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Water Resources

Wetland and Stream Delineation Technical Report

Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report

Prepared for
Port of Seattle

February 2024

Parametrix

Seattle-Tacoma International Airport Sustainable Airport Master Plan (SAMP) Near Term Projects Wetlands and Streams Report

Prepared for

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Acronyms and Abbreviations

AAA	Airport Activity Area
AOA	Airport Operations Area
BMPs	best management practices
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GIS	geographic information system
HGM	hydrogeomorphic (classification)
HPA	Hydraulic Project Approval
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWL	ordinary high water line
PHS	Priority Habitats and Species
RSA	Runway Safety Area
SASA	South Airport Support Area
SMC	SeaTac Municipal Code
SP	Soil Plot
SR	State Route
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

1. Introduction

Parametrix prepared this report on behalf of the Port of Seattle to determine the presence and location of wetlands, streams, and other waters within the SAMP Near Term Project (NTP) study area. Methods and results of the wetland and stream investigation in accordance with federal, state, and City of SeaTac regulations are detailed below. Included in this report is information from wetlands and other waters delineation conducted in 2019 and 2020, with updates based on the wetland and waters verification conducted in 2024.

1.1 General Study Area

The General Study Area (GSA) represents the area where it is anticipated that direct or indirect impacts may occur as a result of constructing the Proposed Action or its alternatives. The GSA includes an area encompassing 3,692 acres (5.8 square miles) that is bounded by S. 140th Street to the north, 33rd Avenue S. to the east, S. 20th Street to the South, and Des Moines Way to the west. Within the GSA, Parametrix conducted field delineations in 2019 and 2020 and verifications in 2024 in areas that would be directly impacted by a proposed project. All of the areas of direct impact are located entirely within the City of SeaTac in King County, Washington, within Sections 16, 20, 21, 29, and 31 of Township 23 North, Range 4 East of the Willamette Meridian and Section 4 of Township 22 North, Range 4 East of the Willamette Meridian. For the purposes of this report, the GSA was divided into six study area zones where the direct impacts would be located: the North Study Area Zone, the North Runway Safety Area (RSA) Study Area Zone, the West Study Area Zone, the South RSA Study Area Zone, the East Study Area Zone, and the Runway Study Area Zone. See Figure 1-1 for the GSA and study area zone locations. The North Study Area extends beyond the GSA to include the full boundary of wetland systems that may be potentially impacted.

The North Study Area Zone is 127 acres and extends north from State Route (SR) 518. This area is currently used as vegetated open land and park space. During the 1980s and 1990s, the Port of Seattle acquired these parcels to address noise-related issues. At that time these parcels were used for residential housing. The Port of Seattle cleared most structures off the parcels. Some old roadways and foundations persist, as well as horticultural species from the landscaping. A portion of this land is part of a lease agreement with the City of SeaTac for use as park space.

The North RSA Study Area Zone comprises the Miller Creek Regional Detention Facility and extends north from the airport runways to SR 518. The Miller Creek Regional Detention Facility receives a high volume of stormwater runoff from the airport. The main features are the mainstem Miller Creek and a large wetland complex partitioned by roads maintained for lighting tower access, of which Lake Reba is a part. Lake Reba is a stormwater feature constructed by King County in 1973 (Port of Seattle 2019b). There is also stormwater infrastructure in the upland between the runways and the stream/wetland complex.

The West Study Area Zone extends from the southern boundary of the Miller Creek Buffer Mitigation area to the corner parcel between SR 509 and the airport. This area was previously residential housing and is currently forested open land, wetland, stormwater facilities, and maintenance facilities.

The South RSA Study Area Zone contains the fuel farm area, the former Tyee Valley Golf Course, wetlands, stormwater facilities, and mitigation areas. The former Tyee Valley Golf Course was

operational until 2014. The Port has since removed all golf course-related structures and routinely mows and maintains this area.

The Runway Study Area Zone is within the Airport Operations Area (AOA) and is maintained to abide by Federal Aviation Administration (FAA) standards.

The East Study Area Zone is between the northeast corner of the Seattle-Tacoma International Airport and SR 99. This area comprises commercial/industrial uses and the Bonney-Watson Cemetery.

1.2 Landscape Setting

The study area is located within the nearshore subwatershed of Water Resource Inventory Area (WRIA) 9 and contains portions of the Miller/Walker Creek, Gilliam Creek/Lower Green River, and Des Moines Creek drainage basins (See Figure 1-1). The Miller Creek/Walker Creek drainage basin is primarily residential but also includes significant areas of commercial/industrial and parkland uses, as well as large, forested wetlands. The north and western portions of the study area drain into the Miller Creek/Walker Creek drainage basin. The East Fork of Miller Creek originates from a series of wetlands and flows into the Miller Creek Regional Detention Facility within the North RSA Study Area Zone. The West Fork Miller Creek occurs outside of the study area and also flows into the Regional Detention Facility. Miller Creek continues outside the overall study area and through a series of Port mitigation sites, off Port property, before eventually reaching the Puget Sound. The Walker Creek headwaters originate within the study area directly west of the airport and flow west outside of the study area into a large, forested wetland west of SR 509. Walker Creek flows into Miller Creek before reaching the Puget Sound. Lower Walker Creek and lower Mill Creek are listed on Ecology's 303d list as Category 5 for bacteria, dissolved oxygen, and temperature standards (2024a). The proposed *Miller and Walker Creek Basin Plan* was completed in 2006 (King County). The basin plan is in draft form and has not yet been adopted by the local governments; however, portions of the plan have been implemented.

The Gilliam Creek/Lower Green River drainage basin is located east of the airport near SR 518 and I-5 interchange. Gilliam Creek flows east and drains into the Lower Green River. The drainage basin consists of residential, commercial/industrial (including the airport), and open land/parkland uses. A small portion of Gilliam Creek is listed in the Washington State Department of Ecology (Ecology) 303d-list for bioassessment standards (Ecology 2024a).

The southern portion of the study area drains into the Des Moines Creek drainage basin. This drainage basin consists of aviation, residential, commercial/industrial, and open land/parkland uses. Several large wetland and stream mitigation areas maintained by the Port of Seattle and basin committee are present within this basin. The East Branch of Des Moines Creek originates from Bow Lake and flows south through the former Tyee Valley Golf Course. The west branch of Des Moines Creek joins the East Branch of Des Moines Creek within the Des Moines Creek Regional Detention Facility mitigation area. The entire stream from origin to its terminus in the Puget Sound is listed on Ecology's 303d-list for bacteria, copper, dissolved oxygen, and temperature standards (Ecology 2024a).

1.3 Regulatory Framework

Wetlands and other waters including streams in the project area are subject to federal, state, and local regulations. Before construction of NTPs that would impact wetlands or other waters, the Port

would need to meet the requirements of these regulations. At the federal level, wetlands and other waters are regulated by Section 404 of the Clean Water Act (CWA), which regulates placement of fill in waters of the United States. The U.S. Army Corps of Engineers (Corps) is responsible for issuing permits under Section 404 of the CWA. Other federal agencies with regulatory responsibility over wetlands and waters include the U.S. Environmental Protection Agency (EPA), which reviews applications for Water Quality Certifications under Section 401 of the Clean Water Act, and the National Oceanic and Atmospheric Administration (NOAA), which oversees Endangered Species Act consultation for anadromous fish species. At the state level, Ecology implements the Section 401 Water Quality Certification program by reviewing projects for compliance with state water quality standards and makes permitting and mitigation decisions based on the nature and extent of impacts, as well as the type and quality of wetlands or streams being affected. Additionally, Ecology issues administrative orders under the state Water Pollution Control Act (Chapter 90.48 Revised Code of Washington (RCW)) to regulate impacts to wetlands considered non-federally jurisdictional. Activities that use, divert, obstruct, or change the flow of a water of the state, including streams and some wetlands, typically require a Hydraulic Project Approval (HPA) issued by the Washington State Department of Fish and Wildlife (WDFW). In addition, Native American Tribes participate in the regulatory process to ensure protection of their treaty fishing rights and through consultation under Section 106 of the National Historic Preservation Act.

To comply with these regulations, the Port will document proposed project impacts and mitigation through the completion of a Joint Aquatic Resource Permit Application (JARPA). The agencies with jurisdiction will review the JARPA and determine whether the projects comply with the regulations and whether the proposed mitigation is sufficient to address the identified impacts. Permit approvals typically include a set of conditions with which the applicant must comply during project construction and operation, such as best management practices (BMPs) to minimize impacts and monitoring of construction activities and mitigation sites. In addition, the construction contractor will be required to develop a stormwater management plan to ensure compliance with the Construction Stormwater General Permit.

The Port and City of SeaTac signed an ILA (ILA) in 2018 which addresses the Port's compliance with the City's critical areas ordinances on Port-owned property within City boundaries. The Port complies with City of SeaTac critical areas codes (SMC Chapter 15.700) to the extent practicable. The 2018 Port-SeaTac Interlocal Agreement (ILA) states that the Port administers permitting within an area identified as the Airport Activities Area (AAA) while the City of SeaTac administers permitting outside the AAA.

The only portion of the study area that is not within the AAA is the North Study Area Zone, which is subject to City of SeaTac permitting. Pertinent to this wetland and streams report, SMC 15.700.275 outlines the requirements for the identification and rating of wetlands. SMC 15.700.285 outlines the wetland buffers and possible minimization measures. SMC 15.700.330 outlines the classification and buffers for streams.

2. Research Methods

This wetland and streams report reviewed conditions within the study area, as defined in Section 1.1. The wetland and stream analyses are based on data obtained through a review of existing information and field investigations. The goal of these efforts was to document existing information that reflects current site conditions, collect new information necessary to assess streams and wetland boundaries and identify any other waters of the United States and/or the State. This information was used to inform the wetland and stream delineation in 2019 and 2020 and verification in 2024.

2.1 Existing Information Review

Before conducting fieldwork, project biologists reviewed maps and materials including, but not limited to:

- Sea-Tac Airport Natural Resource Geodatabase (Port of Seattle 2019a)
- National Wetlands Inventory (NWI) online interactive mapper (USFWS 2024)
- Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2024)
- Forest Practices Application Mapping Tool (WDNR 2024)
- Northwest Indian Fisheries Commission Statewide Washington Integrated Fish Distribution database and mapping application (NWIFC 2024)
- Priority Habitats and Species (PHS) data (WDFW 2024a)
- WDFW Washington State Fish Passage Mapper (WDFW 2024bc)
- Washington State Water Quality Atlas for water quality standards (Ecology 2024a)
- Aerial photography of the project corridor (Google Earth database)
- Climate data for King County as measured at the Seattle-Tacoma International Airport Weather Station (ACIS 2019; 2020; 2024)
- Critical Areas code for the City of SeaTac (SeaTac 2023)
- Port-SeaTac ILA (2018a)
- Low Impact Development Guideline Seattle-Tacoma International Airport (Port of Seattle 2018b)
- Seattle-Tacoma International Airport Stormwater Management Manual (Port of Seattle 2017)
- Infiltration Infeasibility Assessment Seattle-Tacoma International Airport (Aspect 2018)
- Seattle-Tacoma International Airport Stormwater Pollution Prevention Plan (Port of Seattle 2019b)
- Seattle-Tacoma International Airport Final Environmental Impact Statement for the Proposed Master Plan Update Development Actions (Port of Seattle 1996)
- Third Runway Redelineation Assessment [Seattle-Tacoma International Airport 1997 Master Plan Update 2017 Wetland Redelineation Assessment (ESA 2017)]
- South Airport Support Area (SASA) Wetland and Stream Report (ESA 2015)

- Critical Areas Special Study Seattle-Tacoma International Airport Flight Corridor Safety Program (Anchor QEA 2016)

2.2 Wetland Identification and Delineation

Wetland assessments were based on a review of existing information on previously mapped wetlands, soil mapping, and other geographic and weather data, followed by field investigations, during which wetland boundaries were mapped on site. The methods for these assessment steps are described in the sections below.

A formal delineation of wetlands and waters was completed in 2019 and 2020. Project biologists used the methods specified in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the indicators described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Corps 2010) to delineate on-site wetlands. The delineated wetland boundaries and sample plot locations were instrument surveyed by professional land surveyors.

Wetlands were defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. An area must have met these three criteria or exhibit at least one positive field indicator of wetland vegetation, soils, and hydrology to be considered a wetland. Wetland determination data forms from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Corps 2010) were recorded for each wetland. The wetland field assessment evaluated vegetation, soils, and hydrologic conditions. Each of these parameters is described in the following subsections.

Formal delineation of wetland boundaries and determination of agency jurisdiction are required only in areas where impacts will occur. To provide context, estimated boundaries were identified for certain stream and wetland features outside the study area that are not anticipated to be impacted or subject to regulatory compliance. Within the study areas, some boundaries (e.g., portions of the South RSA Study Area Zone) were estimated based on information from the Port regarding the locations of the NTPs. These include boundaries for wetlands and streams that are more than 225 feet (the maximum critical areas buffer width) from planned developments or are separated from planned developments by another wetland or stream.

In January 2024 biologists conducted a wetland and waters verification in to assess the quality and function of wetlands within the GSA. Wetland, streams, and jurisdictional tributary linework from the 2019/2020 delineations were loaded into ArcGIS Field Maps with connection to a DA2 Trimble device with sub-meter accuracy. This tool allowed biologists to review previous boundaries in the field and capture georeferenced photographs to document current conditions. Additionally, previous wetland rating forms were annotated in the field to document any changes (such as increases in invasive species, changes in vegetation classes, etc.), which may change the wetland rating.

2.2.1 Vegetation

During the field investigations by project biologists, dominant plant species were observed and recorded on data forms for each sample plot. The dominant plants and their wetland indicator status were evaluated to determine whether the vegetation was hydrophytic. Hydrophytic vegetation is generally defined as vegetation adapted to prolonged saturated soil conditions. To meet the hydrophytic vegetation criterion, typically more than 50 percent of the dominant plants must be

Facultative, Facultative Wetland, or Obligate, based on the plant indicator status category assigned to each plant species by the U.S. Fish and Wildlife Service (USFWS) (Lichvar et al. 2016).

Scientific and common plant names follow currently accepted nomenclature. Plant names are consistent with *Flora of the Pacific Northwest* (Hitchcock and Cronquist 2018), *Plants of the Pacific Northwest Coast* (Pojar and MacKinnon 2004), and the U.S. Department of Agriculture (USDA) PLANTS Database (USDA, NRCS 2019).

2.2.2 Soils

Generally, an area must have hydric soils to be regulated as a wetland. Hydric soil forms when soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper layer. Biological activities in saturated soil result in reduced oxygen concentrations that cause a preponderance of organisms using anaerobic processes for metabolism. Over time, anaerobic biological processes result in accumulation of organic soil (e.g., peat) and/or certain mineral soil color patterns, which are used as field indicators of hydric soils. Soils were examined by excavating sample plots to a depth of at least 16 inches, where feasible, to observe soil profiles, colors, and textures. Munsell color charts (Munsell Color 2017) were used to describe soil colors.

2.2.3 Hydrology

The study area was examined for evidence of hydrology. An area is considered to have wetland hydrology when soils are ponded or saturated consecutively for 12.5 percent of the growing season. In the study area, the growing season (as determined using the Seattle-Tacoma International Airport weather station) is generally 306 days long and lasts from February 10 to December 13 (ACIS 2024). Therefore, ponding or saturation must be present for approximately 38 consecutive days at 28 degrees Fahrenheit or warmer. Primary indicators of hydrology include, but are not limited to, surface inundation, sediment deposits, high water table, and saturated soils. Secondary indicators of hydrology include drainage patterns, watermarks on vegetation, and water-stained leaves. A soil plot must meet two secondary indicators to have wetland hydrology.

Hydrology was investigated in the early growing season of 2020 to verify wetland hydrology conditions from fall 2019. Sample plots that did not meet primary indicators of hydrology during the fall field investigation were revisited in the spring when groundwater tables were recharged. Biologists sampled these flagged plots in March 2020. They excavated to depths of at least 20 inches and left these pits open for at least one hour to investigate for the presence of a groundwater table or saturation. The results of this hydrologic investigation are detailed throughout Section 3.3. Additionally, biologists noted hydrologic conditions during the January 2024 wetland and waters verification.

2.3 Wetland Classification, Rating, and Buffers

Delineated wetlands were classified according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013; Cowardin et al. 1979). Hydrogeomorphic (HGM) classifications were assigned to wetlands using methods established by Brinson (1993). Wetlands were rated according to the *Washington State Wetland Rating System for Western Washington, 2014 Update Version 2* (Hruby & Yahnke 2023), as specified in SMC 15.700.275.B. City of SeaTac buffer widths are assigned based on the wetland rating score, with higher habitat

values increasing buffer width (SMC 15.700.285.B). New wetland ratings were prepared for all wetlands within the GSA using the Washington Tool for Online Rating (WATOR) tool (Ecology 2024b).

See Table 2-1 below for the City of SeaTac Municipal Code standard buffer widths.

Table 2-1. Standard Buffer Widths from the City of SeaTac

Wetland Category	Habitat Score			
	3-4	5	6-7	8-9
	Buffer Width in Feet			
Category I	75	105	165	225
Category II	75	105	165	225
Category III	60	105	165	225
Category IV	40			

2.4 Stream Identification and Delineation

The Ordinary High Water Line (OHWL) was determined and delineated for all streams in the investigation areas using methods developed by Ecology (Stockdale et al. 2016) and the definition of "ordinary high water" in Washington Administrative Code (WAC) Section 220-660-030. The OHWL flags were instrument-surveyed by professional land surveyors.

According to SMC 15.700.330, streams within SeaTac are classified as Class 1, Class 2, or Class 3. Buffer widths assigned to streams in the study area reflect requirements of the City code (SMC 15.700.330.A).

- Class 1 Streams include only streams inventoried as "Shoreline of the State" under the adopted Shore Master Program and require a 100-foot buffer.
- Class 2 Streams include only streams smaller than Class 1 streams which flow year-round during years of normal rainfall or those which are used by salmonids and require a 100-foot buffer.
- Class 2 streams include only streams smaller than Class 1 streams which flow year-round during years of normal rainfall or those which are not used by salmonids and require a 50-foot buffer.
- Class 3 Streams include only streams which are intermittent or ephemeral during years of normal rainfall and which are not used by salmonids and require a 25-foot buffer.

Fish presence or absence was investigated using the review of existing information described in Section 2.1 above, or visual observation of fish.

2.5 Jurisdictional Tributaries

Some ditches in the GSA meet criteria to be considered under federal jurisdiction as "Tributaries" to Waters of the U.S. They also do not meet criteria to be considered wetlands or streams (which may also be tributaries to waters of the U.S. and are discussed in the sections above). Tributaries as defined here were identified following the Final Revised Definition of "Waters of the United States"

(EPA and USACE 2023). “Tributaries” in this context are ditches that ultimately flow into traditional navigable waters, the territorial seas, interstate waters, or impoundments of jurisdictional waters. These tributaries are documented and described in Section 3.3.3.

2.6 Additional Drainage Features

The Port of Seattle maintains various stormwater facilities including non-jurisdictional ditches, detention ponds, bioswales, and vaults. Parametrix reviewed the documented stormwater best management practices (BMPs) within the study area as described in the Seattle-Tacoma International Airport Stormwater Pollution Prevention Plan (Port of Seattle 2019b). Key stormwater features within the study area were identified in the field to distinguish these documented and maintained stormwater features from the jurisdictional wetlands and other waters in the study area.

2.7 Incorporating Previous Studies

Parametrix reviewed relevant and recent previous studies to provide a comprehensive review of wetlands and streams in the study area. The Port has been monitoring and assessing these wetlands repeatedly for over 20 years and has very good documentation of their extents (Port of Seattle 1996; ESA 2015, 2017; Anchor QEA 2016). The Port and its consultants had formally delineated wetlands as part of Clean Water Act permitting for the Third Runway project approved in 2004. Most of the permitted wetlands are also within the SAMP study area. Only the North Zone of the SAMP study area was excluded from the Third Runway permitting. The Third Runway permits required the Port to delineate wetlands in 2013 and 2017. The 2017 effort included confirming the presence of streams and wetlands in the North Zone and prepared functional ratings for the wetlands.

Parametrix used the information in the 2017 Redelineation Assessment and the natural resource geodatabase provided by the Port of Seattle to inform the 2019/2020 wetland and stream assessment within the SAMP Near Term Projects study area.

3. Results

The results of the background information review and field investigations for the wetland and stream are presented below. Wetland and stream delineations were conducted by project biologists from September to December 2019 with supplemental hydrologic studies conducted in March 2020. A wetland and waters verification to assess boundaries, wetland quality, and function was conducted in January 2024. Wetlands, streams, and other jurisdictional waters were identified and mapped within the study area and are described in detail in the sections below.

3.1 Review of Existing Information

The natural resources geodatabase provided by the Port (Port of Seattle 2019a) was reviewed prior to the field investigation. Figures from that geodatabase are presented in Figure A-1 in Appendix A of this report. The North Study Area Zone contains multiple wetland features, including Tub Lake, which outlets into the East Fork of Miller Creek within the study area. The West Fork of Miller Creek, originating outside of the study area, confluences with the East Fork of Miller Creek before flowing under SR 518. South of SR 518, Miller Creek flows south into the North RSA Study Area Zone and into the Miller Creek Buffer Mitigation Area.

Data from the NWI (USFWS 2024), PHS (WDFW 2024a), and WDNR (2024) also show multiple streams, wetlands, ponds, and lakes mapped throughout the study area (Figures A-4, A-5, and A-6 in Appendix A of this report). Within the North and North RSA Study Area Zones, USFWS (2024) maps wetlands associated with Tub Lake (PFOC/PSSC/PEM1F/PUBH), Lake Reba (PSSC, PUBHx) and other small emergent (PEM) wetlands. Miller Creek and drainage from Tub Lake are mapped flowing south through the North RSA and North Study Area Zones. Miller Creek is mapped as continuing south into the Miller Creek Buffer Mitigation Area just north of the West Study Area Zone. Within the West Study Area Zone, USFWS maps only one small emergent wetland (PEM1Ch). West of this Study Area Zone is a large, forested wetland (PFOC) complex called Airport Park, which drains into Walker Creek (R4SBC). Within the South RSA Study Area Zone, USFWS maps the east branch of Des Moines Creek with riverine wetland features (R4SBC). The east and west branches of Des Moines Creek converge south of the study area. East of the study area within the Gilliam Creek/Lower Green River drainage basin, USFWS maps a small section of Gilliam Creek (R5UBH) flowing north along SR 518 and paralleling I-5 for a short distance. (Figure A-3 in Appendix A of this report).

SWIFD (NWIFC 2024) maps the potential presence of coho salmon (*Oncorhynchus kisutch*) in Miller Creek within the study area. PHS maps resident coastal cutthroat trout (*Oncorhynchus clarkii*) occurrence within Miller Creek and Des Moines Creek within the study area. PHS also maps northwestern pond turtle (*Actinemys marmorata*) in township (T23R04E) in the North wetland zone of the study area (WDFW 2024a).

Three soil types were identified and mapped in the study area by NRCS (2024):

- Urban land (Hydric Rating: 0)
- Urban land-Alderwood complex (Hydric Rating: 10)
- Alderwood-Everett-Urban Land complex (Hydric Rating: 5)

Most soils mapped within the study area have been extensively disturbed and have a low hydric rating. Urban soils are incorporated with the Alderwood and Everett soils series throughout the study

area. The Alderwood soil series consists of moderately well-drained soils formed in glacial drift and outwash. The A horizon of these soils (0-7 inches) is typically a very dark grayish brown (10YR 3/2) gravelly sandy loam. The Bw1 horizon (7-20 inches) is typically a dark yellowish brown (10YR 4/4) very gravelly loam. The Everett soil series consists of somewhat excessively drained soils formed of historic glacial features. The A horizon (0-2 inches) is typically a very dark brown (7.5YR 2.5/2) very gravelly sandy loam. The Bw horizon (2-24 inches) is a dark brown (7.5YR 3/4) very gravelly sandy loam (NRCS 2024). See Figure A- 7 in Appendix A of this report for the mapped locations of these soils within the study area.

