivity, tidal variations, and projections for sea level rise to map potential impacts of future flooding and inundation. The projections utilize the MHHW tidal datum as a baseline, to which sea level rise is combined with other factors to determine the extents of inundation. The Study Area also has existing levees, described in Section 2.2.2 of this document, that NOAA mapped using best available elevation data. Inundation from coastal process would occur if the SWL is greater than the lowest height of the levees adjacent to the Study Area (NOAA, 2023). From the NOAA Office for Coastal Management tools, levee overtopping and permanent inundation would occur between 7 to 8 feet of sea level rise above the Mean Higher High-Water Level (MHHWL), considered as the highest daily tide level. Using 7-feet as a conservative assumption for the lowest levee elevation, the Proposed Action is not projected to be impacted by sea level rise nor extreme still water levels through the design life of 2060 as these elevations remain below the estimated levee elevation. Therefore, human safety, health, and welfare will not be impacted as a result of implementation of the Proposed Action as the result of climate change.

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ATTACHMENT I-1: TIME OF CONCENTRATION CALCULATIONS

Harvey Field Runway Improvement Project EA

Comp. By: JKK
Date: 8/30/2023
Chk. By: LMM
Job No: 2470064.000

Time of Concentration Calculations

Sub-Basin Name: North
Condition: Existing

Sheet Flow [TR-55 equation 3-3]

	AB		BC			
Surface Description	Smooth surfaces		Dense grasses			
Manning's Roughness coeff., n	0.011		0.24			
Flow Length, L (should be <= 100 ft)	39 ft		61 ft			
Two-yr, 24-hr rainfall, P ₂	1.90 in		1.90 in			
Elevation 1, E ₁	24.86 ft		22.67 ft			
Elevation 2, E ₂	22.67 ft		22.41 ft			
Land Slope, s = (E ₁ - E ₂) / L	0.06 ft/ft		0.00 ft/ft			
T _t = 0.007 * (n * L) ^{0.8} / (P ₂ ^{0.5} * s ^{0.4})	0.01 hr		0.39 hr			
	0.5	+	23.1	+		
						23.6 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	CD		DE		EF	
Surface Description	Unpaved		Paved		Unpaved	
Flow Length, L	49 ft		34 ft		1588 ft	
Elevation 1, E ₁	22.41 ft		22.29 ft		21.50 ft	
Elevation 2, E ₂	22.29 ft		21.50 ft		13.00 ft	
Watercourse Slope, s = (E ₁ - E ₂) / L	0.002 ft/ft		0.023 ft/ft		0.005 ft/ft	
Velocity, V	0.80 ft/s		3.10 ft/s		1.18 ft/s	
T _t = L / (3600 * V)	0.02 hr		0.00 hr		0.37 hr	
	1.0	+	0.2	+	22.4	
						23.6 min

Open Channel Flow [TR-55 equation 3-4]

	FG		GH		HI	
Open Channel	Pipe		Pipe		Pipe	
Front Slope, s ₁	:1		:1		:1	
Bottom width, B	ft		ft		ft	
Back Slope, s ₂	:1		:1		:1	
Depth, H	ft		ft		ft	
Pipe Diameter, D	4 in		24 in		30 in	
Cross Sectional Flow Area, a	0.09 sq ft		3.14 sq ft		4.91 sq ft	
Wetted Perimeter, P _w	1.05 ft		6.28 ft		7.85 ft	
Hydraulic radius, r = a / P _w	0.08 ft		0.50 ft		0.63 ft	
Flow Length, L	156 ft		1522 ft		264 ft	
Elevation 1, E ₁	13.00 ft		12.31 ft		5.23 ft	
Elevation 2, E ₂	12.31 ft		5.23 ft		4.39 ft	
Channel Slope, s = (E ₁ - E ₂) / L	0.004 ft/ft		0.005 ft/ft		0.003 ft/ft	
Manning's Roughness coeff., n	0.012		0.013		0.013	
Velocity, V = 1.49 * r ^{2/3} * s ^{1/2} / n	1.58 ft/s		4.92 ft/s		4.73 ft/s	
T _t = L / (3600 * V)	0.03 ft/s		0.09 ft/s		0.02 ft/s	
	1.7	+	5.2	+	0.9	
						7.7 min