3.1.1 Existing Information Review for the Runway Study Area Zone

Several small portions of the runway of the Seattle-Tacoma International Airport are within the study area and collectively make up the Runway Study Area Zone (see Figure 1-1). The Seattle-Tacoma International Airport Infiltration Infeasibility Assessment and Low Impact Development Guideline were reviewed to gain background information on modifications to the runway (Aspect 2018; Port of Seattle 2018b).

All of the soils within the Runway Study Area Zone of the Airport Operations Area (AOA) have been heavily manipulated. All of this area is covered with fill material or pavement. According to Table 3-1 in the Infiltration Infeasibility Assessment, soils within the AOA are compacted per FAA requirements. The majority of soils within the AOA area are also covered with filtration strips, which include compost amendments 4 inches deep (see Figure A-14 in Appendix A of this report, extracted from the Low Impact Development Guideline) (Port of Seattle 2018b).

Because of the documented fill material and compost amendments, the Runway Study Area Zone within the AOA does not contain regulated wetlands, streams, or other waters.

3.2 Climate Data

According to the NRCS climate analysis for wetlands tables (WETS tables) recorded at the Seattle-Tacoma International Airport weather station (ACIS 2019), the period (June, July, August) prior to the September 2019 field investigation had normal hydrologic conditions. The 3-month period prior to October had hydrologic conditions wetter than normal. The 3-month period prior to November and December had normal hydrologic conditions. September received 3.32 inches of rainfall and was much wetter than the high end of the recorded average range (2.01 inches). October received 3.67 inches of rainfall and is within the recorded average range but within the very low end. November received 1.71 inches of rainfall, far below the lower end of the recorded average range (4.27 inches). While overall WETS tables compute to either normal or wetter than normal conditions for these months, there were several stretches of very dry conditions during October, November, and December with several weeks of 0 inches of rainfall.

The WETS tables recorded at the Seattle-Tacoma International Airport weather station (ACIS 2020) were analyzed for the 3-month period prior to the hydrology investigation on March 13 and 25, 2020. The 3-month period prior to March had hydrologic conditions wetter than normal conditions for this time frame.

The WETS table recorded at the Seattle-Tacoma International Airport weather station (ACIS 2024) were analyzed for the 3-month period prior to the wetland verification in January 2024. The 3-month

period prior to January had hydrologic conditions wetter than normal conditions for this time frame. The WETS tables are provided in Figures A-8 through A-13 in Appendix A of this report.

This climatic information summarizes recent precipitation compared to normal monthly averages and provides a basis of what groundwater table and saturation levels may look like compared to the normal average. This assists biologists in determining adequate wetland hydrology and to investigate further if recent hydrology has not been normal.

3.3 Field Investigation Results

3.3.1 Wetlands

Wetland delineations in the study area occurred between September 25, 2019, and December 6, 2019. Biologists again visited the study area in March 13 and 25, 2020, to investigate wetland hydrology. Parametrix biologists identified and delineated 31 wetlands in the study area. A wetland and waters verification to assess boundaries, wetland quality, and function occurred in January 2024.

These wetlands are categorized by study area zones (North, North RSA, West, and South RSA). There were no wetlands documented within the Runway or East Study Area Zones. Wetlands within the North Study Area Zone are within City of SeaTac jurisdiction. The North RSA, West, and South RSA Study Area Zones are within the Port of Seattle jurisdiction. The wetland boundaries will be verified by the Corps during the permitting phase, and the Corps may also conduct a jurisdictional determination at its discretion. The permittee can also request a jurisdictional determination; however, the Port does not anticipate requesting a jurisdictional determination prior to permitting because the determination may expire or become invalid if Clean Water Act Rules change in the interim. Delineations are valid for 5 years.

Summaries of the wetlands in the study area are provided in Table 3-1. General background information is provided in Appendix A of this report, representative photographs are provided in Appendix B, wetland determination forms are provided in Appendix C, and wetland rating forms are provided in Appendix D. General characteristics of wetlands are discussed in the sections below. See Figures 3-1a to 3-1g for wetland locations mapped within the study area.

Wetlands were initially investigated in the late growing season, a time when groundwater tables may not be fully recharged. During this time direct observation of hydrology within some of the wetlands was limited and biologists had to rely on secondary indicators of hydrology in some areas. These areas were revisited in March 2020 when early season hydrology provided a clearer indication of wetland hydrology. Based on the WETS tables for the 3-month period prior to the hydrology investigation, hydrologic conditions were wetter than normal. Using this information, biologists were confident that sample plots, which were found to be dry during the March visit, did not meet wetland hydrology indicators. Early season hydrology and wetter than normal hydrologic conditions would present adequate wetland hydrology at this time. The results of this hydrology investigation are integrated within this report. Table A-2 within Appendix A of this report provides an overview table of groundwater monitoring efforts.

Table 3-1. Summary of Wetlands within the Study Area

Study Area Zone	Wetland	Area (square feet/acres)[a]	USFWS Classification[b]	HGM Classification[c]	Ecology/Local Rating (2014)[d]	Habitat Rating Score[e]	Buffer Width (feet)[f]
North	N3	826,374/18.9	PFO/PSS/PEM	Depressional	I	7	165
	N4	50,935/1.22	PFO/PSS	Slope	IV	4	40
	1	3,623/0.11	PSS	Slope	IV	3	40
	2	36,699/0.8	PFO/PSS/PEM	Slope	III	5	105
	A	3,954/0.11	PSS/PEM	Slope	III	4	60
North RSA	4	205,019/4.7	PFO	Depressional	II	6	165
	5	229,364/5.3	PFO	Depressional	II	6	165
	6	37,761/0.91	PFO	Depressional	II	6	165
	7	294,115/6.8	PFO/PSS/PEM	Depressional	II	6	165
	8	199,266/4.6	PFO/PSS/PEM	Depressional	I	7	165
	9	135,130/3.1	PFO/PSS/PEM	Depressional	II	6	165
	10	15,723/0.41	PFO/PSS	Depressional	III	6	165
	11	558/0.0	PFO	Depressional	III	4	60
West	39	113,256/2.6	PFO/PSS	Slope	III	6	165
	R15	97,629/2.21	PFO	Depressional/Riverine	II	7	165
	A20	23,889/0.55	PFO/PSS/PEM	Depressional	III	5	105
	A14a	8,974/0.21	PFO/PSS/PEM	Slope	III	6	165
	44	133,548/3.12	PFO	Riverine/Slope	II	6	165
	A14b	3,694/0.12	PFO/PEM	Slope	III	6	165
	R13	48,780/1.12	PFO	Riverine/Slope	II	6	165
	R14a	2,610/0.06	PFO	Riverine	II	6	165
	R15b	26,135/0.61	PFO	Riverine/Slope	II	6	165
	R9/37a/18	246,580/5.66	PFO	Depressional/Riverine	II	6	165
	R3	901/0.02	PEM	Riverine	II	6	165
	R2	3,485/0.08	PFO	Riverine	II	6	165
South RSA	E1	9,102/0.21	PFO	Slope	III	4	60
	DC	23,522/0.54	PFO/PSS/PEM	Riverine	II	6	165
	52A/DC	72,119/1.72	PFO	Slope	II	6	165
	DMC1	5/0.0	PSS/PEM	Slope	III	5	105
	DMC2	2,052/0.05	PSS/PEM	Slope	III	5	105
	52B	43,830/1.01	PFO/PSS	Slope	III	6	165
	52C	33,329/0.82	PFO/PEM	Riverine	II	6	165
	G12	105,560/2.41	PFO/PSS/PEM	Depressional/Slope	II	6	165
	G1	150/0.00	PFO/PSS	Slope	III	5	105
	G4	406/0.00	PSS	Slope	III	5	105
	G5	39796/0.93	PSS/PEM	Slope	III	5	105
	H	2962/0.07	PSS/PEM	Slope	III	5	105
	D	164,962/3.81	PFO/PSS	Riverine	II	6	165

[a] Total wetland area
[b] FGDC 2013; Cowardin et al. 1979. PFO = palustrine forested; PSS = palustrine scrub-shrub; PEM = palustrine emergent
[c] Brinson 1993
[d] Hruby & Yahnke 2023, SMC 15.700.275.B
[e] Habitat score based on Hruby & Yahnke 2023
[f] SMC 15.700.285.B

3.3.1.1 North Wetlands

Wetland N3

Wetland N3, otherwise known as Tub Lake, is a large depressional wetland located directly south of Sunset Park (see Figure 3-1g). Wetland N3 consists of a bog surrounded by forested and scrub-shrub wetland. Wetland hydrology is supported by both precipitation and locally high groundwater tables. There is small surface water inflow on the north end along the eastern boundary of Wetland N3 and an outflow stream (East Fork of Miller Creek) on the south end. Parametrix biologists delineated a small depressional lobe feature along the eastern boundary of Wetland N3 in 2019.

Soils sampled along the eastern boundary of Wetland N3 met the hydric soil criterion for Depleted Matrix (F3), Depleted Below Dark Surface (A11), and Black Histic (A3). Soil Plot WL N3-7 is representative of hydric soils present within Wetland N3. The top 2-inch layer is a very dark brown (10YR 2/2) loam. The bottom layer extending down to 13 inches is a dark grayish brown (10YR 4/2) loam with strong brown (7.5YR 5/6) redoximorphic features, therefore meeting the indicator for Depleted Matrix (F3).

Vegetation within the central bog portion of the wetland consists of Labrador tea (*Ledum groenlandicum*), stunted Western hemlock (*Tsuga heterophylla*) trees, and bog cranberry (*Vaccinium oxycoccos*). The bog portion of the wetland is outside of the study area and not assessed by Parametrix biologists. The scrub-shrub stratum surrounding the bog portion of Wetland N3 comprises hardhack (*Spiraea douglasii*), salmonberry (*Rubus spectabilis*), and redtwig dogwood (*Cornus sericea* [= *C. alba* in Lichvar, et al 2016]). The forested stratum surrounding the inner scrub-shrub stratum is primarily red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), Western redcedar (*Thuja plicata*) and willow species (*Salix* spp.).

Wetland N3 is classified as palustrine forested, scrub-shrub, and emergent under the USFWS system and depressional under the HGM system.

Using the 2014 Ecology rating system, Wetland N3 scored as a Category II wetland with a habitat score of 7 points. However, Wetland N3 meets the Ecology's 2014 rating system definition of a bog and is considered a Category I wetland due to special characteristics. Therefore, Wetland N3 requires a regulated buffer of 165 feet (see table 2-1).

Wetland N4

Wetland N4 is located south of S 136th Street (see Figure 3-1g). This area was previously residential development until the 1980s and 1990s when the Port of Seattle acquired the properties and removed most of the structures. Parametrix entirely delineated this wetland. In some areas the boundaries vary from previous delineations. Hydrology for Wetland N4 is supported primarily by surface water runoff and groundwater expression off the hillslope. Wetland N4 is classified as palustrine forested/scrub-shrub/emergent under the USFWS system and slope under the HGM system.

Soils sampled within this wetland met the hydric soil criterion for Depleted Matrix (F3) and Redox Dark Surface (F6).

The forested stratum of Wetland N4 consists primarily of red alder, black cottonwood, Oregon Ash (*Fraxinus latifolia*), and weeping willow (*Salix babylonica*). The sapling and shrub stratum is dominated by invasive Himalayan blackberry (*Rubus armeniacus*). The herbaceous understory

includes giant horsetail (*Equisetum telmateia*), lady fern (*Athyrium cyclosorum*), creeping buttercup (*Ranunculus repens*), and reed canarygrass (*Phalaris arundinacea*). The vegetated buffer surrounding the wetland is used as a park and contains walking and bike trails with high use. The vegetated buffer is primarily red alder, bigleaf maple (*Acer macrophyllum*), various remnant landscaping trees, Himalayan blackberry, and sword fern (*Polystichum munitum*).

Using the 2014 Ecology rating system, Wetland N4 scored as a Category III wetland with a habitat score of 4 points, thus requiring a regulated buffer of 40 feet (See Table 2-1).

Wetland 1

Wetland 1, approximately 0.1 acre, is located directly north of SR 518 in a previous residential area (see Figure 3-1f). Wetland 1 is classified as palustrine scrub-shrub under the USFWS system and depressional/slope under the HGM system. The primary sources of hydrology for Wetland 1 include surface water runoff and groundwater expression off the hillslope. Surface water leaves the wetland via a swale feature paralleling the road. Soils sampled within Wetland 1 met the hydric soil criterion for Depleted Below Dark Surface (A11). Soils sampled at SP WL 1-1 had a very dark gray brown (10YR 3/2) loam top layer 7 inches deep. The middle 2-inch layer was a grayish brown (2.5Y 5/2) loamy sand with dark yellowish brown (10YR 4/6) redoximorphic features. The bottom layer extending to 16 inches was a dark grayish brown (2.5Y 4/2) sand with dark yellowish brown (10YR 4/4) redoximorphic features.

The sapling and shrub stratum is dominated by Himalayan blackberry, salmonberry, and willow saplings. The herbaceous understory includes reed canarygrass, giant horsetail, lady fern, and creeping buttercup. The buffer surrounding Wetland 1 extends into Wetland 2 and into the remainder of the locally forested area and is then limited by roads and parking lots.

Using the 2014 Ecology rating system, Wetland 1 scored as a Category IV wetland with a habitat score of 3 points, thus requiring a regulated buffer of 40 feet (See Table 2-1).

Wetland 2

Wetland 2, approximately 0.8 acres, is located directly north of SR 518 in a previous residential area (see Figure 3-1f). Wetland 2 is classified as palustrine forest/scrub-shrub/emergent under the USFWS system and slope under the HGM system. A gravel road separates Wetland 2 and Wetland 1. The primary sources of hydrology for Wetland 2 include surface water runoff and groundwater expression off the hillslope.

Soils sampled within Wetland 2 met the hydric soil criterion for Redox Dark Surface (F6) and Depleted Matrix (F3). Soil Plot WL 2-5 is representative of hydric soils present within Wetland 2. This plot extends to a depth of 18 inches and consists of very dark grayish brown (10YR 3/2) gravelly loam soil with strong brown (7.5YR 4/6) redoximorphic features, thus meeting the indicator for Redox Dark Surface (F6).

The forested stratum of Wetland 2 consists primarily of red alder, black cottonwood, and willow species. The sapling and shrub stratum is dominated by Himalayan blackberry and willow saplings. The herbaceous understory is primarily reed canarygrass and creeping buttercup. The buffer surrounding Wetland 2 extends into Wetland 1 and into the remainder of the forested parcel and is then limited by roads and parking lots.

Using the 2014 Ecology rating system, Wetland 2 scored as a Category III wetland with a habitat score of 5 points, thus requiring a regulated buffer of 105 feet (See Table 2-1).

Wetland A

Wetland A is a small, previously unmapped wetland within the same forested area as Wetlands 1 and 2. Wetland A is classified as palustrine scrub-shrub/emergent under the USFWS system and slope under the HGM system. Wetland A extends along a hillslope and into a swale feature before draining into Ditch 7. Ditch 7 flows downslope into a catch basin and the NEPL bioswale stormwater feature. The primary sources of hydrology for Wetland A include stormwater runoff from the parking facility upslope and groundwater expression off the hillslope.

Soils sampled within Wetland A met the hydric soil criterion for Redox Dark Surface (F6). Soils sampled at SP WL A-1 had a very dark gray brown (10YR 3/2) gravelly sandy loam top layer 4 inches deep. The bottom layer extending to 13 inches was very dark gray brown (10YR 3/2) sandy loam with strong brown (7.5YR 4/6) and dark brown (7.5YR 3/4) redoximorphic features.

The sapling and shrub stratum of Wetland A is dominated by Himalayan blackberry. The herbaceous stratum is primarily reed canarygrass, velvetgrass *(Holcus lanatus*), and soft rush (*Juncus effusus*). The buffer surrounding Wetland A extends into forested parcel and is then limited by roads and parking facility upslope.

Using the 2014 Ecology rating system, Wetland A scored as a Category III wetland with a habitat score of 4 points, thus requiring a regulated buffer of 60 feet (See Table 2-1).

3.3.1.2 North RSA Wetlands

Wetland 5

Wetland 5 is located within the Miller Creek Regional Detention Facility. Wetland 5 is classified as palustrine forested under the USFWS system and depressional under the HGM system. Wetland hydrology is primarily supported by a high groundwater table and stormwater inputs. A perennial stream labeled as Stream A flows into the southwest corner of Wetland 5, with flows partially contributed from adjacent stormwater discharges (see Figure 3-1f).

Soils sampled within Wetland 5 met the hydric soil criterion for Depleted Matrix (F3) and Redox Dark Surface (F6). Soil Plot WL 5-1 is representative of hydric soils present within Wetland 5. The soil plot extends to a depth of 14 inches and consists of a dark gray (10YR 4/1) gravelly sandy loam with dark yellowish brown (10YR 3/4) redoximorphic features. Therefore, the soil plot meets indicators for Depleted Matrix (F3).

The forest stratum of Wetland 5 consists primarily of red alder, black cottonwood, and willow species. The sapling and shrub stratum is dominated by Himalayan blackberry, red-osier dogwood, and willow saplings. The herbaceous understory includes reed canarygrass, giant horsetail, lady fern, and small-fruited bulrush. The buffer surrounding Wetland 5 is limited by roads and the airport to the south. To the north and west the buffer abuts the Miller Creek riparian corridor and Lake Reba.

Using the 2014 Ecology rating system, Wetland 5 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland 6

Wetland 6 is located within the Miller Creek Regional Detention Facility. Wetland 6 is classified as palustrine forested under the USFWS system and depressional under the HGM system. Wetland hydrology is primarily supported by a high groundwater table and stormwater inputs. A seasonal

stream labeled as Stream A flows into the northwest corner of Wetland 6. The stream openly flows for 40 feet within Wetland 6 before it flows into a culvert and is piped to Lake Reba (see Figure 3-1f).

Soils sampled within Wetland 6 met the hydric soil criterion for Depleted Matrix (F3) and Histosol (A1). Soil Plot WL 6-3 is representative of hydric soils present within Wetland 6. The top 2-inch layer was a very dark grayish brown (10YR 3/2) loam. The middle layer from 2 to 10 inches was a dark grayish brown (10YR 4/2) sandy loam. The bottom layer extending to a depth of 19 inches was a dark grayish brown (10YR 4/2) gravelly sandy loam with strong brown (7.5YR 4/6) redoximorphic features. Therefore, this soil plot met for Depleted Matrix (F3).

The forest stratum of Wetland 6 consists primarily of red alder, black cottonwood, and willow species. The sapling and shrub stratum is dominated by Himalayan blackberry, red-osier dogwood, and willow saplings. The herbaceous understory includes reed canarygrass, giant horsetail, soft rush, lady fern, and sword fern on hummocks. The buffer surrounding Wetland 6 is limited by roads and the stormwater pond to the south. To the north and west the buffer abuts the Miller Creek riparian corridor and Lake Reba.

Using the 2014 Ecology rating system, Wetland 6 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetlands 4/7/8/9

Wetlands 4, 7, 8, and 9 are located within the Miller Creek Regional Detention Facility area (see Figure 3-1f). Reba Lake, Miller Creek, stormwater inputs, and a high groundwater table provide hydrology to these wetlands. These wetlands have the potential to store a high volume of incoming stormwater. Wetland 4 is classified as palustrine forested under the USFWS system and depressional under the HGM system. Wetlands 7, 8, and 9 are classified as palustrine forested/scrub-shrub/emergent under the USFWS system and depressional under the HGM system.

Soils sampled within Wetland 7 met the hydric soil criterion for Sandy Redox (S5) and Depleted Below Dark Surface (A11). Soils sampled at SP WL 7-2 had a very dark grayish brown (10YR 3/2) loam top layer 6 inches deep. The middle layer from 6 to 12 inches was grayish brown (2.5Y 5/1) sand with dark yellowish brown (10YR 4/6) redoximorphic features. The bottom layer extending to 22 inches was a dark gray (2.5Y 4/1) sand. Therefore, SP WL 7-2 meets the Sandy Redox (S5) and Depleted Below Dark Surface (A11) indicators.

The forest stratum for Wetlands 4, 7, 8, and 9 is primarily red alder, black cottonwood, and willow species. The sapling and shrub stratum is dominated by Himalayan blackberry, salmonberry, red-osier dogwood, and willow saplings. The herbaceous understory includes reed canarygrass, giant horsetail, soft rush, stinging nettle (*Urtica dioica*), lady fern, and sword fern on hummocks. The upland buffer for these wetlands is very limited by roads. Near the western edge of Wetland 9 there is a narrow road bisecting the Miller Creek riparian corridor. Wildlife connectivity may be possible in this area.

Under the 2014 Ecology rating system, Wetlands 4,7, and 9 scored as Category II with a habitat score of 6 points, thus requiring a standard buffer of 165 feet. Wetland 8 scored as a Category I with a habitat score of 7 points, thus requiring a standard buffer of 165 feet (see Table 2-1).

Wetland 10

Wetland 10 is located within the Miller Creek Regional Detention Facility. Wetland 10 is classified as palustrine forested/scrub-shrub under the USFWS system and depressional under the HGM system. Wetland 10 has no surface water outlet and with seasonal and occasional ponding.

Soils sampled within Wetland 10 met the hydric soil criterion for Loamy Mucky Mineral (F1). Soils sampled at SP WL 10-1 were a black (7.5YR 2.5/1) mucky loam to a depth of 22 inches.

The forested stratum of Wetland 10 consists primarily of red alder, black cottonwood, and Sitka willow. The sapling and shrub stratum is dominated by Himalayan blackberry, red-osier dogwood, and willow saplings. The herbaceous understory includes reed canarygrass, giant horsetail, lady fern, and small-fruited bulrush (*Scirpus microcarpus*). The buffer surrounding Wetland 10 is limited by roads and the airport to the south. To the north and west the buffer abuts the Miller Creek riparian corridor and Lake Reba.

Using the 2014 Ecology rating system, Wetland 10 scored as a Category III wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland 11

Wetland 11 is a small depressional wetland located directly south of Wetland 10. The majority of Wetland 11 was directly permanently impacted by the Third Runway Project, and the remaining wetland was impacted indirectly. Wetland 11 is classified as palustrine forested under the USFWS system and slope under the HGM system. The remaining portion of the wetland is 0.01-acre in size and is separated from Wetland 10 by an upland berm (see Figure 3-1f). The wetland receives stormwater inputs and has no outlet. Seasonal ponding occurs in over half of the wetland.

Soils sampled within Wetland 11 met the hydric soil criterion for Depleted Matrix (F3) and Depleted Below Dark Surface (A11). Soils sampled within Wetland 11 had a black (10YR 2/1) loam top layer 3 inches deep. The bottom layer extending to 15 inches was a dark gray (10YR 4/1) gravelly loam with dark yellowish brown (10YR 4/6) redoximorphic features.

The forest stratum of Wetland 11 is dominated by black cottonwood. The sapling and shrub stratum consists of Himalayan blackberry and willow saplings. No herbaceous understory vegetation was observed within the wetland during the field visit.

Using the 2014 Ecology rating system, Wetland 11 scored as a Category III wetland with a habitat score of 4 points, thus requiring a regulated buffer of 60 feet (See Table 2-1).

3.3.1.3 West Wetlands

Wetland 39

Wetland 39 is located near South 168 Street and is south of the Miller Creek Buffer Mitigation Area (see Figure 3-1e). The wetland is also directly northwest of the Port's Engineering and Survey field office. Wetland 39 is classified as palustrine forested/scrub-shrub under the USFWS system and slope under the HGM system. The primary source of hydrology to Wetland 39 is a shallow ground water table along the hillslope. During the field visit, most of the soil plots did not have a water table or saturation present within the top 12 inches of the soil plot but had the presence of oxidized rhizospheres as a primary wetland hydrology indicator. Only two plots, soil plot WL 39-7 and soil plot 12, had water table and/or saturation present within the top 12 inches.

Soils sampled within Wetland 39 met the hydric soil criterion for Depleted Matrix (F3), Redox Dark Surface (F6), and Depleted Below Dark Surface (A11). Soil Plot WL 39-2 is representative of hydric soils present within Wetland 39. The top 2-inch layer is a very dark gray (10YR 3/1) loam. The middle layer from 2 to 7 inches is a very dark gray (10YR 3/1) gravelly loam. The bottom layer extending down to 18 inches is a very dark gray (10YR 3/1) loam with dark yellowish brown (10YR 4/4) redoximorphic features, therefore meeting the indicator for redox dark surface (F6).

The forest stratum of Wetland 39 consists primarily of red alder, Oregon Ash, and weeping willow. Numerous trees present within the wetland appear to be remnant landscaping trees, such as pin oak (*Quercus palustris*). The scrub-shrub stratum is dominated by invasive Himalayan blackberry. The herbaceous understory includes giant horsetail, lady fern, and creeping buttercup. The buffer surrounding Wetland 39 is limited by roads and field office to the south. To the north the buffer habitat is contiguous with the Miller Creek Buffer mitigation area. The vegetated buffer is primarily red alder, bigleaf maple, various remnant landscaping trees, and Himalayan blackberry.

Using the 2014 Ecology rating system, Wetland 39 scored as a Category III wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland R15

Wetland R15 is located on the west side of the Seattle-Tacoma International Airport between Des Moines Drive South and FAA Seattle Terminal Radar Approach Control Facilities (TRACON) service road (see Figure 3-1e). Wetland R15 is classified as palustrine forested under the USFWS system and depressional under the HGM system. Within the southern portion of R15 there is a small culvert providing stormwater discharge into the wetland This area also sits within a topographic depression and collects surface water runoff from nearby impervious road surfaces. The northern portion of Wetland R15 has additional hydrology inputs provided by Miller Creek overbank flooding.

Soils sampled within Wetland R15 met the hydric soil indicator for Depleted Below Dark Surface (A11). Soils sampled at SP WL R15-1 had a very dark grayish brown (2.5Y 3/2) loam top layer 8 inches deep overlaying fragmented depleted layers with distinct redoximorphic concentrations.

The forest stratum of Wetland R15 consists primarily of red alder, Western redcedar, and black cottonwood. Numerous trees present within the wetland appear to be remnant landscaping trees, such as Japanese maple (*Acer palmatum*). The sapling and shrub stratum is dominated by invasive Himalayan blackberry and salmonberry. The herbaceous understory includes giant horsetail (*Equisetum telmateia*), lady fern, and creeping buttercup (*Ranunculus repens*). The buffer surrounding Wetland R15 is limited by roads and facilities in the WSDOT right-of-way to the south and west. To the north, the buffer habitat is contiguous with the riparian corridor of Miller Creek, all of which are within the Miller Creek Buffer mitigation area.

Using the 2014 Ecology rating system, Wetland R15 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland A20

Wetland A20 is located on a corner parcel west of the maintenance facility and is bound by SR 509, South 168th Street, and access roads. The portion of wetland on WSDOT right-of-way was estimated based on field observations and contour maps. Wetland A20 is located within a depression and extends up the gradual hillslope leading to the west airport tower. Wetland A20 is classified as palustrine forested/ scrub-shrub/ emergent under the USFWS system and depressional/slope under the HGM system. The northern boundary of the wetland along South 168th Street has water ponded

within a swale feature. The primary sources of hydrology to Wetland A20 are stormwater inputs and groundwater expression along the hillslope.

Soils sampled within Wetland A20 met the hydric soil criterion for Depleted Matrix (F3). Soils sampled at SP WL A19b-2 had a top layer 7 inches deep consisting of dark gray (10YR 4/1) sandy loam soils with dark yellowish brown (10YR 4/4) redoximorphic features. The bottom layer extending to 16 inches was a dark gray (10YR 4/1) gravelly loamy sand with dark yellowish brown (10YR 4/4) redoximorphic features.

The forested stratum of Wetland A20 is dominated by red alder, black cottonwood, western redcedar, and willow species. The sapling and shrub stratum is dominated by Himalayan blackberry and willow saplings. Emergent vegetation within Wetland A20 consists primarily of reed canarygrass, creeping buttercup, and bentgrass (*Agrostis* sp.). The upland buffer surrounding the wetland is limited by roads on all sides. Vegetation within the upland buffer consists primarily of Himalayan blackberry, grasses, and remnant landscaping trees such as Japanese maple.

Using the 2014 Ecology rating system, Wetland A20 scored as a Category III wetland with a habitat score of 5 points, thus requiring a regulated buffer of 105 feet (See Table 2-1).

Wetland 44

Wetland 44 is located in a corner parcel between the third runway and SR 509 (see Figure 3-1d). Wetland 44 is classified as palustrine forested under the USFWS system and riverine/slope under the HGM system. The primary sources of hydrology to Wetland 44 are groundwater expression from a series of seeps along the hillslope and discharge from a low-flow mitigation well in the southeastern lobe of the wetland. These seeps and flow from the mitigation well drain directly into the headwaters of Walker Creek. During the field visit, there was channelized water flowing downslope into Walker Creek.

Soils sampled within Wetland 44 met the hydric soil criterion for Depleted Matrix (F3), Redox Dark Surface (F6), Depleted Below Dark Surface (A11), and Thick Dark Surface (A12). Soil Plot WL 44-7 is representative of hydric soils present within Wetland 44. The top 8-inch layer is a very dark gray (10YR 3/1) loam. The middle layer from 8 to 10 inches is a very dark grayish brown (10YR 3/2) loam with dark yellowish brown (10YR 4/6) redoximorphic features. The bottom layer extending down to 18 inches is a dark gray (2.5Y 4/1) loam with reddish yellow (7.5YR 6/8) redoximorphic features, therefore meeting the indicators for depleted matrix (F3) and depleted below dark surface (A11).

The forested stratum of Wetland 44 is dominated by red alder, black cottonwood, and Pacific willow. The sapling and shrub stratum is dominated by salmonberry and invasive Himalayan blackberry. The herbaceous understory includes giant horsetail, lady fern, and sword fern on hummocks. The upland buffer surrounding the wetland is limited by the airport to the east, SR 509 to the west, and the Engineering and Field Survey office to the north. Vegetation within the upland buffer consists primarily of red alder, black cottonwood, bigleaf maple, Himalayan blackberry, and common pasture grasses.

Using the 2014 Ecology rating system, Wetland 44 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland A14a/A14b

Wetlands A14a and A14b are small slope wetlands bisected by an old residential road and are located northeast of the Engineering and Survey Field office (see Figure 3-1e). These wetlands are directly south of the Miller Creek Buffer Mitigation area. Wetland A14a is classified as palustrine forest/scrub shrub/emergent under the USFWS system and slope under the HGM system. A14b is classified as palustrine forest/emergent under the USFWS system and slope under the HGM system. The primary sources of hydrology to these wetlands are stormwater inputs from South 168 Street and groundwater expression along the hillslope.

Soils sampled within Wetland A14b met the hydric soil indicator for Depleted Below Dark Surface (A11). Soils sampled at SP WL A14b-2 were black (2.5Y 2.5/1) and very dark gray (2.5Y 2.5Y/1) to a depth of 11 inches. Underneath these dark top layers were depleted very dark grayish brown (10YR 4/1) loam and sandy loam layers with distinct redoximorphic features extending to a depth of 16 inches.

The forested stratum of Wetlands A14a/A14b consists primarily of red alder and black cottonwood. The sapling and shrub stratum is dominated by invasive Himalayan blackberry, salmonberry, and oso berry (*Oemleria cerasiformis*). The herbaceous understory includes giant horsetail, lady fern, skunk cabbage (*Lysichiton americanus*), and small fruited bulrush (*Scirpus microcarpus*). The buffer surrounding these wetlands is limited by South 168th Street and 8th Avenue South to the south and west, respectively. To the north, the buffer habitat is contiguous with the riparian corridor of Miller Creek and additional wetlands, all of which are within the Miller Creek Buffer mitigation area.

Using the 2014 Ecology rating system, Wetlands A14a and A14b scored as Category III wetlands with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetlands R15b/14a/13

Wetlands R15b/14a/13 are riverine wetlands which receive overbank flooding from Miller Creek. These wetlands are classified as palustrine forested under the USFWS system and riverine under the HGM system. The wetlands are located within the Miller Creek Buffer mitigation area, and the site receives routine maintenance such as invasive species control.

The forest stratum of Wetlands R15b/14a/13 consists primarily of red alder, Western redcedar, and black cottonwood. The shrub stratum is dominated by salmonberry. The herbaceous understory includes giant horsetail, lady fern, and creeping buttercup.

Using the 2014 Ecology rating system, Wetlands R15b/14a/13 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetlands R9/37a/18

Wetlands R9/37a/18 are located along Miller Creek east and southeast of the FAA Seattle TRACON building. These wetlands are classified as palustrine forested under the USFWS system and depressional/riverine under the HGM system. The wetlands are within a topographic depression and collect surface water runoff from nearby impervious road surfaces and receive overbank flooding from Miller Creek.

Using the 2014 Ecology rating system, Wetlands R9/37a/18 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland R3

Wetland R3 is a small riverine wetland which receives hydrologic input from Miller Creek. The wetland is located south of the S 157th Place crossing over Miller Creek. Wetland R3 is classified as palustrine emergent under the USFWS system and riverine under the HGM system.

Using the 2014 Ecology rating system, Wetland R3 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetland R2

Wetland R3 is a small riverine wetland which receives hydrologic input from Miller Creek. The wetland is located north of the S 157th Place crossing over Miller Creek. Wetland R3 is classified as palustrine forested under the USFWS system and riverine under the HGM system.

Using the 2014 Ecology rating system, Wetland R3 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

3.3.1.4 South RSA Wetlands

Wetland E1

Wetland E1 is located southeast of the airport runways near the fuel tank farm and South 188 Street. Wetland E1 is classified as palustrine forested under the USFWS system and slope under the HGM system. The primary sources of hydrology include groundwater expression off the hillslope and stormwater inputs. Directly northeast of Wetland E1, there is a culvert with a small gravel fill pad below it.

Soils sampled within Wetland E1 met the hydric soil criterion for Depleted Matrix (F3) and Redox Dark Surface (F6). Soil Plot WL E1-1 is representative of hydric soils present within Wetland E1. The top 6-inch layer is a very dark brown (10YR 2/2) sandy loam. The bottom layer extending down to 17 inches is a very dark brown (10YR 2/2) sandy loam with distinct redoximorphic features, therefore meeting the indicators for Redox Dark Surface (F6).

The forested stratum of Wetland E1 is dominated by red alder, black cottonwood, western redcedar, and willow species. The sapling and shrub stratum is primarily Himalayan blackberry, hardhack, red-osier dogwood, and willow saplings. The herbaceous understory includes soft rush, lady fern, and sword fern on hummocks. The upland buffer surrounding the wetland is very limited by airport facilities.

Using the 2014 Ecology rating system, Wetland E1 scored as a Category III wetland with a habitat score of 4 points, thus requiring a regulated buffer of 60 feet (See Table 2-1).

Wetland 52A/Wetland DC

Wetland 52A is located along the East Fork Des Moines Creek directly southeast of the airport runways and extends into the former Tyee Valley Golf Course (see Figure 3-1b/c). Wetland 52A is classified as palustrine forest under the USFWS system and slope under the HGM system. The primary source of hydrology to Wetland 52A is groundwater expression from a series of seeps along the steep hillslope east of the creek. Stormwater sheet flow also enters the wetland from the Port of Seattle parking area and South 192nd Street upslope of the wetland. Des Moines Creek flows adjacent to Wetland 52A but is fairly incised and subsequently does not provide substantial

overbank flooding to the wetland. The wetland is on a fairly steep slope and the majority of the wetland lies above the level of the creek.

Within the Des Moines Creek riparian corridor there is also wetland present below OHWL ((Wetland DC). The presence of wetland below the OHWL extends into the three smaller segments of Des Moines Creek near the fuel farm area (see Figure 3-1c).

Soils sampled within Wetland 52A met the hydric soil criterion for Depleted Matrix (F3), Depleted below dark surface (A11), and Loamy Gleyed Matrix (F2). Soil Plot WL 52A-3 is representative of hydric soils present within Wetland 52A. The top 5-inch layer is a black (10YR 2/1) loam. The middle layer from 5 to 10 inches is a very dark grayish brown (10YR 3/2) loam. The bottom layer extending down to 16 inches is a gray (10YR 6/1) sandy loam with dark yellowish brown (10YR 4/6) and light olive brown (2.5Y 5/3) redoximorphic features, therefore meeting the indicators for Depleted Matrix (F3) and Depleted Below Dark Surface (A11).

The forested stratum of Wetland 52A is dominated by red alder and Pacific willow. The sapling and shrub stratum is primarily dense invasive Himalayan blackberry, salmonberry, and Pacific willow saplings. The herbaceous understory includes giant horsetail, soft rush, lady fern, and sword fern on hummocks. The vegetated buffer surrounding the wetland is limited by parking lots and roads. The vegetated buffer extending into the former golf course offers connection to other habitat that is routinely maintained and disturbed. Vegetation within the upland buffer consists primarily of Lombardi poplar (*Populus nigra*), Himalayan blackberry, and grasses.

Using the 2014 Ecology rating system, Wetland 52A scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet. Wetland DC also scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetlands 52B/52C/DMC1/DMC2/G1

Wetlands 52B, 52C, DMC1, DMC2, and G1 are located within the Des Moines Creek riparian corridor in the former Tyee Valley Golf Course (see Figure 3-1b). The Tyee Detention Pond has a downstream outlet control structure that backs up water from the East Fork of Des Moines Creek in the bowl-shaped local topography. Parametrix biologists found Wetland 52C to be entirely below the OHWL for the East Fork of Des Moines Creek. Wetlands 52B, DMC1, DMC2, and G1 are located along a hillslope and have hydrology supported by groundwater seeps. Wetland 52B is classified as palustrine forest/ scrub-shrub under the USFWS system and slope under the HGM system. Wetland 52C is classified as palustrine forest/emergent under the USFWS system and riverine under the HGM system. Wetland G1 is classified as palustrine forested and scrub-shrub under the USFWS system and slope under the HGM system. Wetlands DMC1 and DMC2 are palustrine scrub-shrub and emergent wetlands under the USFWS system and slope under the HGM system.

Soils sampled within Wetland 52B met the hydric soil criterion for Loamy Gleyed Matrix (F2). Soils at SP WL 52B-1 had a top 5-inch layer consisting of very dark grayish brown (10YR 3/2) silty clay loam. The bottom layer extending down to 14 inches was a dark greenish gray (10Y 4/1) gley soil.

Wetlands 52B, 52C, and G1 are primarily vegetated by red alder, black cottonwood, Himalayan blackberry, creeping buttercup, and pasture grasses. Wetlands DMC1 and DMC2 are dominated by reed canarygrass.

Under the 2014 Ecology rating system, Wetland 52C scored as a Category II with a habitat score of 6 points, thus requiring a standard buffer of 165 feet. Wetland 52B scored as a Category III with a

habitat score of 6 points, thus requiring a standard buffer of 165 feet. Wetlands DMC1, DMC2, and G1 are Category III wetlands with a habitat score of 5 points, thus requiring a regulated buffer of 105 feet (See Table 2.1).

Wetland G12

Wetland G12 is located in the former Tyee Valley Golf Course (see Figure 3-1b). Wetland G12 is classified as palustrine forested/scrub-shrub/emergent under the USFWS system and depressional/slope under the HGM system. The primary source of hydrology to Wetland G12 appears to be a seasonally high groundwater table and seepage from the runway embankment. The wetland is ditched at the toe of the embankment slope and drains into a manhole.

Soils sampled within Wetland G12 met the hydric soil criterion for Depleted Matrix (F3) and Depleted Below Dark Surface (A11). Soil Plot WL G12-7 is representative of hydric soils present within Wetland G12. The top 7-inch layer is a very dark grayish brown (10YR 3/2) loam. The bottom layer extending down to 19 inches is a grayish brown (10YR 5/2) loam with dark yellowish brown (10YR 5/6) redoximorphic features, therefore meeting the indicators for depleted matrix (F3) and depleted below dark surface (A11).

The forested stratum of Wetland G12 is dominated by Lombardi poplar and willow species. Trees in the former golf course area are routinely trimmed to maintain line of sight. The sapling and shrub stratum is primarily dense invasive Himalayan blackberry, salmonberry, and willow saplings. Herbaceous vegetation is present in the maintained field area. This area consists primarily of bentgrasses *(Agrostis sp.*), bluegrasses (*Poa sp*.), and velvetgrass (*Holcus lanatus*). The upland buffer surrounding the wetland is limited by the airport to the west. The vegetated buffer extending into the former golf course offers additional habitat connectivity; however, this area is routinely maintained and disturbed.

Using the 2014 Ecology rating system, Wetland G12 scored as a Category II wetland with a habitat score of 6 points, thus requiring a regulated buffer of 165 feet (See Table 2-1).

Wetlands G4/G5

Wetlands G4 and G5 are located in the central portion of the former Tyee Valley Golf Course (see Figure 3-1b). Wetland G4 is classified as palustrine scrub-shrub under the USFWS system and slope under the HGM system. Wetland G5 is classified as palustrine scrub-shrub and emergent under the USFWS system and slope under the HGM system. These slope wetlands appear to have hydrology primarily supported by a seasonally high groundwater table. At a soil test pit within Wetland G5, Parametrix biologists found a high water table and saturation 8 inches below the surface. Soils at this pit were a black (10YR 2/1) mucky loam to a depth of 16 inches and met for the hydric soil criterion for Loamy Mucky Mineral (F1).

Wetland G4 is dominated Himalayan blackberry. Wetland G5 is primarily Himalayan blackberry, creeping buttercup, and typical pasture grasses including red fescue (*Festuca rubra*).

Under the 2014 Ecology rating system, Wetlands G4 and G5 scored as a Category III with a habitat score of 5 points, thus requiring a standard buffer of 105 feet (See Table 2-1).

Wetland H

Wetland H is located within former Tyee Valley Golf Course and is directly east of the gravel access road and Wetland G12 (See Figure 3-1b). The wetland lies in a small depression that drains along a

gradual slope into a swale feature with no outlet. The primary source of hydrology is a seasonally high groundwater table. Wetland H is classified as palustrine scrub-shrub and emergent under the USFWS system and depressional/slope under the HGM system.

Soils sampled within Wetland H met the hydric soil criterion for Depleted Matrix (F3) and Depleted Below Dark Surface (A11). Soil Plot WLH-2 is representative of hydric soils present within Wetland H. The top 4-inch layer is a very dark brown (10YR 2/2) loam. The middle layer from 4 to 17 inches is a very dark grayish brown (10YR 3/2) loam with distinct redoximorphic features. The bottom layer extending down to 22 inches is a dark gray (2.5Y 4/1) loamy sand with distinct redoximorphic features.

Wetland H is dominated by typical pasture grasses including bluegrass and velvetgrass species and contains willow saplings.

Under the 2014 Ecology rating system, Wetland H scored as a Category III with a habitat score of 5 points, thus requiring a standard buffer of 105 feet (See Table 2-1).

Wetland D (Des Moines Creek Regional Detention Facility mitigation area)

Wetland D is located in the Des Moines Creek Regional Detention Facility mitigation area (under a restrictive covenant) (see Figure 3-1b). Wetland D is classified as palustrine forested/scrub-shrub under the USFWS system and riverine under the HGM system. This wetland holds the confluence of the east and west forks of Des Moines Creek and associated riparian habitat and extends into depressions within the maintained field to the north.

The vegetation within Wetland D consists of shrubs and younger saplings, such as willow species and redtwig dogwood along the northern boundary of the wetland. Further interior in the wetland there are red alder and conifer trees.

Under the 2014 Ecology rating system, Wetland D scored as a Category II with a habitat score of 6 points, thus requiring a standard buffer of 165 feet (See Table 2-1).

3.3.2 Streams

Parametrix biologists identified and delineated four streams in the study area. Summaries of the streams in the study area are provided in Table 3-2. All streams are governed by the City of SeaTac critical areas code (Chapter 15.30) as indicated by the 2018 Port-SeaTac ILA (Port of Seattle 2018a). General background information is provided in Appendix A, and representative photographs are provided in Appendix B of this report. General characteristics of the streams are discussed in the sections below.

Table 3-2. Summary of Streams within the Study Area

Stream	Stream Width (feet)[a]	Flow Duration	WDNR Classification[b]	USFWS Classification[c]	SeaTac Stream Class[d]	Standard Buffer (feet)[e]
Miller Creek	20	Perennial	F	R3UBH	2	50
Stream A	8	Perennial	F	None	2	50
Walker Creek	6	Perennial	F	None	2	50
East Fork of Des Moines Creek	30	Perennial	F	R4SBC	2	50

Stream	Stream Width (feet)[a]	Flow Duration	WDNR Classification[b]	USFWS Classification[c]	SeaTac Stream Class[d]	Standard Buffer (feet)[e]
Des Moines Creek	20	Perennial	F	PEM1Cx	2	100

[a] As measured within the study area
[b] WDNR FPARS mapping (2024), as mapped within the study area
[c] USFWS NWI mapping (2024), as mapped within the study area
[d] SMC 15.700.330: The Port of Seattle has adopted SMC 15.700.330 with respect to classification of streams and application of appropriate buffer widths.
[e] SMC 15.700.330.A: : The Port of Seattle has adopted SMC 15.700.330 with respect to classification of streams and application of appropriate buffer widths.

3.3.2.1 Miller Creek

Miller Creek flows south through the Miller Creek Regional Detention Facility and the Miller Creek Buffer Mitigation area within the study area. There is a full fish barrier on Miller Creek downstream of the study area (Site ID: 930591) (WDFW 2024b). Because the stream meets the physical characteristics for a fish-bearing stream as outlined in the WAC (222-16-031), the East Fork of Miller Creek is classified as fish-bearing. Therefore, according to SMC 15.700.330 (See Table 3-2 above), Miller Creek is classified as a Class 2 stream without salmonid use and would require a standard buffer of 50 feet (SMC 15.700.330.A).

3.3.2.2 Stream A

Stream A is a perennial stream that flows into the southwest corner of Wetland 5 through two culverts. Flows are partially contributed from stormwater discharge. The stream flows north through Wetland 5, through a culvert under the road, and into Wetland 6 where it daylights for 40 feet before flowing into a culvert. The downstream end of this culvert could not be located but likely flows into Lake Reba. WDFW maps the east end of the culvert as a partial fish barrier (Site ID: 938411) and the west end of the culvert as a full fish barrier (Site ID: 938410). There are also several other fish barriers between the surveyed portion of Stream A and Miller Creek, and a full fish barrier on Miller Creek (2019c). Because the stream meets the physical characteristics for a fish-bearing stream as outlined in the WAC (222-16-031), Stream A is classified as fish-bearing. Therefore, according to SMC 15.700.330 (See Table 3-2 above), Stream A is classified as a Class 2 stream without salmonid use and would require a standard buffer of 50 feet (SMC 15.700.330.A).

3.3.2.3 Walker Creek

The portion of Walker Creek within the Project study area consists of the headwater flows originating within Wetland 44 (see Figure 3-1c). These headwater flows are supported by groundwater seeps off the hillslope and drainage from a low-flow mitigation discharge well. These flows concentrate at the base of the hillslope and flow west through a culvert under SR-509 and into the Airport Park wetlands. The stream at the base of the hillslope within Wetland 44 is perennial. The headwaters of Walker Creek within the study area are unmapped by WDNR (2019a) and WDFW (2019a). Because the stream is perennial but does not support salmonids, it is classified as a Class 2 stream and requires a standard buffer of 50 feet (SMC 15.700.330.A).