Total Time of Concentration

Sub-Basin T_c = 55.0 min

Harvey Field Runway Improvement Project EA

Comp. By: JKK
Date: 8/30/2023
Chk. By: LMM
Job No: 2470064.000

Time of Concentration Calculations

Sub-Basin Name: South
Condition: Existing

Sheet Flow [TR-55 equation 3-3]

	AB		BC			
Surface Description	Dense grasses		Smooth surfaces			
Manning's Roughness coeff., n	0.24		0.011			
Flow Length, L (should be <= 100 ft)	48 ft		52 ft			
Two-yr, 24-hr rainfall, P ₂	1.90 in		1.90 in			
Elevation 1, E ₁	26.62 ft		24.92 ft			
Elevation 2, E ₂	24.91 ft		22.63 ft			
Land Slope, s = (E ₁ - E ₂) / L	0.04 ft/ft		0.04 ft/ft			
T _t = 0.007 * (n * L) ^{0.8} / (P ₂ ^{0.5} * s ^{0.4})	0.14 hr		0.01 hr			
	8.2	+	0.7	+		= 8.9 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	CD		DE			
Surface Description	Paved		Unpaved			
Flow Length, L	45 ft		5477 ft			
Elevation 1, E ₁	22.63 ft		19.11 ft			
Elevation 2, E ₂	19.11 ft		8.00 ft			
Watercourse Slope, s = (E ₁ - E ₂) / L	0.078		0.002 ft/ft			
Velocity, V	5.69		0.73 ft/s			
T ₁ = L / (3600 * V)	0.00		2.09 hr			
	0.1	+	125.6	+		= 125.7 min

Open Channel Flow [TR-55 equation 3-4] - None

Total Time of Concentration

Sub-Basin T_c = 134.6 min

Harvey Field Runway Improvement Project EA

Comp. By:
Date:
Chk. By:
Job No:

JKK
8/30/2023
LMM
2470064.000

Time of Concentration Calculations

Sub-Basin Name: **North**
Condition: **Proposed**

Sheet Flow [TR-55 equation 3-3]

	AB		BC						
Surface Description	Smooth surfaces		Dense grasses						
Manning's Roughness coeff., n	0.011		0.24						
Flow Length, L (should be <= 100 ft)	39	ft	61	ft					
Two-yr, 24-hr rainfall, P ₂	1.90	in	1.90	in					
Elevation 1, E ₁	24.86	ft	22.67	ft					
Elevation 2, E ₂	22.67	ft	22.41	ft					
Land Slope, s = (E ₁ - E ₂) / L	0.06	ft/ft	0.00	ft/ft					
Tt = 0.007 * (n * L) ^{0.8} / (P ₂ ^{0.5} * g ⁴)	0.01	hr	0.39	hr					
	0.5	+	23.1	+		+		+	
									23.6 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	CD		DE		EF		FG		GH	
Surface Description	Unpaved		Paved		Unpaved		Paved		Unpaved	
Flow Length, L	49	ft	34	ft	1091	ft	66	ft	349	ft
Elevation 1, E ₁	22.41	ft	22.29	ft	21.98	ft	14.55	ft	14.50	ft
Elevation 2, E ₂	22.29	ft	21.50	ft	14.55	ft	14.50	ft	13.00	ft
Watercourse Slope, s = (E ₁ - E ₂) / L	0.002		0.023	ft/ft	0.007	ft/ft	0.001	ft/ft	0.004	ft/ft
Velocity, V	0.80		3.10	ft/s	1.33	ft/s	0.56	ft/s	1.06	ft/s
T ₁ = L / (3600 * V)	0.02		0.00	hr	0.23	hr	0.03	hr	0.09	hr
	1.0	+	0.2	+	13.7	+	2.0	+	5.5	=
										22.3 min

Open Channel Flow [TR-55 equation 3-4]