3.3.2.4 East Fork of Des Moines Creek

The East Fork of Des Moines Creek originates from Bow Lake and flows through a series of subsurface pipes before daylighting southeast of the airport runways. From here the East Fork of Des Moines Creek flows through a narrow riparian corridor and into the former Tyee Valley Golf Course (see Figure 3-1b). The stream flows through the Tyee Detention Pond within the former golf course and then flows via a culvert into Des Moines Creek within the Des Moines Regional Detention Facility Mitigation Area (Wetland D). At the downstream end of the Tyee Detention Pond is an outlet control structure that blocks anadromous fish use. Because the stream meets the physical characteristics for a fish-bearing stream as outlined in the WAC (222-16-031), the East Fork of Des Moines Creek is classified as fish-bearing. Therefore, according to SMC 15.700.330 (see Table 3-2 above), the East Fork of Des Moines Creek is classified as a Class 2 stream without salmonid use and would require a standard buffer of 50 feet (SMC 15.700.330.A).

3.3.2.5 Des Moines Creek

The West Fork and East Fork of Des Moines Creek converge within the Des Moines Regional Detention Facility Mitigation Area south of the airport runways. According to the WDFW Washington State Fish Passage mapper, there is a potential barrier with an unknown status (Site ID: 09.0377 2.12) for the culvert conveying Des Moines Creek under South 200 Street (2024b). Because of the unknown status, it is assumed that the stream section north of the culvert does have anadromous fish use. Therefore, according to SMC 15.700.330 (See Table 3-2 above), Des Moines Creek is classified as a Class 2 stream with salmonid use and would require a standard buffer of 100 feet (SMC 15.700.330.A).

3.3.3 Jurisdictional Tributaries

Seven tributaries were identified in the study area. For the purposes of this review, the tributaries were considered to be under the jurisdiction of the Corps. The Corps will make a jurisdictional determination to confirm the status of the tributaries during the formal permitting process. Tributaries 1 through 7 are described below.

3.3.3.1 Tributary 1

Tributary 1 is 350 feet in length and conveys surface water runoff downslope along 8th Place North (see Figure 3-1e). Tributary 1 flows into a small culvert and likely discharges into Wetland A14b. Tributary 1 is 1 foot in width and is assumed to be intermittently flowing.

3.3.3.2 Tributary 2

Tributary 2 is 500 feet in length and conveys surface water runoff downslope along the gravel access road to the TRACON building (see Figure 3-1e). The Tributary flows into a stormwater treatment wetland and then outflows into Wetland A14b. Tributary 2 is 2 feet in width and is assumed to be intermittently flowing.

3.3.3.3 Tributary 3

Tributaries 3a and 3b are located within the WSDOT right-of-way along SR-509 and span 1,000 feet in length (see Figure 3-1e). Tributary 3a is 3 feet in width and flows downslope into a culvert and into Tributary 3b. Tributary 3b is approximately 5 feet in width, likely perennially flowing, and flows into the headwater streams of Walker Creek within Wetland 44.

3.3.3.4 Tributary 4

Tributary 4 is 100 feet in length and conveys surface water runoff downslope and into the headwaters of Walker Creek (see Figure 3-1d). Tributary 4 is 3 feet in width and is assumed to be intermittently flowing.

3.3.3.5 Tributary 5

Tributary 5 is 60 feet in length and flows downslope into Wetland 5 within the Miller Creek Regional Detention Facility (see Figure 3-1f). Tributary 5 is 1 foot in width and is assumed to be intermittently flowing.

3.3.3.6 Tributary 6

Tributary 6 is 90 feet in length and is located in the forested parcel north of SR 518. Wetland A is directly upslope and discharges surface water flows in Tributary 6 (see Figure 3-1f). Tributary 6 flows downslope and drains into a catch basin and into a stormwater treatment wetland. The tributary then flows along SR 518 and then conveyed under the road and into the Miller Creek Regional Detention Facility. Tributary 6 is 2 feet in width and is assumed to be intermittently flowing.

3.3.3.7 Tributary 7

Tributary 7 comprises three segments separated by small culverts under pavement. Tributary 7a, 7b, and 7c span 450 feet and flow south along the east side of 16th Avenue, directly across from the PacWest baseball fields (see Figure 3-1f). Tributary 7 is approximately 4 feet in width, is assumed to be intermittently flowing, and ultimately drains into the Miller Creek Regional Detention Facility. SP-4(UPL) was excavated within the Tributary 7a segment and confirmed non-wetland conditions.

3.3.4 Stormwater Features

Four key stormwater facilities were identified within the SAMP Near Term Project study area and are documented stormwater best management practices (BMPs) in the Seattle-Tacoma International Airport Stormwater Pollution Prevention Plan (Port of Seattle 2019b). These particular stormwater features are identified to distinguish them from jurisdictional wetland features within the study area. These key stormwater features are mapped on Figures 3-1a to 3-1g.

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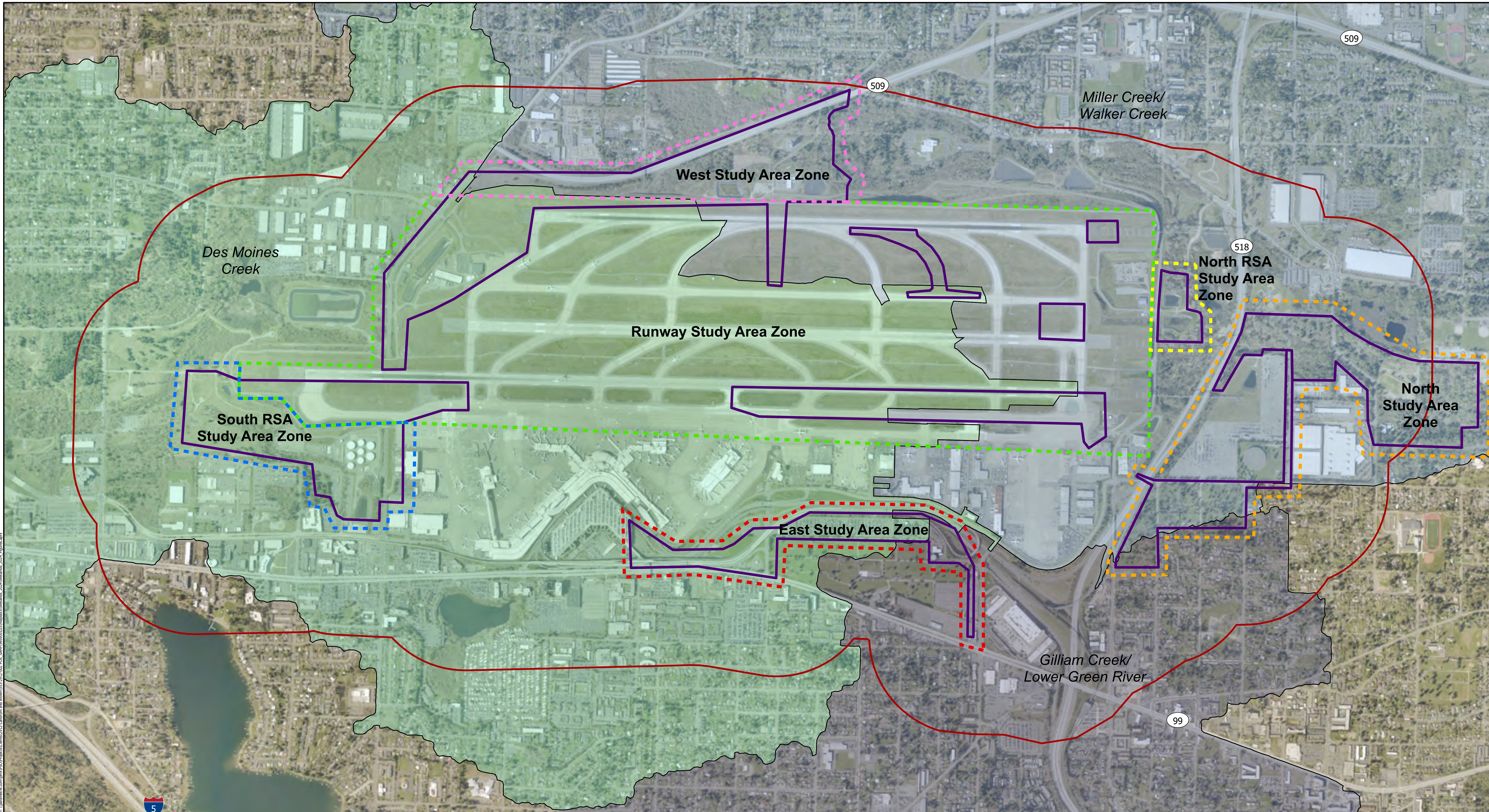
Josh Wozniak, PWS (#1478)

Figures



Parametrix

Date: 2/5/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 0.13 0.25 0.38 0.5 Miles

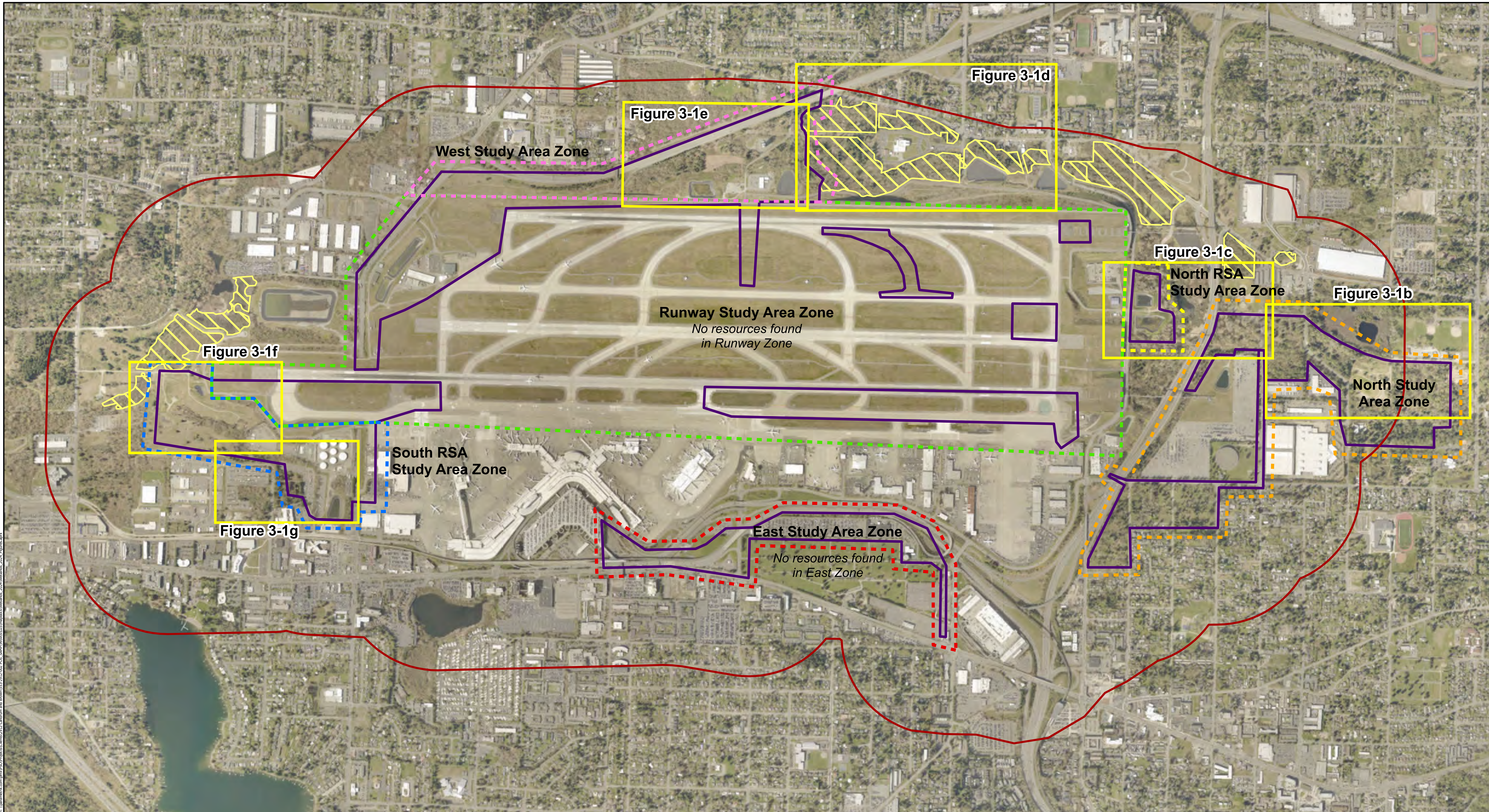
General Study Area
Field Survey Area

Drainage Basins
Des Moines Creek
Gilliam Creek/Lower Green River
Miller Creek/Walker Creek

Study Area Zones
East Zone
North RSA Zone
North Zone
Runway Zone
South RSA Zone
West Zone

Figure 1-1
Vicinity Map
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report

King County, WA



Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 0.13 0.25 0.38 0.5 Miles

- Figures 3-1b to 3-1g Page Extents
- General Study Area
- Field Survey Area
- Restrictive Covenant Wetland Area

Study Area Zones

- East Zone
- North RSA Zone
- North Zone
- Runway Zone
- South RSA Zone
- West Zone

Figure 3-1a

Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report

King County, WA

Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 100 200 300 400 Feet

- Sample Plot
- Wetland Boundary
- General Study Area
- Miller Creek
- Wetland Area
- King County Parcel
- Field Survey Area
- Restrictive Covenant
- Lake/Pond

Figure 3-1b
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report
Page 1 of 6

King County, WA

Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 100 200 300 400 Feet

- Sample Plot
- Culvert
- Stormwater Feature
- Tributaries
- Wetland Boundary
- OHWL
- General Study Area
- Miller Creek
- Wetland Area
- King County Parcel
- Field Survey Area
- Restrictive Covenant
- Lake/Pond

Figure 3-1c
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report
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King County, WA

Wetland R15b
Wetland R15
Wetland A14a
Wetland R14a
Wetland R13
SP WL 39-11
SP WL 39-10
Wetland R9
Miller Creek
Wetland 37a
Wetland 18
S. 160th Ave
Wetland R2
Wetland R3

Parametrix

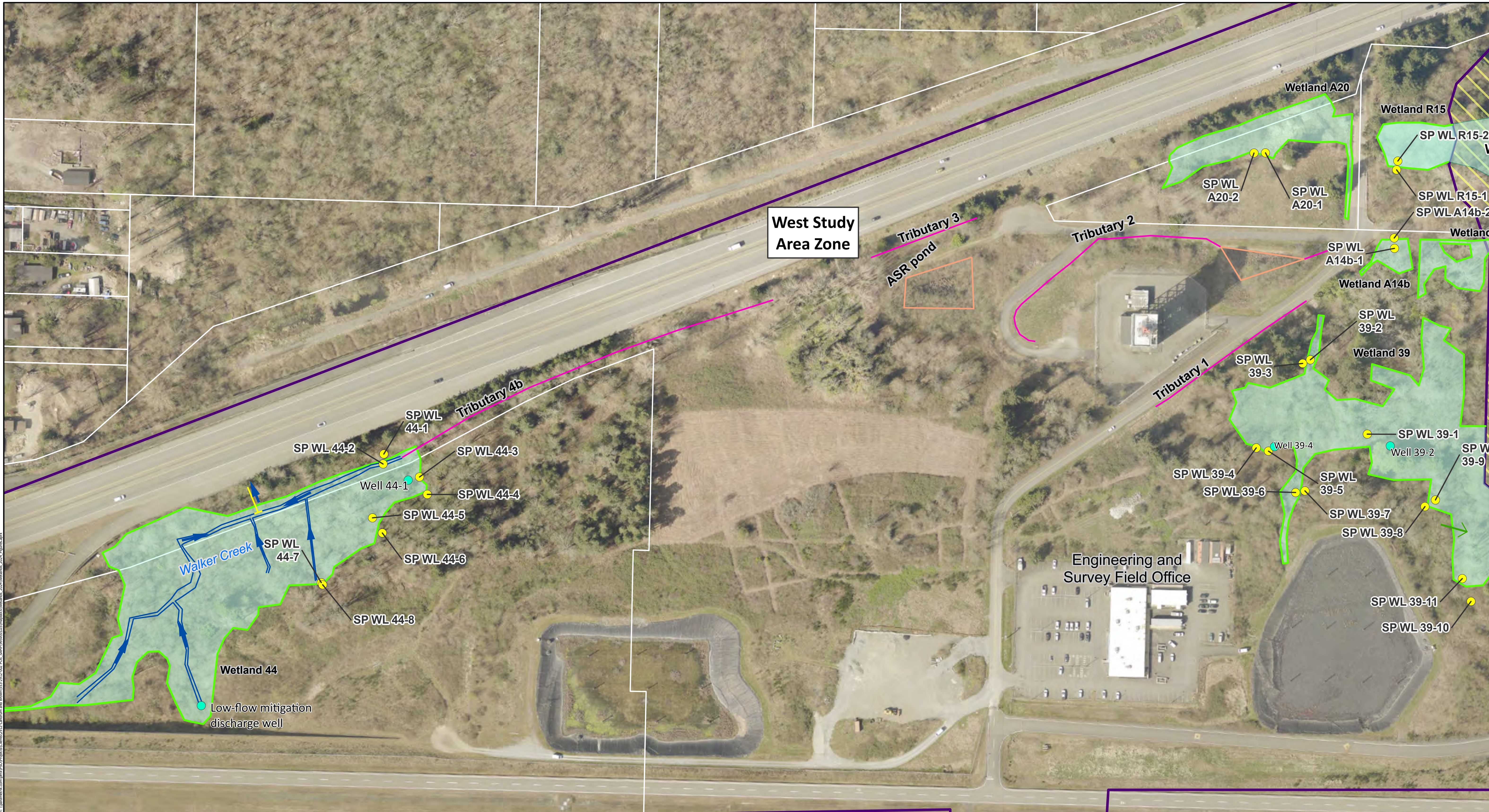
Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 100 200 300 400 Feet

Sample Plot
Wetland Boundary
General Study Area
Miller Creek
Wetland Area
King County Parcel
Field Survey Area
Restrictive Covenant

Figure 3-1d
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report

King County, WA



Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 100 200 300 400 Feet

- Wells
- Sample Plot
- Culvert
- Stormwater Feature
- Tributaries
- Wetland Boundary
- OHWL
- General Study Area
- Miller Creek
- Wetland Area
- King County Parcel
- Field Survey Area
- Restrictive Covenant

Figure 3-1e
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report
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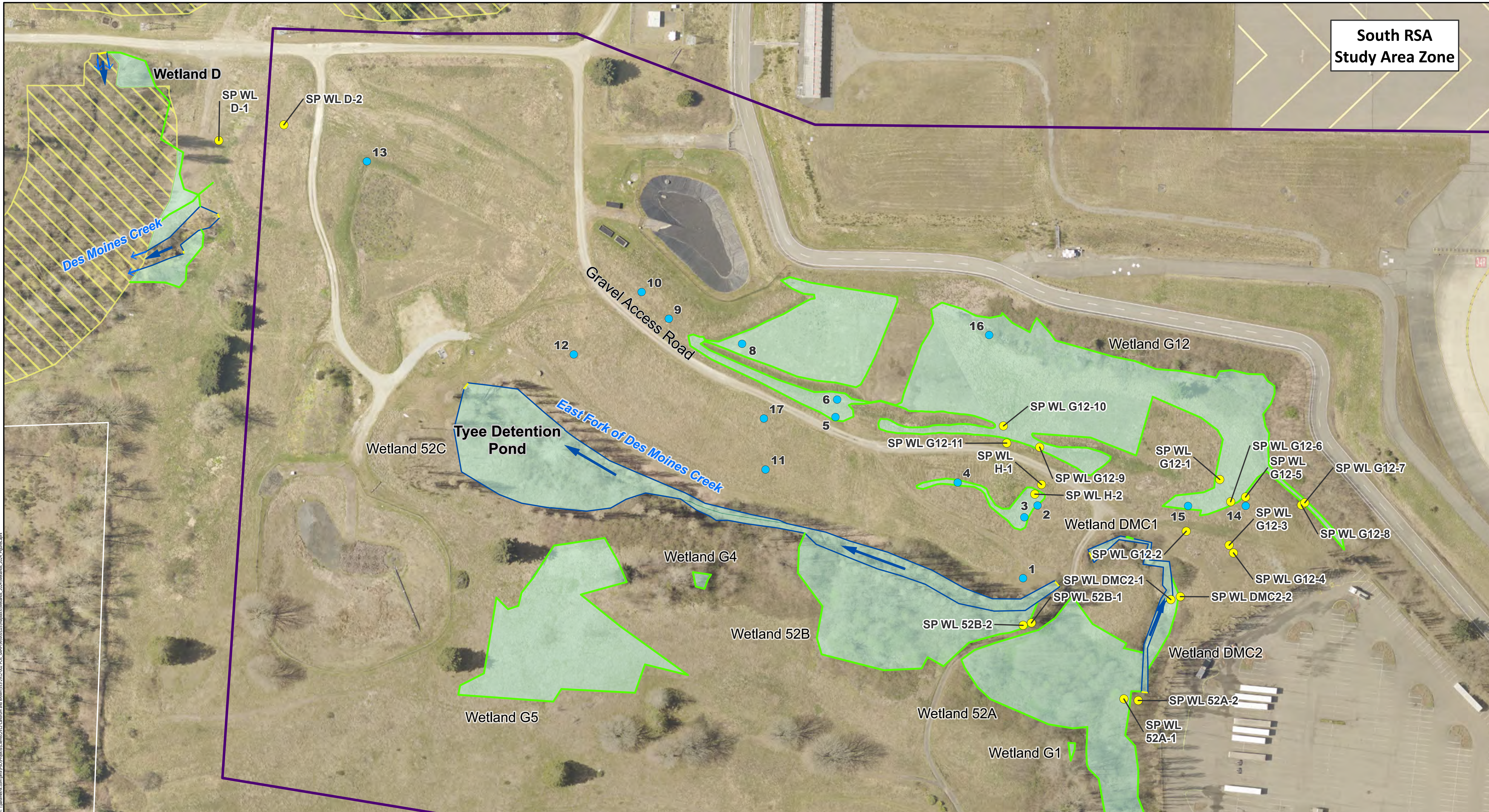
King County, WA



Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 100 200 300 400 Feet

- Sample Plot
- Hydrology Test Plot
- Culvert
- Wetland Boundary
- OHWL
- General Study Area
- Miller Creek
- Wetland Area
- King County Parcel
- Field Survey Area
- Restrictive Covenant