	HI		IJ		JK				
Open Channel	Pipe		Pipe		Pipe				
Front Slope, s ₁		:1		:1		:1		:1	
Bottom width, B		ft		ft		ft		ft	
Back Slope, s ₂		:1		:1		:1		:1	
Depth, H		ft		ft		ft		ft	
Pipe Diameter, D	4	in	24	in	30	in		in	
Cross Sectional Flow Area, a	0.09	sq ft	3.14	sq ft	4.91	sq ft		sq ft	
Wetted Perimeter, P _w	1.05	ft	6.28	ft	7.85	ft		ft	
Hydraulic radius, r = a / P _w	0.08	ft	0.50	ft	0.63	ft		ft	
Flow Length, L	156	ft	1522	ft	264	ft		ft	
Elevation 1, E ₁	13.00	ft	12.31	ft	5.23	ft		ft	
Elevation 2, E ₂	12.31	ft	5.23	ft	4.39	ft		ft	
Channel Slope, s = (E ₁ - E ₂) / L	0.004	ft/ft	0.005	ft/ft	0.003	ft/ft		ft/ft	
Manning's Roughness coeff., n	0.012		0.013		0.013				
Velocity, V = 1.49 * r ^{2/3} * s ^{1/2} / n	1.58	ft/s	4.92	ft/s	4.73	ft/s		ft/s	
T ₁ = L / (3600 * V)	0.03	hr	0.09	hr	0.02	hr		hr	
	1.7	+	5.2	+	0.9	+		+	
									7.7 min

Total Time of Concentration

Sub-Basin Tc = 53.7 min

Harvey Field Runway Improvement Project EA

Comp. By: JKK
Date: 8/30/2023
Chk. By: LMM
Job No: 2470064.000

Time of Concentration Calculations

Sub-Basin Name: South
Condition: Proposed

Sheet Flow [TR-55 equation 3-3]

	AB		BC			
Surface Description	Dense grasses		Smooth surfaces			
Manning's Roughness coeff., n	0.24		0.011			
Flow Length, L (should be <= 100 ft)	48 ft		52 ft			
Two-yr, 24-hr rainfall, P ₂	1.90 in		1.90 in			
Elevation 1, E ₁	26.62 ft		24.92 ft			
Elevation 2, E ₂	24.91 ft		22.63 ft			
Land Slope, s = (E ₁ - E ₂) / L	0.04 ft/ft		0.04 ft/ft			
T ₁ = 0.007 * (n * L) ^{0.58} / (P ₂ ^{0.5} * s ^{0.4})	0.14 hr		0.01 hr			
	8.2	+	0.7	+		
						= 8.9 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	CD		DE		EF		FG		GH		HI
Surface Description	Unpaved		Unpaved		Paved		Unpaved		Paved		Unpaved
Flow Length, L	45 ft		264 ft		81 ft		124 ft		151 ft		4819 ft
Elevation 1, E ₁	22.63 ft		19.11 ft		16.10 ft		15.81 ft		15.54 ft		15.29 ft
Elevation 2, E ₂	19.11 ft		16.10 ft		15.81 ft		15.54 ft		15.29 ft		8.00 ft
Watercourse Slope, s = (E ₁ - E ₂) / L	0.078		0.011 ft/ft		0.004 ft/ft		0.002 ft/ft		0.002 ft/ft		0.002 ft/ft
Velocity, V	4.51		1.72 ft/s		1.22 ft/s		0.75 ft/s		0.83 ft/s		0.63 ft/s
T ₁ = L / (3600 * V)	0.00		0.04 hr		0.02 hr		0.05 hr		0.05 hr		2.13 hr
	0.2	+	2.6	+	1.1	+	2.7	+	3.0	+	128.0
											= 134.6 min