Figure 3-1f
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report
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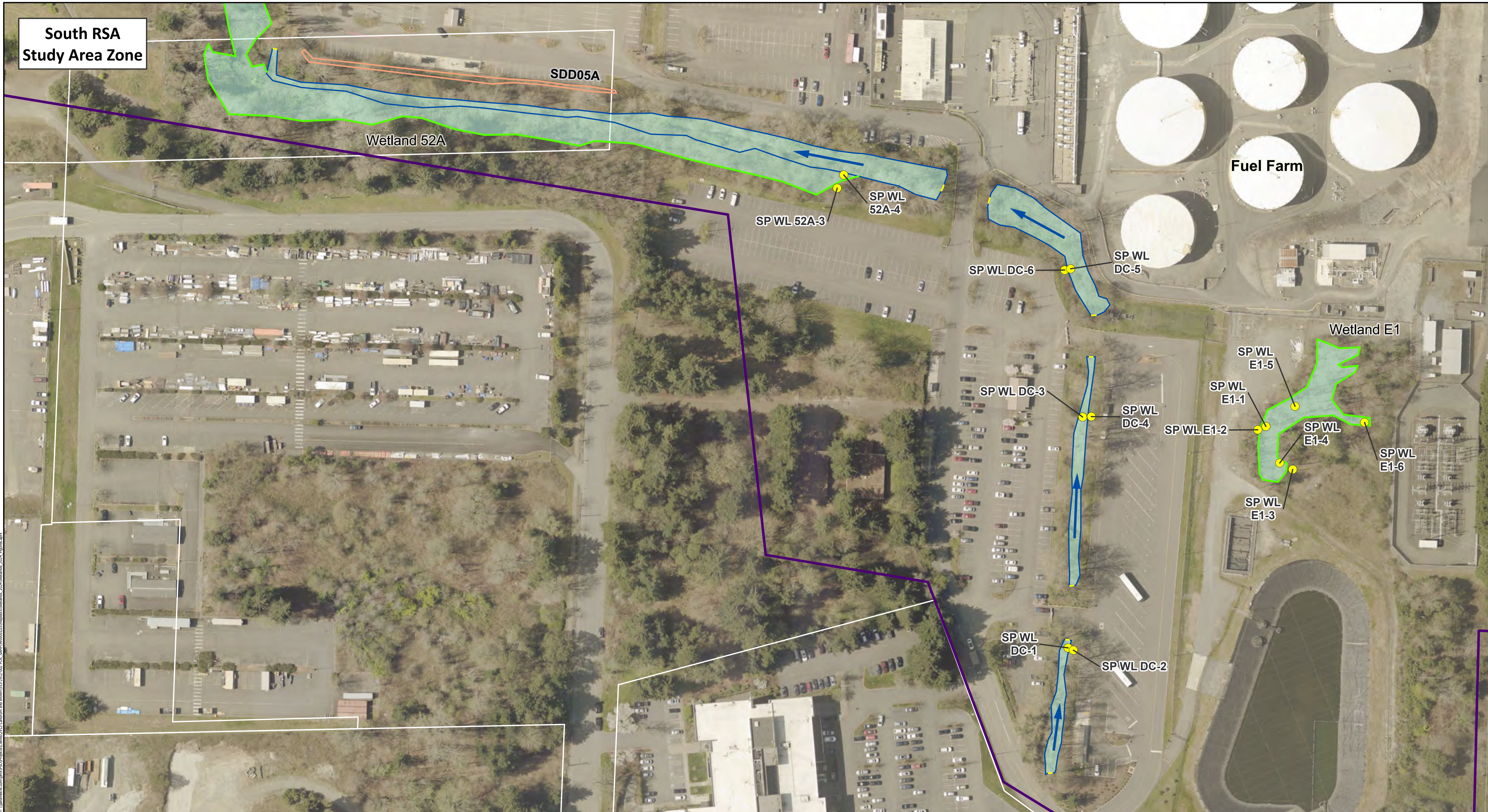
King County, WA



Parametrix

Date: 5/21/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

Sample Plot
Culvert
Stormwater Feature
Wetland Boundary
OHWL
General Study Area
Miller Creek
Wetland Area
King County Parcel
Field Survey Area
Restrictive Covenant

0 100 200 300 400 Feet

Figure 3-1g
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)
Near Term Projects
Wetlands and Streams Report
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King County, WA

Appendix A

Background Information (Available by Request)

Appendix B

Site Photographs (Available by Request)

Appendix C

Data Forms
(Available by Request)

Appendix D

Ecology Rating Forms (Available by Request)

APPENDIX M

Water Resources

Impacts Assessment for Aquatic Critical Areas

Parametrix
let's create tomorrow, together

Technical Memorandum

DATE:	May 22, 2024
TO:	Adele Pozzuto and Steve Rybolt, Port of Seattle
FROM:	Kaylee Moser, PWS and Josh Wozniak, PWS
SUBJECT:	Sustainable Airport Master Plan (SAMP) Impacts Assessment for Aquatic Critical Areas
CC:	Sarah Potter and Erik Schwenke, Landrum & Brown
PROJECT NUMBER:	553-2912-002
PROJECT NAME:	Sustainable Airport Master Plan (SAMP)

This memo describes estimated project impacts to aquatic critical areas based on the current designs for the Near-Term Projects (NTP). Impacts were calculated by overlaying the footprint of these NTPs and associated utility features provided by Landrum & Brown with mapped aquatic critical areas. Sources of mapped aquatic critical areas used in this analysis include:

- Wetland and streams delineated within the study areas (Parametrix 2024).
- Wetland and stream mapping provided by the Port for areas outside of the delineation study areas.
- Wetland and stream buffers created in compliance with SeaTac Municipal Code
- Wellhead protection areas and floodplains sourced from King County, City of SeaTac (SeaTac) and the Federal Emergency Management Agency (FEMA).

Impact assessments are based on the overlap between these GIS datasets and the NTP footprints. This memo provides only the spatial overlay of the projects with these features, pending further design refinement or technical studies. This memo and impact assessment provides information to the planning and design team, alerting them to potential aquatic critical area issues within certain portions of the NTP footprints.

Critical Areas Jurisdiction

The Port and City of SeaTac signed an ILA (ILA) in 2018 which addresses the Port's compliance with the City's critical areas ordinances on Port-owned property within City boundaries. The ILA provides that the Port complies with local critical area codes (SMC 15.700) to the extent practicable. The Port administers permitting for projects on Port property within the Airport Activity Area (AAA), while the City administers permitting outside the AAA. The major exception is that, if 401/404 or Hydraulic Project Act permitting is required for a project, the City's critical area regulations shall not apply. The Port will administer permitting for all of the critical areas permits except for projects in the North Study Area Zone, which is within City of SeaTac jurisdiction. This portion of the study area is directly north of State Route (SR) 518 (See Figure 1-1 Vicinity Map in Attachment A).

The City of SeaTac regulates the following aquatic critical areas under Chapter 15.700:

- Flood hazard areas
- Wetlands
- Stream
- Wellhead protection areas (WHPAs)
- Fish and wildlife habitat conservation areas

Overview of Project Impacts to Aquatic Critical Areas

The mapped aquatic critical areas within the study area include wetland, stream, floodways, WHPAs, and fish and wildlife habitat conservation areas. These layers were mapped by Parametrix or downloaded from the GIS data sites of government agencies, including the City of SeaTac, King County, and FEMA. The NTP footprints do not have any impacts on the mapped floodway or 100-year floodplain, nor are impacts to fish and wildlife habitat conservation areas anticipated to occur. The NTP footprints, utility lines, and stormwater ponds do have impacts to WHPAs, jurisdictional tributaries, wetlands, streams, and their associated buffers. Three WHPAs are mapped within the study area. The impacts to WHPAs were calculated based on a 10- year contaminant travel time. Wetlands and streams mapped within the study area were delineated between September and December 2019 and in March 2020, with a wetland and waters verification in January 2024. The mapped wetlands and streams within the study area drain into the Miller/Walker Creek, Gilliam Creek/Lower Green River, and Des Moines Creek drainage basins.

The NTPs are divided into five project groups: Airfield Operational Efficiency Projects, Airfield Safety/Standards Projects, Cargo Expansion Projects, North Terminal Projects, and Sustainable Aviation Fuel Projects. There is also associated utility infrastructure, including new stormwater ponds and 10 types of utility lines to be installed for the projects. Only the project elements that have impacts to aquatic critical areas are discussed in this memorandum. Permanent impacts to aquatic critical areas from utility line installation were calculated based on a 20- foot-wide buffer polygon applied to individual utility lines. Access roads are assumed to be 30 feet wide, with 5 feet of temporary disturbance on each side during construction, except in the vicinity of the Miller Creek crossing, where temporary disturbance extends to the limits of a covenant boundary that restricts impacts (20-50 feet). Temporary construction impact areas to critical areas were calculated based on a 50-foot buffer polygon applied to NTP footprints and stormwater ponds.

Impacts were specifically calculated so that there was no double counting for project elements that overlap spatially. In particular, for areas where permanent impacts from NTPs and utility lines overlapped, permanent “impact values” (acreages of impact) were assigned to the NTPs. As an example, consider a theoretical NTP served by an upgraded water line. The NTP would impact 0.5 acres of wetland. The new theoretical water line would impact 0.1 acre of the wetland inside the NTP footprint. Therefore, the water line impact would not be counted because it has already been included as an NTP impact. For areas where permanent impacts from new stormwater ponds and utility lines overlapped, permanent impact values were assigned to stormwater ponds. Where permanent and temporary buffer impacts overlapped, impact values were assigned to the project element that was permanent.

Table 1 summarizes the total permanent and temporary construction impacts for the NTP footprints, utility lines, and stormwater ponds within critical areas and associated buffers. Tables 2, 3, and 4 provide further details on permanent and temporary impacts for NTP footprints, utility lines, and stormwater ponds. In Tables 1 and 4 stream buffer impacts overlap wetland buffer impacts in some

areas but are accounted for separately. Also, all buffers have existing development such as buildings and impervious surfaces clipped out for the impact analysis.

See Attachment A for Figures 1-1 through 1-6d, displaying a vicinity map and the location of NTP footprints, utilities, stormwater ponds, and impacts to aquatic critical areas.

Table 1. Overview of Impacts to Aquatic Critical Areas and Buffers (acres)

Aquatic Critical Areas and Buffers	Permanent Impacts	Temporary Impacts
Stream/Jurisdictional Tributaries	0.02	0.08
Stream Buffer	0.12	0.20
Wetland	0.79	0.21
Wetland Buffer	2.66	3.43
Wetland, Stream and Buffer Total	**3.59**	**3.92**
Wellhead Protection Area	52.10	7.55

The current project design results in a total of 0.79 acres of permanent wetland impacts for all NTP footprints, utility lines, and stormwater ponds. Permanent stream/ jurisdictional tributary impacts—associated with the West Maintenance Campus access road—total 0.02 acre. Permanent wetland and stream buffer impacts total 2.66 acres and 0.12 acre, respectively. Temporary construction impacts, which would be restored after construction is complete, total 3.92 acres for wetland, stream, and buffer. Projects would protect WHPAs from groundwater contamination, as required by the State of Washington Department of Health. Based on the current spatial analysis, permanent WHPA impacts are estimated at 52.10 acres, with temporary construction impacts totaling 7.56 acres. Additional analysis of WHPA impacts will be conducted during design development for individual projects, and specific measures to protect WHPAs will be integrated into project designs as appropriate.

Permanent Impacts

Permanent project impacts are a result of excavation and fill to construct the NTPs, associated utility lines, and stormwater ponds. Permanent impacts for utility lines were calculated based on an assumption of a 20-foot-wide buffer polygon, as discussed with Landrum & Brown. Project impacts are a combination of impacts from the NTPs, as well as associated infrastructure. Impacts for NTP projects and associated infrastructure are broken down and described below.

The NTP footprints permanently impact a total of 0.23 acre of wetland and 2.31 acres of wetland buffer. Additionally, the NTP footprints permanently impact 0.01 acre of stream and impact 0.07 acre of stream buffer.

Associated infrastructure improvements (utility lines and stormwater ponds) permanently impact 0.56 acres of wetlands and 0.35 acres of wetland buffer. The infrastructure projects permanently impact 0.05 acre of stream buffer and 0.01 acre of streams/ jurisdictional tributaries. See Figure 1-4 for locations of permanent NTP impacts and Figure 1-5 for permanent utility/stormwater impacts.

Table 2 details the impacts to critical areas and buffers for individual project elements and sums up permanent impacts. Only the individual projects that have impacts to aquatic critical areas are listed.

Table 2. Permanent Impacts to Aquatic Critical Areas and Buffers (acres)

Project Element	Streams/ Jurisdictional Tributaries	Stream Buffer	Wetland	Wetland Buffer	WHPAs
Employee Parking Structure	--	--	0.02	0.60	--
Fuel Farm Expansion	--	--	0.21	0.01	--
North GT Holding Lot	--	--	--	--	5.02
Off-site Cargo PH 1 (L-Shape)	--	--	--	--	34.08
Off-site Cargo PH 2 (L-Shape)	--	--	--	--	3.17
Taxiway A/B Extension	--	--	--	--	6.12
Westside Maintenance Campus	0.01	0.07	<0.01	1.70	--
NTP Projects Subtotal	***0.01***	***0.07***	***0.23***	***2.31***	***48.39***
Stormwater Pond (Miller Creek detention pond)	--	--	0.55**	--	--
Stormwater Pond (Pond M)	--	--	--	0.11	--
Stormwater Pond (Pond F detention pond)	--	--	--	<0.01	--
Stormwater Pond (SDS4 pond)	--	--	--	<0.01	0.13
Sanitary Sewer Lines	--	--	--	0.01	2.24
Storm Lines	0.01	0.05	0.01	0.23	1.33
Water Lines	--	--	--	--	--
Infrastructure Improvements Subtotal	***0.01***	***0.05***	***0.56***	***0.35***	***3.71***
Grand Total*	***0.02***	***0.12***	***0.79***	***2.66***	***52.10***

Impacts values in the table are rounded from more detailed calculations. The grand total is rounded from the calculated grand total, not the sum of the individualrounded values presented in the table.
** Future design may include a vault, reducing or eliminating this impact.

Table 3 below summarizes all permanent wetland impacts by project element and Wetland ID (as identified in the Port wetland GIS layers and the 2024 Parametrix report).

Table 3. Permanently Impacted Wetlands

Project Element	Wetland Impact (acre)	Wetland ID	2014 Ecology Rating [a]
Employee Parking Structure	0.02	Wetland A	III
Westside Maintenance Campus	<0.01	Wetland 39	III
Stormwater Pond (Miller Creek detention pond)	0.55**	Wetland A20	III
Fuel Farm Expansion	0.21	Wetland E1	III
Storm (UMP Line)	<0.01	Wetland A14	III
	0.01	Wetland 44	II
	<0.01	Wetland A20	III
	<0.01	Wetland R13	II
	<0.01	Wetland R14a	II
Grand Total*	***0.79***		

[a] Hruby and Yahnke 2023
* Impacts values in the table are rounded from more detailed calculations. The grand total is rounded from the calculated grand total, not the sum of theindividual rounded values presented in the table.** Future design may include a vault, reducing or eliminating this impact.

Wetlands having the greatest permanent impact include Wetland E1, Wetland A20, and Wetland A. Wetland E1 is a Category III wetland permanently impacted by the Fuel Farm Expansion project within the Sustainable Aviation Fuel Project group (See Figure 1-6c in Attachment A). This wetland would be entirely impacted. Wetland A20 is a Category III wetland located near the WMC project and is fully permanently impacted by UMP projects including a stormwater pond (See Figure 1-6d in

Attachment A). Wetland A is a Category III wetland also located at the north end of the study area and is permanently impacted by the Employee Parking Structure (See Figure 1-6a in Attachment A).

More detailed information on these wetlands can be found within the Seattle-Tacoma International Airport Sustainable Airport Master Plan (SAMP) Near Term Projects Wetlands and Streams Report (Parametrix 2024).

Temporary Construction Impacts

Temporary construction impacts would occur where aquatic critical areas or buffers are affected by clearing and ground-disturbing work but are revegetated following construction. Temporary construction impacts were calculated based on the assumption of a 50-foot buffer polygon applied to NTP footprints and stormwater ponds, as discussed with Landrum & Brown. The temporary construction impacts for the WMC access road were calculated based on a 5- foot buffer from the edge of the road. At the Miller Creek stream crossing, the temporary construction impacts were extended to meet the boundaries of the restrictive covenant on either side of the road. The duration of temporary construction impacts is unknown at this time, and, therefore, temporary construction impacts are not further divided into short-term versus long-term.

The temporary construction impacts for wetlands are 0.21 acre for NTP footprints. The utility infrastructure projects would have 0.70 acre of temporary wetland buffer impacts. Additionally, 130 linear feet of jurisdictional tributaries would be permanently impacted for the WMC, Miller Creek detention pond, and some proposed utility lines.

Table 4 details the impacts to critical areas and buffers for individual project elements and sums up the temporary construction impacts. Only the individual projects that have temporary impacts to critical areas and/or associated buffers are listed in this table.

Table 4. Temporary NTP Construction Impacts to Aquatic Critical Areas and Buffers (acres)

Project Element	Stream	Stream Buffer	Wetland	Wetland Buffer	WHPAs
Employee Parking Structure	--	--	0.04	0.55	0.31
Fuel Farm Expansion	0.07	--	0.07	0.35	--
North GT Holding Lot	--	--	--	--	0.24
Off-site Cargo PH 1 (L-Shape)	--	--	--	--	1.79
Taxiway A/B Extension	--	--	--	0.42	4.58
Westside Maintenance Campus	0.01	0.20	0.10	1.41	--
NTP Projects Subtotal	*0.08*	*0.20*	*0.21*	*2.73*	*6.92*
Stormwater Pond (Miller Creek detention pond)	--	--		--	--
Stormwater Pond (Pond F detentionpond)	--	--	--	0.11	--
Stormwater Pond (SDS4 Pond)	--	--	--	0.06	0.63
Stormwater Pond buffer (Pond M)	--	--	--	0.53	--
Infrastructure Improvements Subtotal	*–*	*–*		*0.70*	*0.63*
Grand Total*	*0.08*	*0.20*	*0.21*	*3.43*	*7.55*

* Impact values in the table are rounded from more detailed calculations. The grand total is rounded from the calculated grand total, not the sum of the individual rounded values presented in the table.

Discussion of Impacts by Project Element

The following sections describe impacts for each NTP group and detail individual projects within each group that impact aquatic critical areas and/or buffers. Details on the use and purpose of these individual projects were extracted from the SAMP Facilities Implementation and Financial Feasibility

Technical Memorandum No. 7 and Environmental Overview Technical Memorandum No. 8 (Leigh-Fisher 2018a, 2018b). Utility line and stormwater pond project impacts are also discussed in this section.

Cargo Expansion Projects

The Cargo Expansion Projects group contains three individual projects with impacts to aquatic critical areas and/or associated buffers. Construction of these projects could permanently and temporarily impact WHPAs, wetlands, and wetland/stream buffers.

Land use conversion within a WHPA presents the potential for impact if construction or operation of new projects could result in a release of contaminants to groundwater. However, these impacts can be avoided by project design and operational measures that minimize the risk of contamination. During the project design and permitting phase, detailed geotechnical and hydrogeological assessments will be developed to characterize the potential for groundwater contamination from the proposed projects. The potential of the proposed uses to release contaminants will then be assessed, and appropriate measures applied to minimize any risk of contaminant release. The City of SeaTac requires non-residential developments within WHPAs to submit hazardous material inventory sheets to the respective water district at a minimum of once every two years. In addition, a critical area report may be required with details regarding geologic and hydrogeologic characteristics of the site, groundwater depth, and available historic water quality data. The Port will work with the relevant authorities to comply with all applicable requirements to avoid and/or minimize the potential for contamination.

- Off-site Cargo Phase 1 (L-Shape) – The building would provide warehouse and office space, truck terminals, and parking for visitors and employees. This NTP is located within the WHPA in the northern portion of the Port property. The project results in 34.08 acres of permanent land use conversion in the WHPA and 1.79 acres of temporary construction impacts to the WHPA.
- Off-site Cargo Phase 2 (L-Shape) – The building would provide warehouse and office space, truck terminals, and parking for visitors and employees. This NTP is located within the WHPA in the northern portion of the Airport. The project would result in 3.17 acres of permanent land use conversion in the WHPA.
- Westside Maintenance Campus – This project would relocate the Aviation Maintenance Facility from its current location in the North Cargo area to allow for construction of the Hardstand (north) project. This project would result in 0.01 acre of permanent wetland impact to Wetland 39 and 1.70 acre of permanent wetland buffer impact. The access road into the WMC crosses over Miller Creek and would result in 0.01 acre of permanent stream impact and 0.07 acre of permanent stream buffer impact. Temporary wetland impacts would be 0.1 acre, and temporary wetland buffer impacts would be 1.41 acre (See Figure 1-6d in Attachment A). Temporary stream impact would be 0.01 acre, and temporary stream buffer impact would be 0.20 acre.

North Terminal Projects

The North Terminal Projects group contains two individual projects with impacts to critical areas and/or associated buffers. Construction of these projects could permanently and temporarily impact WHPAs, wetland, and wetland/stream buffer.

- Employee Parking Structure – A large new parking structure would be constructed on Port property adjacent to and west of the North Employee Parking Lot, directly north of SR 518. Construction of this project would result in impacts to Wetland A. Permanent wetland

impacts are 0.02 acre and permanent wetland buffer impacts are 0.60 acre. Temporary construction impacts to the wetland are 0.04 acre and temporary wetland buffer impacts are 0.55 acre. This project is directly adjacent to the WHPA in the northern portion of the Port property and would result in 0.31 acre of temporary construction impacts to the WHPA.

- North Ground Holding (GT) Lot – A new GT lot is needed replace the current lot displaced by the Elevated Busway. This project is located within the WHPA in the northern portion of the Airport. The project results in 5.02 acres of permanent impacts and 0.24 acre of temporary construction impacts to the WHPA.

Fuel Farm Expansion Projects

The Fuel Farm Expansion Projects group includes the Fuel Farm Expansion project, which would have impacts to critical areas and/or associated buffers. Construction of this project would permanently and temporarily impact wetland, stream, and wetland/stream buffer.

Fuel Expansion of the fuel farm would include four new settling tanks, 10 million additional gallons of storage capacity, an approximately 500,000 gallon blending tank, an approximately 100,000-gallon Sustainable Aviation Fuel receipt tank, and infrastructure to support these improvements. The project is located in the southeast portion of the Airport, near the East Fork of Des Moines Creek. Construction would permanently impact the entirety of Wetland E1. Permanent impacts would include 0.21 acre of wetland and 0.01 acre of wetland buffer (See Figure 1-6c in Attachment A).

Taxiway A/B Projects

The Taxiway A/B Projects group contains the Taxiway A/B Extension project, which would have impacts to critical areas and/or associated buffers. Construction of this project would temporarily impact wetland buffers and would require protecting wellhead areas from impacts of contaminant discharge.

The extension of Taxiways A and B to provide access to the south end of Runway 16L/34R includes construction of parallel taxiway connectors from Taxiway B to Runway 16L/34R and the relocation of Taxiway S by 310 feet southward. The project would also include glideslope modifications the construction of a new vehicle service road bridge over S 188th St. Construction would result in 6.12 acres of permanent land use conversion within WHPAs. Temporary impacts would include 0.42 acre of wetland buffer associated with Wetland G12 and 4.58 acres of WHPA.

Utility Lines

As currently designed, the project would result in 0.01 acre of permanent wetland impacts and 0.01 acre of permanent stream impacts associated with stormwater utility lines. Wetlands impacted would include Wetland 44, Wetland A14a, and Wetland A20, all located on the west side of the airport. Additionally, utility lines would result in 0.24 acre of permanent wetland buffer impact for storm and water lines, and 3.57 acres of permanent land use conversion within WHPAs for sanitary sewer and storm lines (See Figure 1-6d in Attachment A).

Stormwater Ponds

The current design for stormwater ponds would result in 0.55 acre of permanent wetland impact. Wetland A20 near the WMC footprint would be entirely impacted by the Miller Creek detention pond (See Figure 1-6d in Attachment A). As the design evolves, it is possible that a vault rather than a stormwater pond will be proposed, reducing or eliminating this impact. New stormwater ponds would result in 0.70 acre of temporary wetland buffer impacts. Stormwater ponds would result in 0.13 acre of permanent land use conversion within WHPAs and would temporarily impact 0.63 acres.

Indirect Impacts

Indirect impacts from construction of the NTPs listed previously may result in long-term wetland degradation from stormwater discharges and alteration in wetland hydrology; however, stormwater detention and treatment activities would minimize long-term indirect water quality impacts on wetlands. Indirect impacts from stormwater ponds may also result in minimal wetland hydrology alteration. For aquatic habitat, indirect impacts would be minimal given the surrounding areas near project impacts are heavily developed.

Mitigation, Avoidance, And Minimization Measures

The avoidance and minimization of impacts to wetlands, streams and buffers was a guiding principle for the preliminary project design. Additional avoidance and minimization measures would be implemented, as practical, as the project design continues to develop. The Port is exploring options to reduce permanent wetland and stream impacts associated with utility lines and to minimize buffer impacts. Additional strategies include minimizing vegetation clearing and restoring temporarily affected areas as soon after the initial impact as possible.

The Port would comply with standard specifications, best management practices (BMPs),[1] and applicable federal and state mitigation requirements during design, construction, and post-construction activities. The Port would meet all regulatory requirements and continue to meet or exceed avoidance and minimization measures related to these BMPs in adherence with federal and state regulations.

[1] BMPs include various methods and devices to control, remove, or reduce pollution, and are listed in the Airport's Stormwater Pollution Prevention Plan (https://www.portseattle.org/file-documents/sea-tac-stormwater-pollution-prevention-plan). BMPs include operational practices (e.g. training and spill prevention), structural controls (e.g. stormwater ponds and oil/water separators), and erosion and sediment controls (e.g. silt fence and filter strips).

For unavoidable permanent impacts to wetlands, streams, temporary impacts to wetlands lasting more than one year, and permanent impacts to associated buffers, the Port would develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal and state requirements and guidelines. These guidelines are listed in the U.S. Army Corps of Engineers and EPA's Compensatory Mitigation for Losses of Aquatic Resources,[2] and Ecology's interagency guidance contained in Wetland Mitigation in Washington State: Parts 1 and 2.[3] The Port anticipates that it has capacity on its current property to construct all or most of the mitigation, while acknowledging that other mechanisms, such as purchasing mitigation credits from banks or in-lieu fee programs, ensure capacity is available to provide the required quantity of mitigation.

The mitigation plan would be developed following a mitigation sequencing approach based on a hierarchy of avoiding and minimizing adverse impacts through careful design, rectifying temporary impacts, and compensating for unavoidable adverse impacts. The specific portfolio of mitigation, including location, design, and timing of permitting and construction, would be developed concurrent with the progression of NTP construction designs, which would be required to adhere to mitigation sequencing guidelines.

In cooperation with resource agencies and tribes, the Port would develop plans to mitigate unavoidable effects of the project on wetlands, streams, and regulatory buffers on a watershed basis. To the extent possible, compensatory mitigation sites would be identified and compensated for lost values in kind. It may be necessary to use several sites and mitigation approaches, given the project size, complexity of identifying mitigation opportunities, and mitigation requirements. The project would adhere to the mitigation requirements, including replacement ratios, specified by federal regulators, state resource agencies, and local critical area codes. Stream impacts are included in the wetland mitigation calculations below.

The Port has seven sites within its ownership identified as being suitable for compensatory mitigation. Proposed mitigation approaches have been evaluated and described based on each sites' opportunities and potential (Anchor 2019). Six sites are within the airport and one site is located along the Green River in Auburn. They encompass over 150 acres and include potential for greater than 40 acres of wetland re-establishment, 11 acres of wetland enhancement, almost 8 acres of preservation, and 80 acres of buffer enhancement (Anchor QEA 2019).

The area needed for compensatory mitigation is dictated by federal and state guidance, with a minimum 1:1 compensation ratio required by the Corps. Some agencies use the credit/debit system (Hruby 2012) to evaluate mitigation is some situations. Table 5 provides a summary of the compensatory mitigation ratios recommended by an interagency review committee composed of the Corps, EPA, and Ecology (Ecology, et al 2021).

Table 5. Interagency Recommended Compensatory Mitigation Ratios for Wetland Impacts

Category and Type of Wetland	Creation or Reestablishment	Rehabilitation	Enhancement
Category I: Mature Forested	6:1	12:1	24:1
Category I: Based on Functions	4:1	8:1	16:1
Category II	3:1	6:1	12:1
Category III	2:1	4:1	8:1
Category IV	1.5:1	3:1	6:1

[2] 33 CFR Parts 325 and 332/ 40 CFR Part 230

[3] *Wetland Mitigation in Washington State Part 1: Agency Policies and Guidance (2021),* and *Part 2: Developing Mitigation Plans* (2006)

Table 6 provides a summary of the compensatory wetland mitigation area calculation anticipated to be requiredby the current preliminary design, based on the unavoidable, permanent impacts to wetlands and the required mitigation ratios. Buffer impacts are mitigated at a 1:1 ratio and would require 2.66 acres.

Table 6. Compensatory Wetland Mitigation Area Calculations

Project Element	Wetland Impact (acre/Rating)	Re-establishment Area Needed (acres)	Rehabilitation Area Needed (acres)	Enhancement Area Needed (acres)
Facilities	0.23/III	0.46	0.92	1.84
UMP Line	0.01/III	0.02	0.04	0.08
Utility Lines	0.01/II	0.03	0.06	0.12
StormwaterPonds	0.55/III	1.10	2.75	4.40
	Total Areas	**1.61**	**3.77**	**6.44**

Based on these calculations, the mitigation areas identified by the Port have sufficient capacity to provide theneeded compensatory mitigation for the anticipated impacts of the proposed action.

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Leigh-Fisher. 2018b. Environmental Overview Seattle-Tacoma International Airport Technical Memorandum No. 8. Prepared for the Port of Seattle by Leigh-Fisher, Seattle, WA. May 2018.

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Attachment A

Figures

West Study Area Zone

Runway Study Area Zone

East Study Area Zone

North RSA Study Area Zone

North Study Area Zone

South RSA Study Area Zone

Des Moines Creek

Miller Creek/ Walker Creek

Gilliam Creek/ Lower Green River

509

518

99

5

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Date: 2/12/2024
Sources: King County, King County Aerial (2021)
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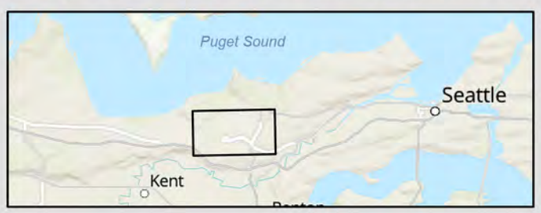


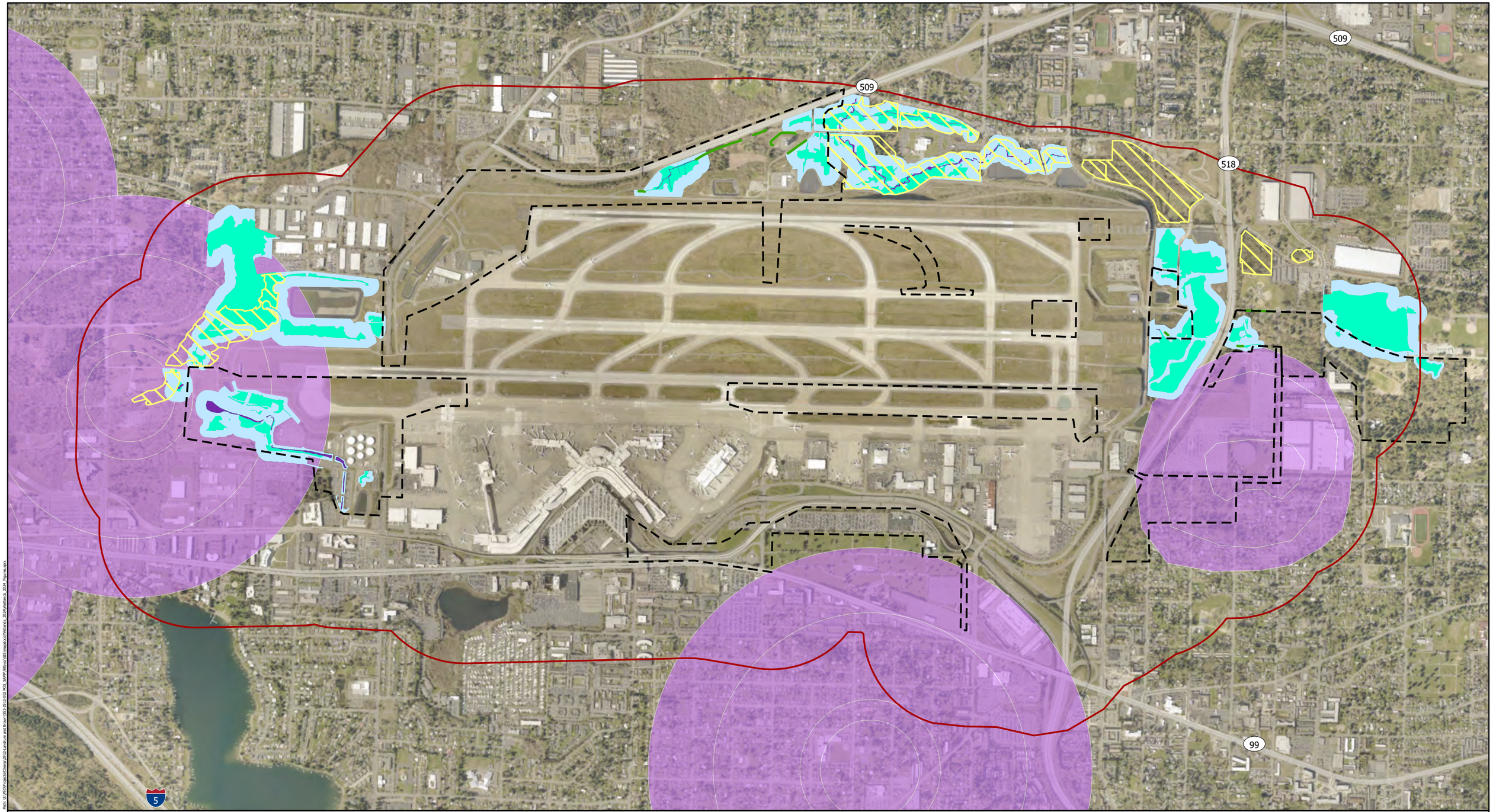
General Study Area
Field Survey Area

Drainage Basins
Des Moines Creek
Gilliam Creek/Lower Green River
Miller Creek/Walker Creek

Study Area Zones
East Zone
North RSA Zone
North Zone
Runway Zone
South RSA Zone
West Zone

Figure 1-1
Vicinity Map
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



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Date: 2/12/2024
Sources: King County, King County Aerial (2021)
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0 0.13 0.25 0.38 0.5 Miles

Tributaries
General Study Area
Field Survey Area
Restrictive Covenant

Critical Area Type
Stream
Wetland
Stream/Wetland Buffer
Wellhead Protection Area

Figure 1-2
Aquatic Critical Areas within the Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA

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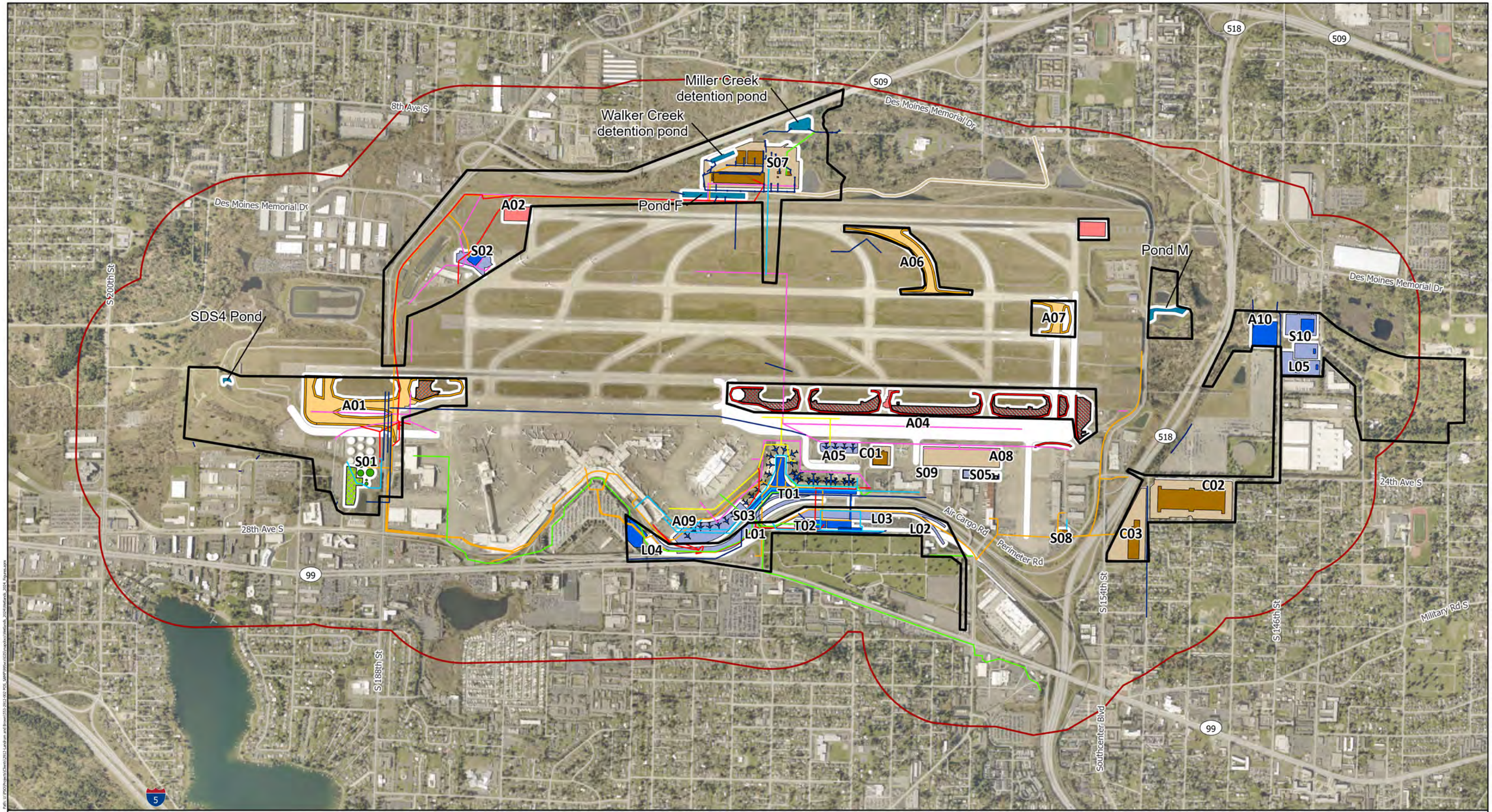


Parametrix

Date: 2/12/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 0.13 0.25 0.38 0.5 Miles

- Field Survey Area
- General Study Area
- Construction Area (50-ft buffer)
- Stormwater Pond (UMP Polygon)

Proposed Utilities (UMP Line)

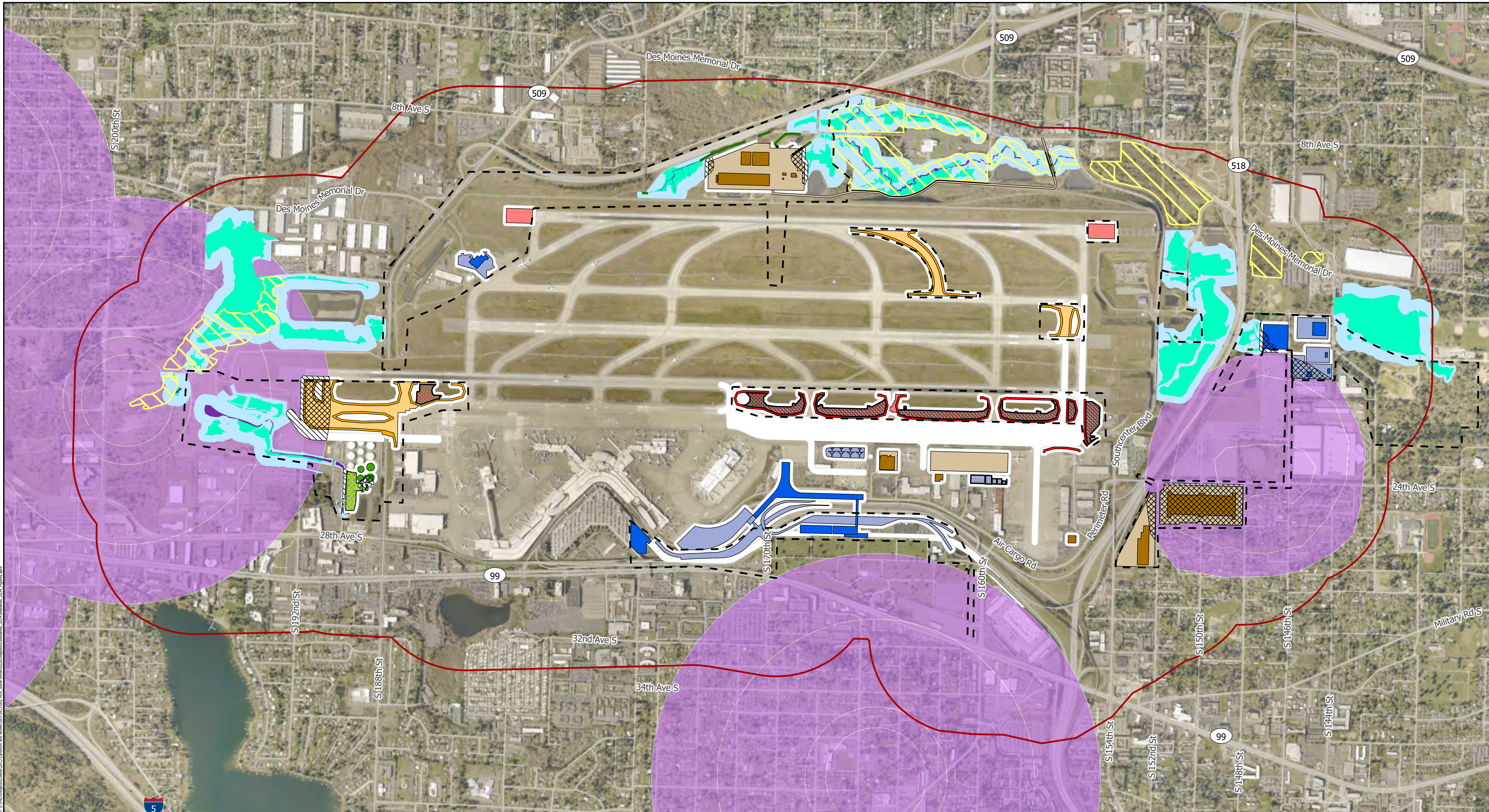
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-3
Project Elements within the Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



Parametrix

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Sources: King County, King County Aerial (2021)
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0 0.13 0.25 0.38 0.5 Miles

- Tributaries
- Tributaries Impact
- Permanent Impact Area
- Temporary Impact Area
- Construction Area (50-ft buffer)
- General Study Area
- Field Survey Area
- Restrictive Covenant

Critical Area Type

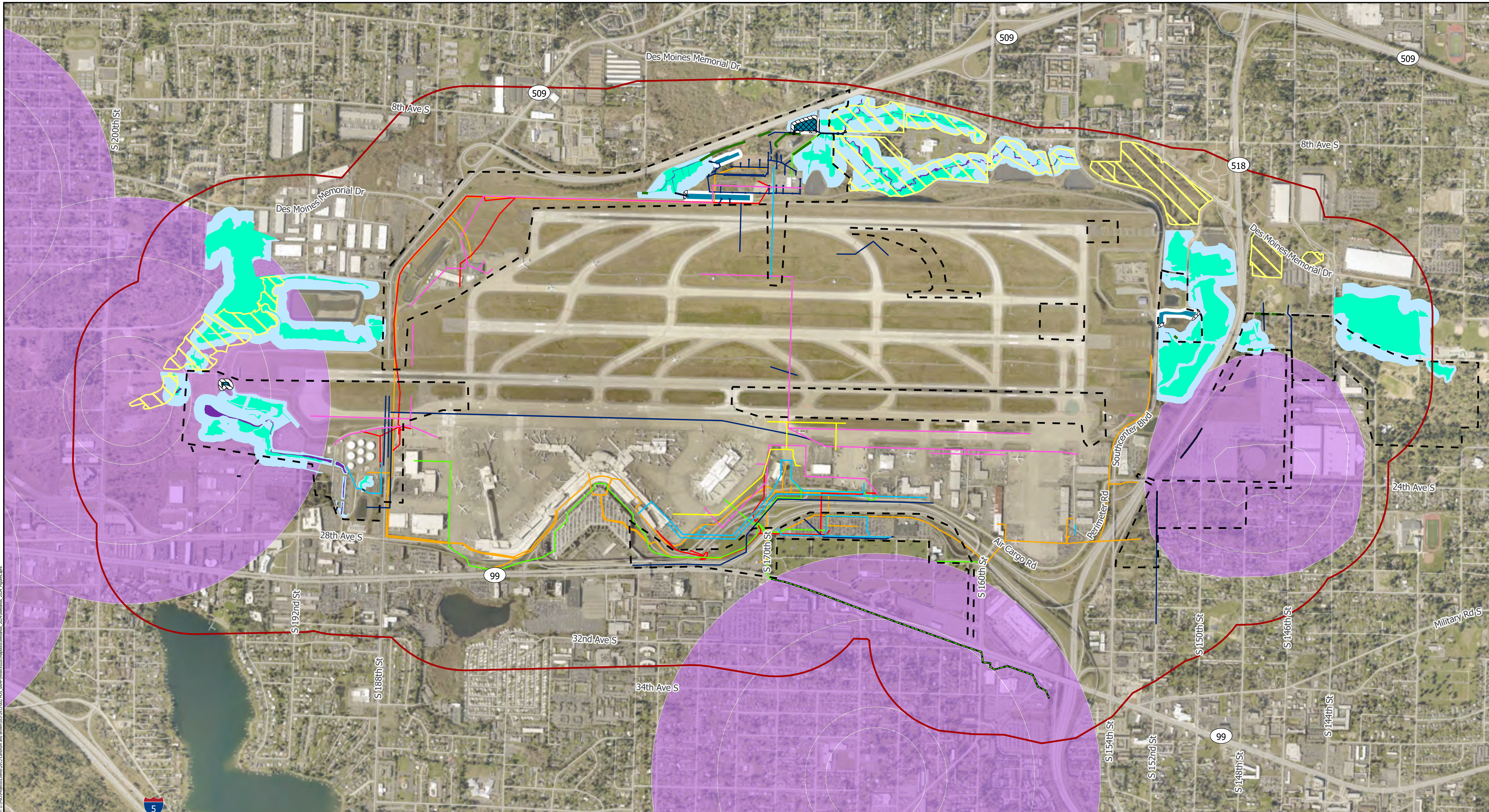
- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-4
NTP Impacts to Aquatic Critical Areas within the Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



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Sources: King County, King County Aerial (2021)
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0 0.13 0.25 0.38 0.5 Miles

- Tributaries
- Tributaries Impact
- Permanent Impact Area
- Temporary Impact Area
- Construction Area (50-ft buffer)
- Field Survey Area
- General Study Area
- Restrictive Covenant