Open Channel Flow [TR-55 equation 3-4] - None

Total Time of Concentration

Sub-Basin T_c = 143.4 min

ATTACHMENT I-2: NRCS SOILS SURVEY



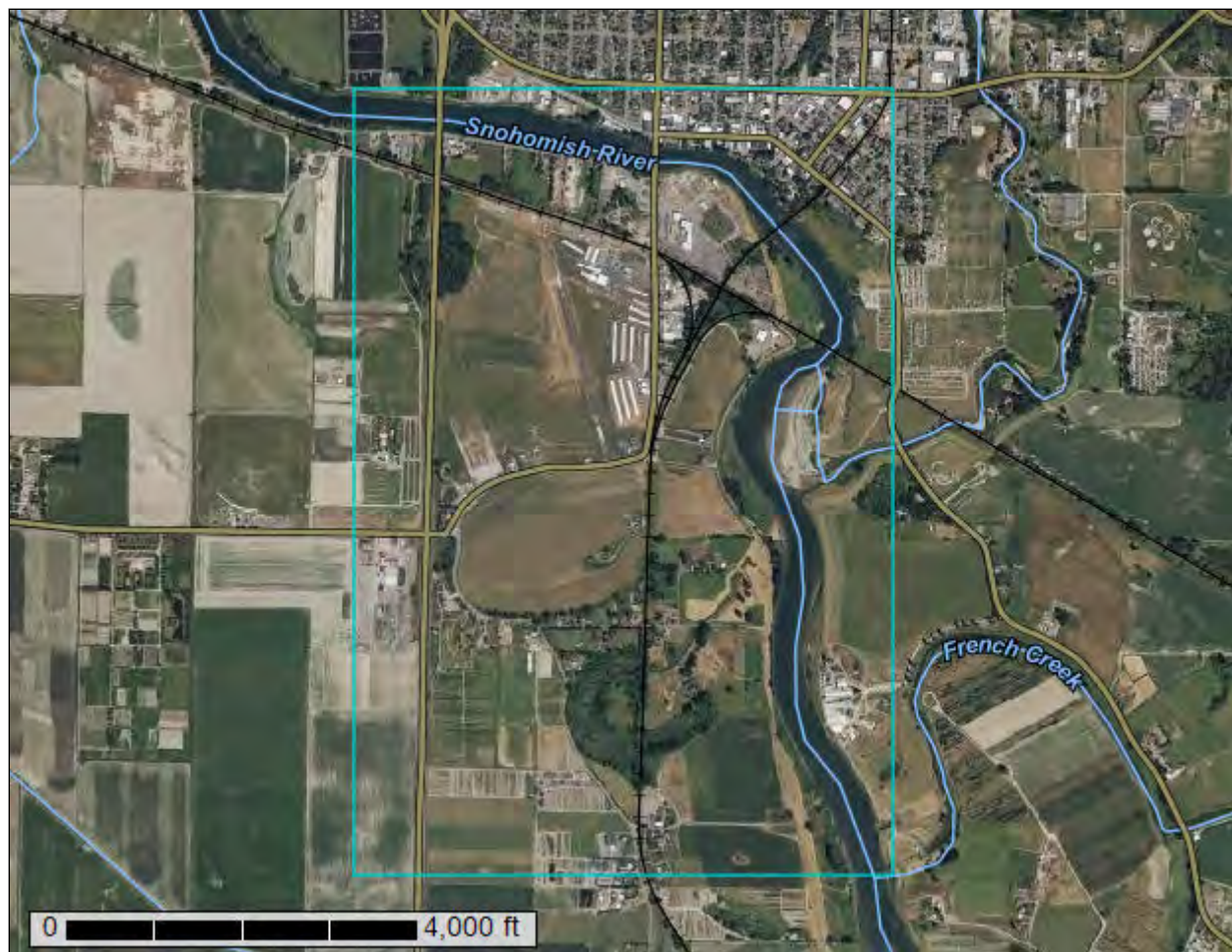
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Snohomish County Area, Washington**



July 14, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:16,000 if printed on A portrait (8.5" x 11") sheet.

0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Snohomish County Area, Washington

Survey Area Data: Version 24, Sep 8, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 31, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
50	Pilchuck loamy sand	26.0	2.0%
55	Puget silty clay loam	463.6	36.4%
56	Puyallup fine sandy loam	261.2	20.5%
66	Sultan silt loam	302.9	23.8%
72	Tokul gravelly medial loam, 0 to 8 percent slopes	52.9	4.2%
73	Tokul gravelly medial loam, 8 to 15 percent slopes	20.9	1.6%
77	Tokul-Winston gravelly loams, 25 to 65 percent slopes	4.6	0.4%
82	Xerorthents, nearly level	4.0	0.3%
83	Water	137.8	10.8%
Totals for Area of Interest		1,274.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.