Critical Area Type

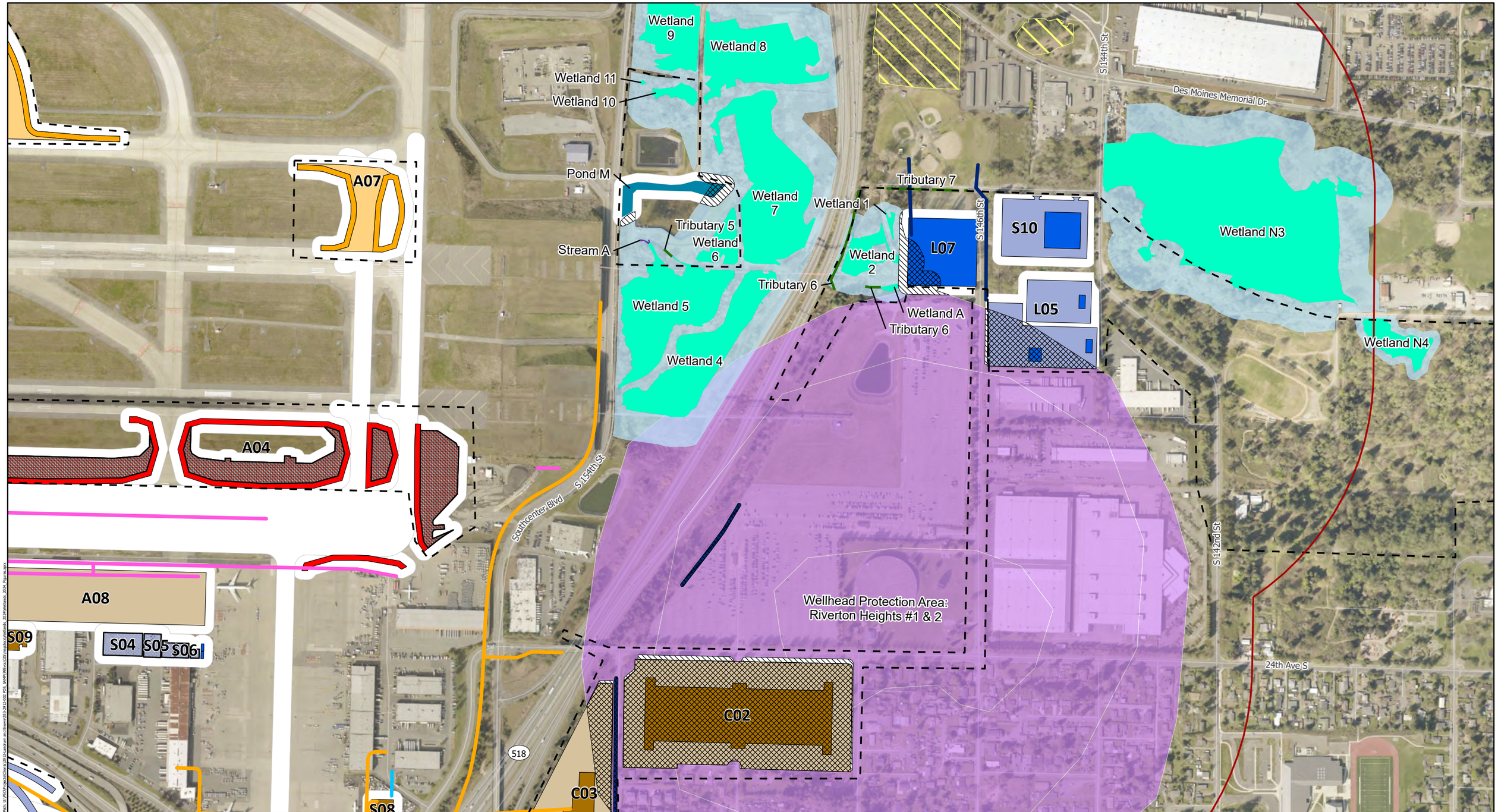
- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Utility Master Plan (UMP) Type

- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Figure 1-5
UMP Impacts to Aquatic Critical Areas within the Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



Parametrix

Date: 2/12/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

Critical Area Type

- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Utility Master Plan (UMP) Type

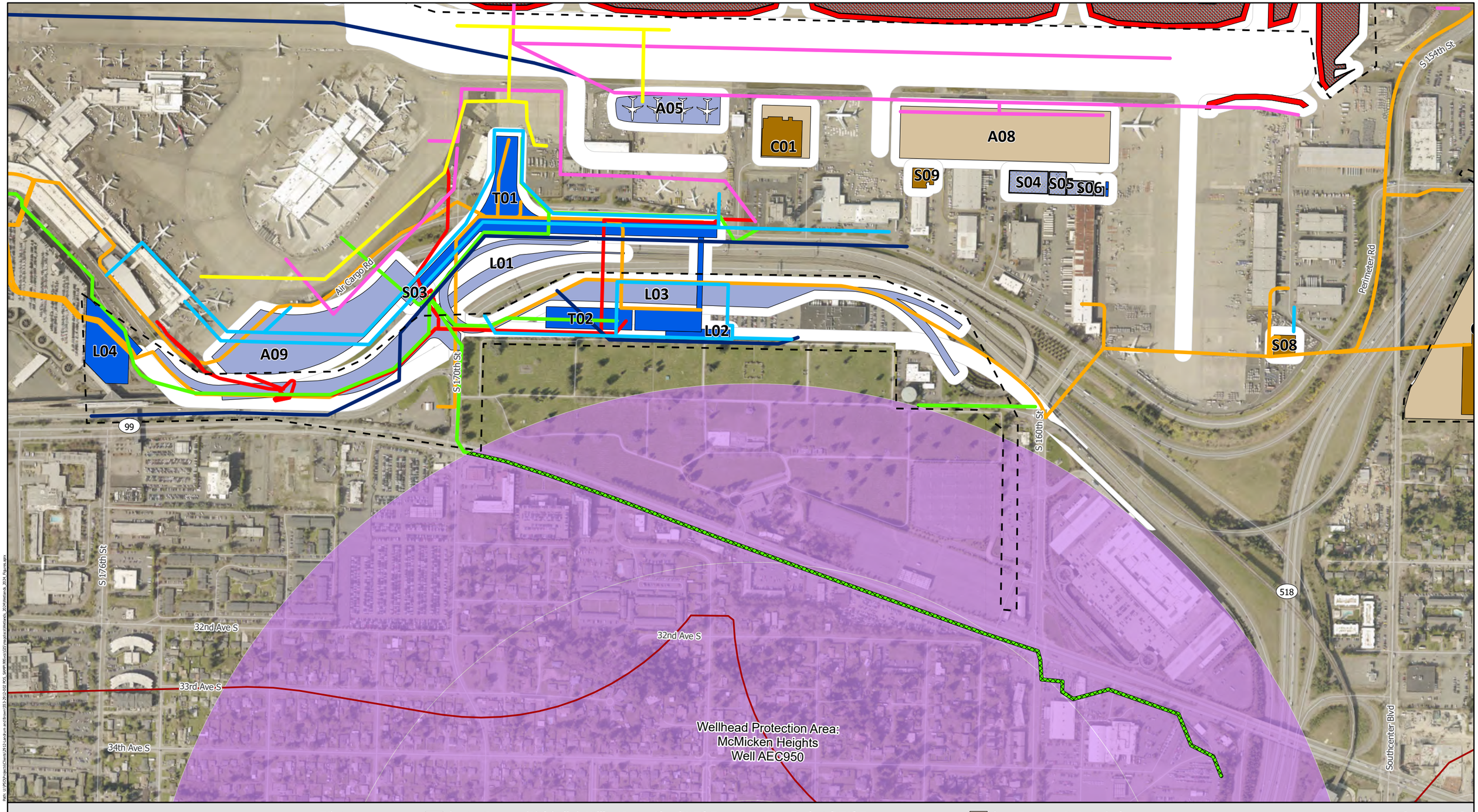
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-6a
Project Impacts to Aquatic Critical Areas
in North Portion of Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



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Date: 2/12/2024
Sources: King County, King County Aerial (2021)
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0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

Critical Area Type

- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Utility Master Plan (UMP) Type

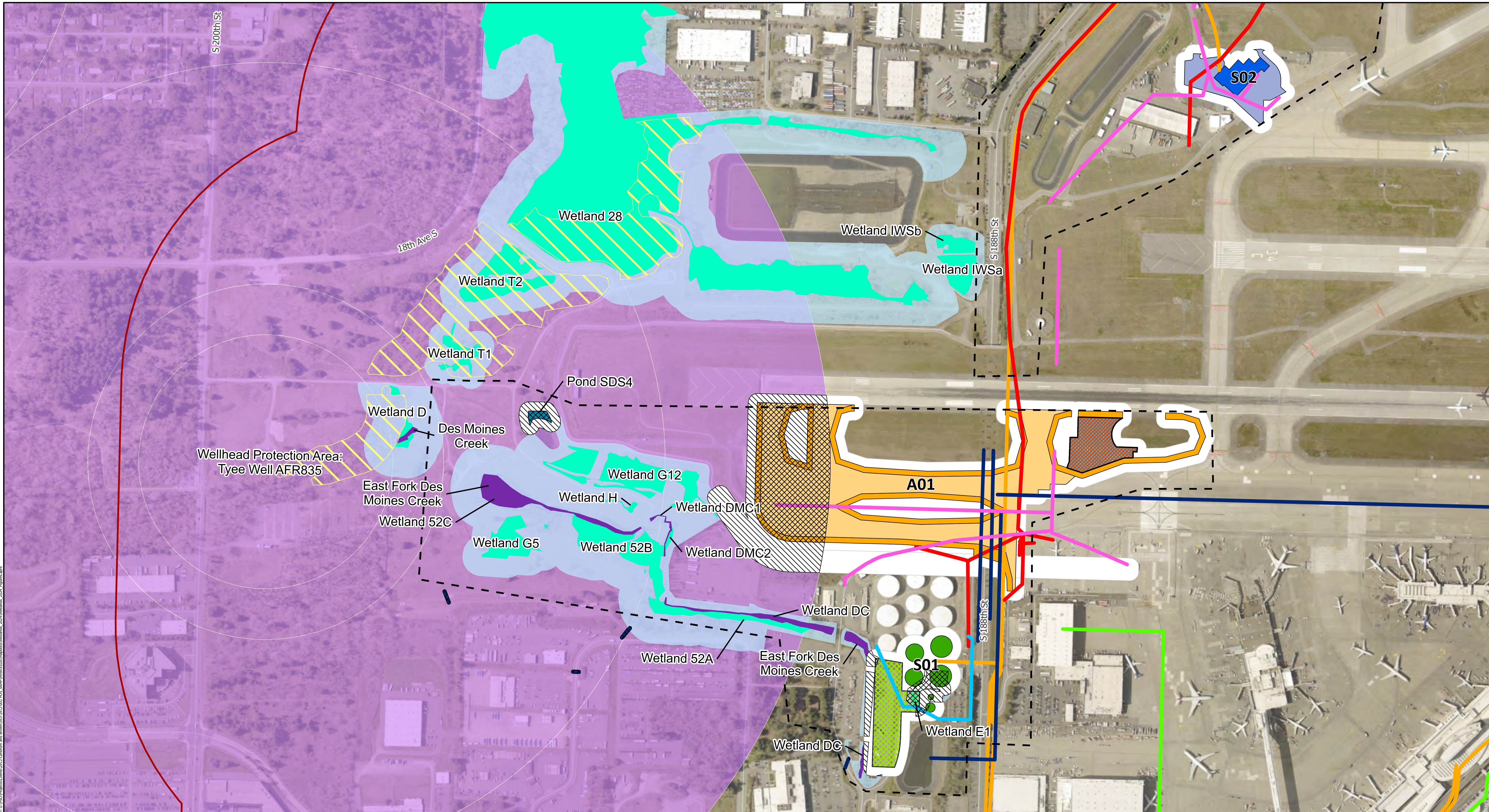
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-6b
Project Impacts to Aquatic Critical Areas
in North Portion of Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



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Date: 2/12/2024
Sources: King County, King County Aerial (2021)
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0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

Critical Area Type

- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Utility Master Plan (UMP) Type

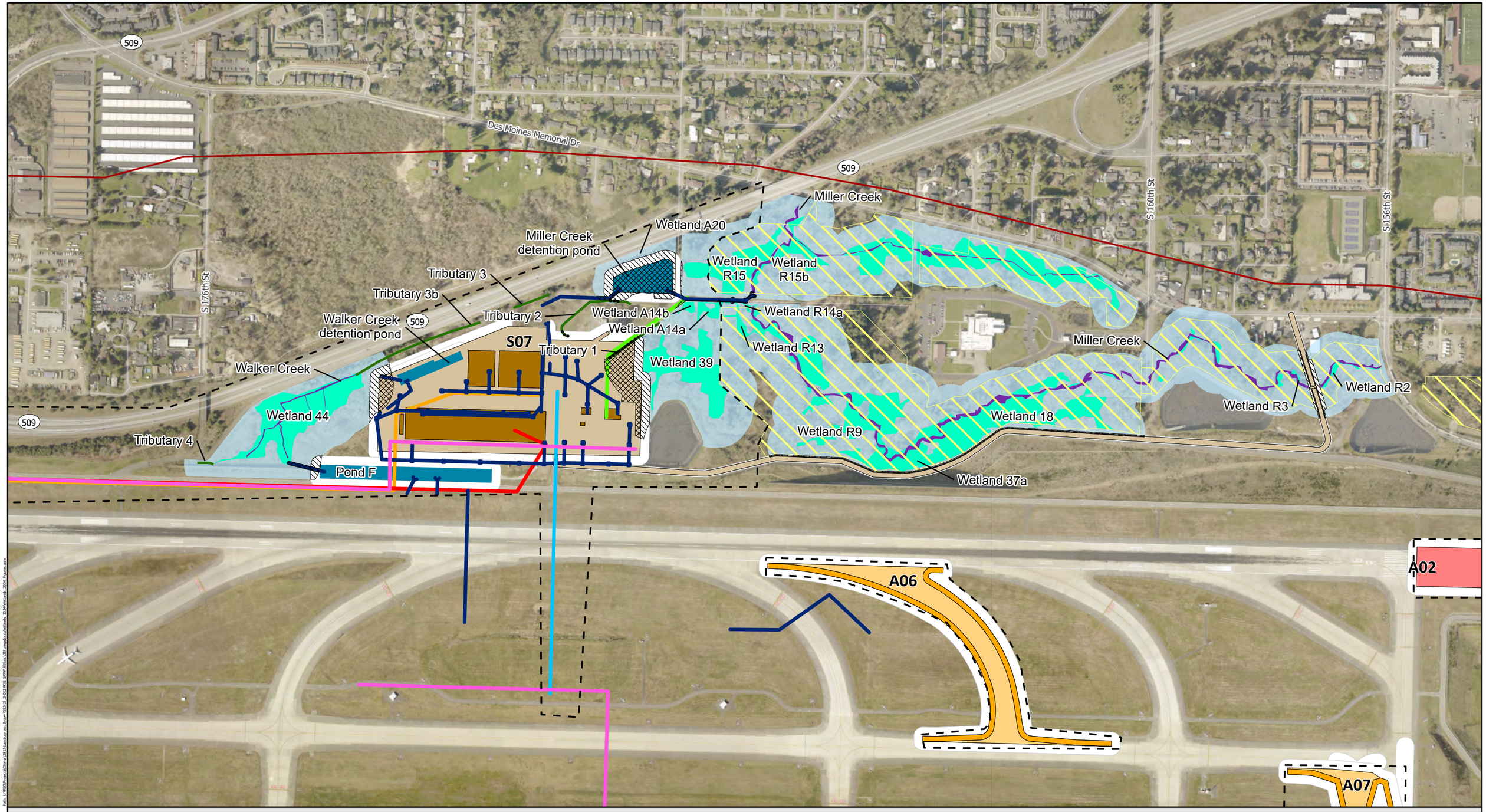
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-6c
Project Impacts to Aquatic Critical Areas in North Portion of Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



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0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

Critical Area Type

- Stream
- Wetland
- Stream/Wetland Buffer
- Wellhead Protection Area

Utility Master Plan (UMP) Type

- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type

- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 1-6d
Project Impacts to Aquatic Critical Areas
in North Portion of Survey Area
Impact Analysis Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA

APPENDIX M

Water Resources

Impacts and Mitigation Summary and Proposed Permitting Approach

Parametrix
let's create tomorrow, together

Technical Memorandum

DATE:	May 22, 2024
TO:	Steve Rybolt, Port of Seattle
FROM:	Josh Wozniak, PWS and Kaylee Moser, PWS
SUBJECT:	SAMP Project Impacts and Mitigation Summary and Proposed Permitting Approach
CC:	Jenifer Young
PROJECT NUMBER:	553-2912-002
PROJECT NAME:	Port of Seattle SAMP

Introduction and Purpose

This memorandum provides a preliminary summary of potential impacts, proposed mitigation for aquatic resources, and permitting approach under the jurisdiction of the U.S. Army Corps of Engineers (Corps) that would be affected by Near-Term Projects (NTP) under the Port of Seattle's (Port) Sustainable Airport Master Plan (SAMP) at Seattle-Tacoma International Airport (SEA). All wetlands included in this memorandum are assumed to be federally jurisdictional by the Corps for the purposes of the Environmental Assessment (EA). A jurisdictional determination will be sought during the permitting phase of the project.

Project Overview

The Port of Seattle (Port) identified a set of NTPs to address the near-term activity levels projected to occur at the Airport. The NTPs include over 30 projects that would improve efficiency, safety, access to SEA, and support facilities for airlines and SEA.

The NTPs are depicted on Figure 1, as well as the proposed utilities and stormwater facilities necessary for NTP implementation. Collectively, the NTPs and the enabling projects are referred to as the Proposed Action. If approved, the Proposed Action is expected to take approximately five years to construct. Those projects that are anticipated to have impacts to aquatic resources under the Corps' jurisdiction—and the subject of this memorandum– are listed in Table 1.

Miller Creek detention pond
Walker Creek detention pond
Pond F
Pond M
SDS4 Pond
Des Moines Memorial Dr
8th Ave S
S 200th St
28th Ave S
S 188th St
24th Ave S
S 154th St
S 146th St
Military Rd S
Air Cargo Rd
Perimeter Rd
Southcenter Blvd
509
518
99
5
A01
A02
A04
A05
A06
A07
A08
A09
A10
C01
C02
C03
L01
L02
L03
L04
L05
S01
S02
S03
S07
S08
S09
S10
T01
T02

Parametrix

Date: 3/13/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 0.13 0.25 0.38 0.5 Miles

Field Survey Area
General Study Area
Construction Area (50-ft buffer)
Stormwater Pond (UMP Polygon)

Proposed Utilities (UMP Line)
ICT
IWS
Jet Fuel
Power
Sanitary Sewer
Storm
Water

Near Term Project (NTP) Type
Airfield Operational Efficiency Projects
Airfield Operational Efficiency Projects, Structure
Airfield Operational Efficiency Projects, Surface
Airfield Safety/Standards Projects
Airfield Safety/Standards Projects
Airfield Safety/Standards Projects, Structure
Airfield Safety/Standards Projects, Surface
Cargo Expansion Projects, Structure
Cargo Expansion Projects, Surface
North Terminal Projects
North Terminal Projects, Structure
North Terminal Projects, Surface
Sustainable Aviation Fuel Projects
Sustainable Aviation Fuel Projects, Structure

Figure 1
Project Elements within the Survey Area
Corps Technical Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA

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Table 1. Proposed Action Elements Anticipated to Impact Aquatic Resources Under Corps Jurisdiction

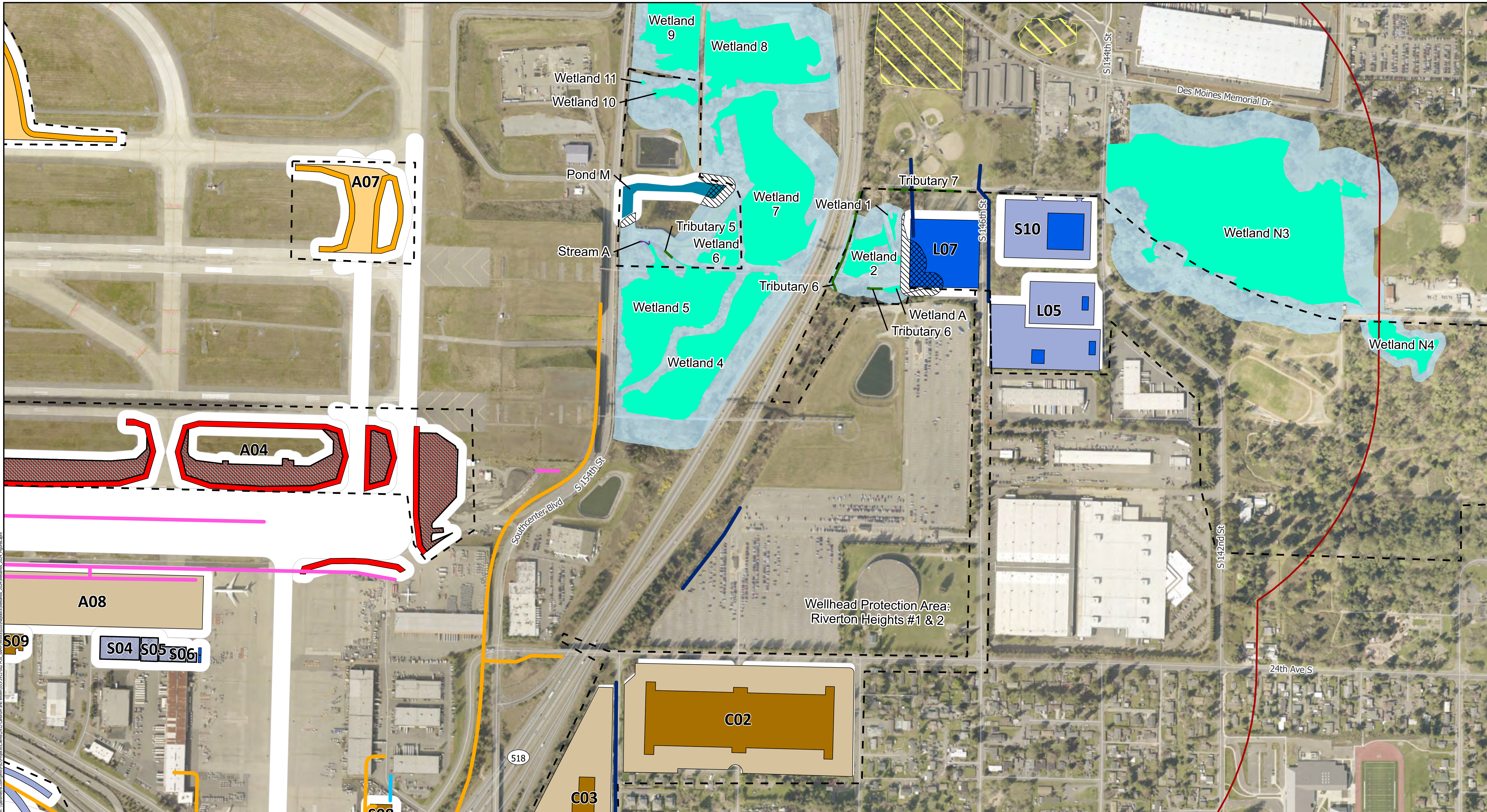
Project Element	SAMP NTP Number	Project Type
Employee Parking Structure	L07	North Terminal Projects, Structure
Fuel Farm Expansion	S01	Sustainable Aviation Fuel Projects, Structure
North Ground Transportation (GT) Holding Lot	L05	North Terminal Projects
Off-site Cargo PH 1 (L-Shape)	C02	Cargo Expansion Projects, Structure
Off-site Cargo PH 2 (L-Shape)	C03	Cargo Expansion Projects, Structure
Taxiway A/B Extension	A01	Airfield Operational Efficiency Projects, Surface
Westside Maintenance Campus	S07	Airfield Operational Efficiency Projects, Surface
Miller Creek Detention Pond	n/a	Stormwater Pond
Pond F Detention Pond	n/a	Stormwater Pond
SDS4 Pond	n/a	Stormwater Pond
Sanitary Sewer Lines	n/a	Utility
Storm Lines	n/a	Utility
Water Lines	n/a	Utility
UMP Line	n/a	Utility

Impact Analysis

Wetlands, streams, and other waters of the US were mapped and documented during site investigations in 2019 and 2020 and wetland and water verification in 2024 (Parametrix 2024). The potential permanent and temporary construction impacts to these aquatic resources from construction of the Proposed Action are summarized in Table 2 and depicted in Figures 2a through 2d. In some instances, designated stream and buffer areas overlap, but for the purpose of this analysis they are reported separately.

Table 2. Summary of Permanent and Temporary Impacts to Aquatic Resources under Corps Jurisdiction

Aquatic Critical Areas and Buffers	Permanent Impacts (acres)	Temporary Impacts (acres)
Stream/Jurisdictional Ditches	**0.02**	**0.08**
Stream Buffer	**0.12**	**0.20**
Wetland	**0.79**	**0.21**
Wetland Buffer	**2.66**	**3.43**



Parametrix

Date: 3/13/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

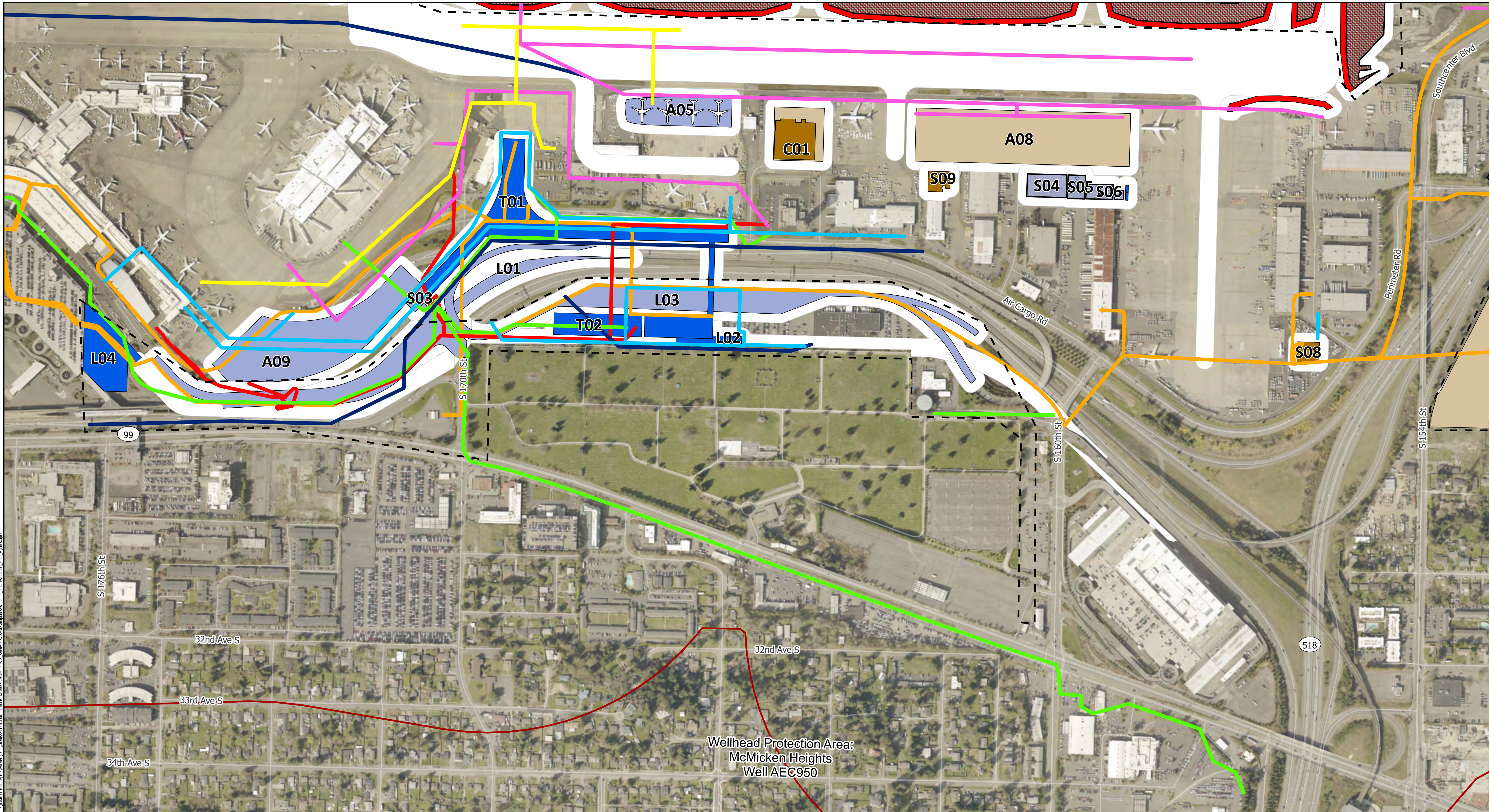
Critical Area Type
- Stream
- Wetland
- Stream/Wetland Buffer

Utility Master Plan (UMP) Type
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type
- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 2a
Project Impacts to Aquatic Critical Areas in North Portion of Survey Area
Corps Technical Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



Parametrix

Date: 3/13/2024
Sources: King County, King County Aerial (2021)
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

0 250 500 1,000 Feet

- Tributaries
- Tributaries Impact
- General Study Area
- Field Survey Area
- Permanent Impact Area
- Temporary Impact Area
- Stormwater Pond
- Construction Area (50-ft buffer)
- Restrictive Covenant

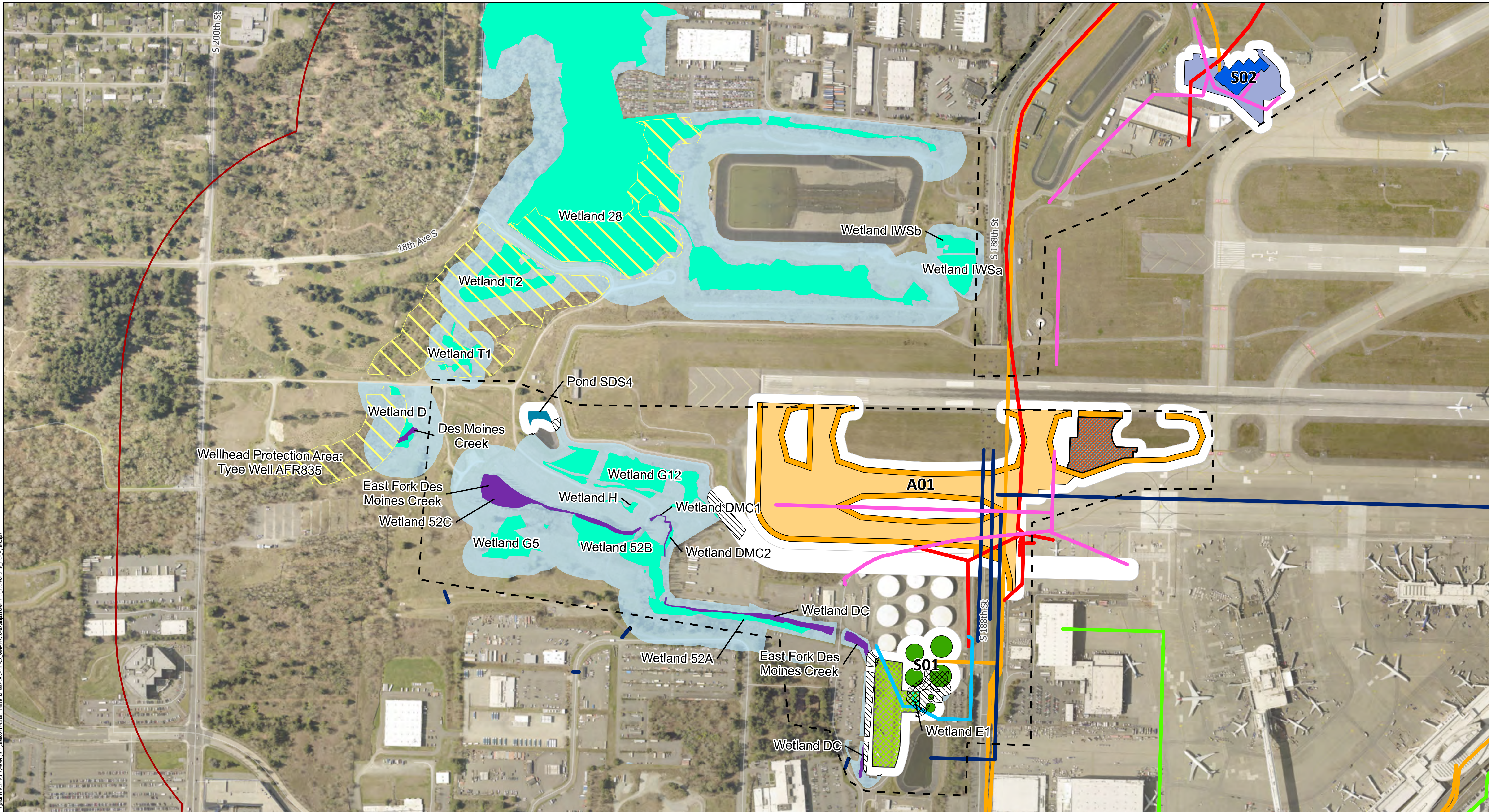
Critical Area Type
- Stream
- Wetland
- Stream/Wetland Buffer

Utility Master Plan (UMP) Type
- ICT
- IWS
- Jet Fuel
- Power
- Sanitary Sewer
- Storm
- Water

Near Term Project (NTP) Type
- Airfield Operational Efficiency Projects
- Airfield Operational Efficiency Projects, Structure
- Airfield Operational Efficiency Projects, Surface
- Airfield Safety/Standards Projects
- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 2b
Project Impacts to Aquatic Critical Areas in North Portion of Survey Area
Corps Technical Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



Parametrix

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Near Term Project (NTP) Type
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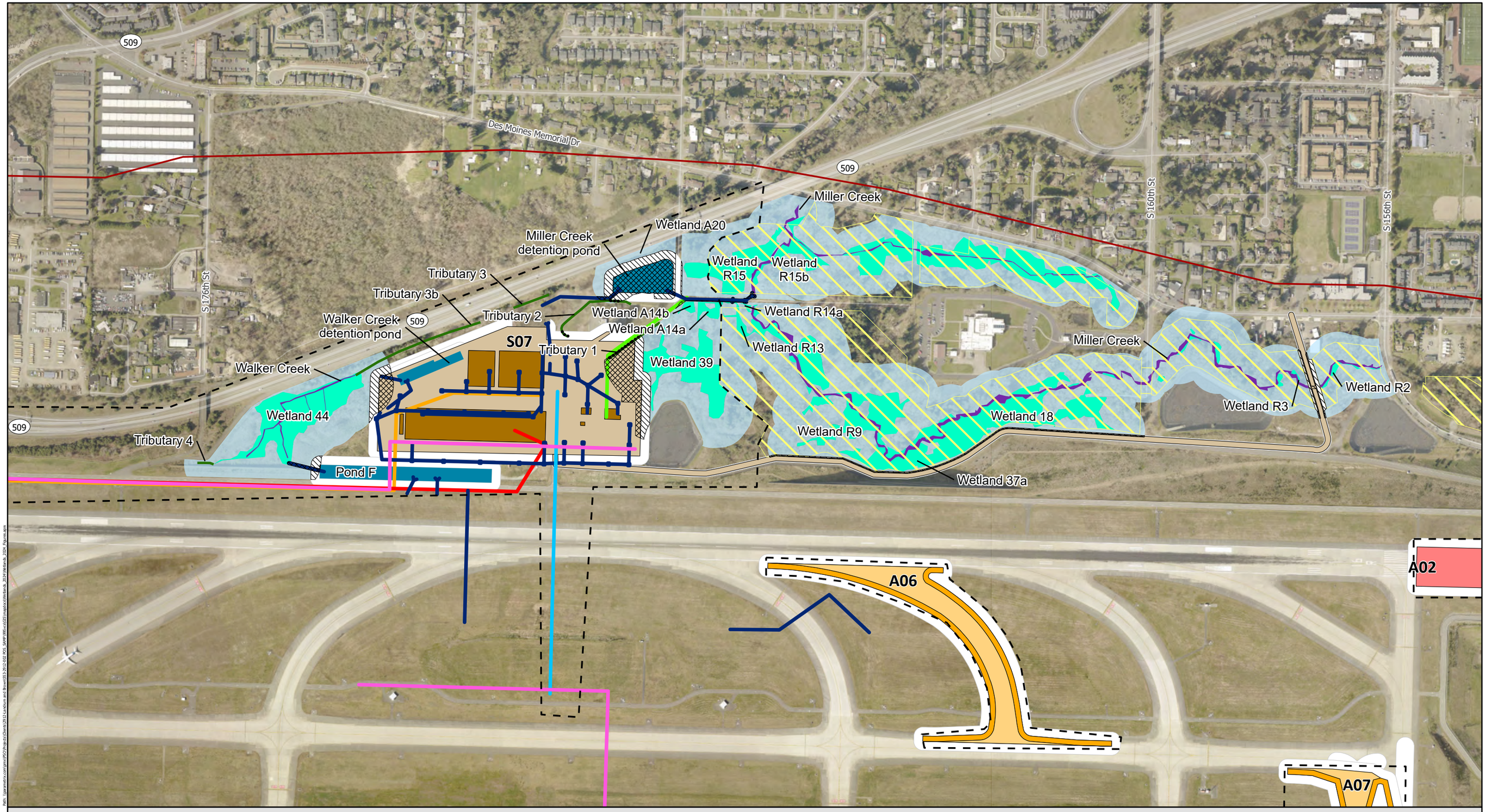
Airfield Operational Efficiency Projects, Structure
Airfield Operational Efficiency Projects, Surface
Airfield Safety/Standards Projects
Airfield Safety/Standards Projects, Structure
Airfield Safety/Standards Projects, Surface
Cargo Expansion Projects, Structure
Cargo Expansion Projects, Surface
North Terminal Projects
North Terminal Projects, Structure
North Terminal Projects, Surface
Sustainable Aviation Fuel Projects
Sustainable Aviation Fuel Projects, Structure

Figure 2c
Project Impacts to Aquatic Critical Areas in North Portion of Survey Area
Corps Technical Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA



Parametrix

Date: 3/13/2024
Sources: King County, King County Aerial (2021)
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- Airfield Operational Efficiency Projects, Surface
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- Airfield Safety/Standards Projects, Structure
- Airfield Safety/Standards Projects, Surface
- Cargo Expansion Projects, Structure
- Cargo Expansion Projects, Surface
- North Terminal Projects
- North Terminal Projects, Structure
- North Terminal Projects, Surface
- Sustainable Aviation Fuel Projects
- Sustainable Aviation Fuel Projects, Structure

Figure 2d
Project Impacts to Aquatic Critical Areas
in North Portion of Survey Area
Corps Technical Memorandum
Seattle-Tacoma International Airport
Sustainable Airport Master Plan (SAMP)

King County, WA

Permanent Impacts

Permanent impacts from implementation of the Proposed Action would result from excavation and fill activities associated with project construction. Permanent impacts for utility lines were calculated based on an assumption of a 20-foot-wide buffer polygon. Table 3 details the permanent impacts to aquatic resources for individual project elements.

Table 3. Permanent Impacts to Aquatic Resources from the Proposed Action

Project Element	Streams/Tributaries (acres)	StreamBuffer (acres)	Wetland (acres)	Wetland Buffer (acres)
Employee Parking Structure	–		0.02	0.60
Fuel Farm Expansion	–	–	0.21	0.01
Taxiway A/B Extension	–	–	–	–
Westside Maintenance Campus	0.01	0.07	<0.01	1.70
NTP Projects Subtotal	*0.01*	*0.07*	*0.23*	*2.31*
Stormwater Pond (Miller Creek detention pond)	–	–	0.55**	–
Stormwater Pond (Pond M)	–	–	–	0.11
Stormwater Pond (Pond F)	–	–	–	<0.01
Stormwater Pond (SDS4 pond)	–	–	–	<0.01
Sanitary Sewer Lines	–	–	–	0.01
Storm Lines	0.01	0.05	0.01	0.23
Water Lines	–	–	–	–
Enabling Projects Subtotal	*0.01*	*0.05*	*0.56*	*0.35*
Total*	*0.02*	*0.12*	*0.79*	*2.66*

* Impacts values in the table are rounded from more detailed calculations. The grand total is rounded from the calculated total, not the sum of the individual rounded values presented in the table.

** Future design may include a vault, reducing or eliminating this impact.

Table 4 summarizes all permanent wetland impacts by project element and Wetland ID. Table 5 summarizes all permanent stream/tributary impacts by project element and Stream/Tributary ID. Table 6 summarizes the wetland and stream resources associated with the permanent buffer impacts per project element. Because the buffers are overlapping in most of the project area, the buffers were dissolved into one layer in GIS so as to not double-count buffer impacts. Therefore, buffer impacts per individual resource are not provided.

Table 4. Permanently Impacted Wetlands

Project Element	Wetland Impact (acre)	Wetland ID	2014 Ecology Rating [a]	Total Wetland Size (acres)
Employee Parking Structure	0.02	Wetland A	III	0.11
Westside Maintenance Campus	<0.01	Wetland 39	III	2.60
Stormwater Pond (Miller Creek detention pond)	0.55**	Wetland A20	III	0.55
Fuel Farm Expansion	0.21	Wetland E1	III	0.21
Storm (UMP Line)	<0.01	Wetland A14	III	0.21
	0.01	Wetland 44	II	3.10
	<0.01	Wetland A20	III	0.55
	<0.01	Wetland R13	II	1.12
	<0.01	Wetland R14a	II	0.06
Total	*0.79*			

[a] Hruby and Yahnke 2023

* Impacts values in the table are rounded from more detailed calculations. The total is rounded from the calculated total, not the sum of the individual rounded values presented in the table.
** Future design may include a vault, reducing or eliminating this impact.

Table 5. Permanently Impacted Streams/Tributaries

Project Element	Stream Impact (acre)	Stream/Tributary ID	WDNR Classification[a]	SeaTac Stream Class[b]
Westside Maintenance Campus	0.01	Miller Creek	F	2
Storm Lines	0.01	Tributary 2	N/A	N/A
Total	***0.02***			

[a] WDNR FPARS mapping (2024), as mapped within the study area
[b] SMC 15.700.330: The Port of Seattle has adopted SMC 15.700.330 with respect to classification of streams and application of appropriate buffer widths.

Table 6. Permanently Impacted Wetland and Stream Buffer

Wetland Buffer		
Project Element	**Buffer Impact per Project Element (acre)**	**Associated Wetland ID[a]**
Employee Parking Structure	0.60	Wetland A, Wetland 1, Wetland 2
Fuel Farm Expansion	0.01	Wetland DC
Westside Maintenance Campus	1.70	Wetland 39, Wetland 44, Wetland R9, Wetland 37a, Wetland 18, Wetland R3, Wetland R2
Stormwater Pond (Pond M)	0.11	Wetland 6, Wetland 7
Stormwater Pond (Pond F)	<0.01	Wetland 44
Stormwater Pond (SDS4 pond)	<0.01	Wetland G12
Sanitary Sewer Lines	0.01	Wetland 39
Storm Lines	0.23	Wetland 44, Wetland 39, Wetland A20, Wetland A14a, Wetland A14b, Wetland 13, Wetland R15, Wetland R15b
Total	***2.66***	
Stream Buffer		
Project Element	**Buffer Impact (acre)**	**Associated Stream ID**
West Side Maintenance Campus	0.07	Miller Creek
Storm Lines	0.05	Walker Creek
Total	**0.12**	

[a] Because the buffers are overlapping in most of the project area, the buffers were dissolved into one layer in GIS so as to not double-count buffer impacts. Therefore, buffer impacts per individual resource would not be accurate.

Temporary Construction Impacts

Temporary construction impacts would occur where aquatic areas or buffers are affected by clearing and ground- disturbing work but are revegetated within a year following construction. These impacts were calculated based on the assumption of a 50-foot buffer polygon applied to NTP footprints and stormwater ponds. The temporary construction impacts for the West Maintenance Campus access road were calculated based on a 5- foot buffer from the edge of the road. At the Miller Creek stream crossing, the temporary construction impacts were extended to meet the boundaries of the restrictive covenant on either side of the road.

Table 7 details the temporary impacts to critical areas and buffers for individual project elements. Only the individual projects that have temporary impacts to critical areas and/or associated buffers are listed in this table.

Table 7. Temporary Impacts to Aquatic Resources from the Proposed Action

Project Element	Stream (acres)	Stream Buffer (acres)	Wetland (acres)	Wetland Buffer (acres)
Employee Parking Structure	--	--	0.04	0.55
Fuel Farm Expansion	0.07	--	0.07	0.35
Taxiway A/B Extension	--	--	--	0.42
Westside Maintenance Campus	0.01	0.20	0.10	1.41
NTP Projects Subtotal	***0.08***	***0.20***	***0.21***	***2.73***
Stormwater Pond (Miller Creek detention pond)	--	--	--	--
Stormwater Pond (Pond F detention pond)	--	--	--	0.11
Stormwater Pond (SDS4 Pond)	--	--	--	0.06
Stormwater Pond buffer (Pond M)	--	--	--	0.53
Infrastructure Improvements Subtotal	***--***	***--***	***--***	***0.70***
Total*	***0.08***	***0.20***	***0.21***	***3.43***

* Impact values in the table are rounded from more detailed calculations. The total is rounded from the calculated total, not the sum of the individual rounded values presented in the table.

Table 8 summarizes all temporary wetland impacts by project element and Wetland ID. Table 9 summarizes all temporary stream/tributary impacts by project element and Stream/Tributary ID. Table 10 summarizes the wetland and stream resources associated with the temporary buffer impacts per project element. Because the buffers are overlapping in most of the project area, the buffers were dissolved into one layer in GIS so as to not double-count buffer impacts. Therefore, buffer impacts per individual resource are not provided.

Table 8. Temporarily Impacted Wetlands

Project Element	Wetland Impact (acre)	Wetland ID	2014 Ecology Rating [a]	Total Wetland Size (acres)
Employee Parking Structure	0.02	Wetland A	III	0.11
	0.02	Wetland 2	III	0.81
Fuel Farm Expansion	0.07	Wetland DC	II	0.54
Westside Maintenance Campus	0.06	Wetland 39	III	2.60
	0.04	Wetland 44	II	3.12
Total*	***0.21***			

[a] Hruby and Yahnke 2023

Table 9. Temporarily Impacted Streams/Tributaries

Project Element	Stream Impact (acre)	Stream/Tributary ID	WDNR Classification[a]	SeaTac Stream Class[b]
Fuel Farm	0.07	East Fork Des Moines Creek	F	2
Westside Maintenance Campus	0.01	Miller Creek	F	2
Total*	***0.08***			

[a] WDNR FPARS mapping (2024), as mapped within the study area

[b] SMC 15.700.330: The Port of Seattle has adopted SMC 15.700.330 with respect to classification of streams and application of appropriate buffer widths.

Table 10. Temporarily Impacted Wetland and Stream Buffer

Wetland Buffer		
Project Element	Buffer Impact per Project Element (acre)	Associated Wetland ID[a]
Employee Parking Structure	0.55	Wetland A, Wetland 1, Wetland 2
Fuel Farm Expansion	0.35	Wetland DC
Taxiway A/B Extension	0.42	Wetland G12
Westside Maintenance Campus	1.41	Wetland 44, Wetland 39, Wetland R9, Wetland 37a, Wetland 18, Wetland R3, Wetland R2
Stormwater Pond (Pond F detention pond)	0.11	Wetland 44
Stormwater Pond (SDS4 Pond)	0.06	Wetland G12
Stormwater Pond buffer (Pond M)	0.53	Wetland 6, Wetland 7
Total	***3.43***	
Stream Buffer		
Project Element	**Buffer Impact (acre)**	**Associated Stream ID**
West Side Maintenance Campus	0.20	Walker Creek, Miller Creek
Total	**0.20**	

[a] Because the buffers are overlapping in most of the project area, the buffers were dissolved into one layer in GIS so as to not double-count buffer impacts. Therefore, buffer impacts per individual resource would not be accurate.

Avoidance And Minimization Measures

The avoidance and minimization of impacts to aquatic resources was a guiding principle for the preliminary project design. Additional avoidance and minimization measures would be implemented, as practical, as the project design continues to develop. The Port is exploring options to reduce permanent wetland and stream impacts associated with utility lines and to minimize buffer impacts. Additional strategies include minimizing vegetation clearing and restoring temporarily affected areas as soon after the initial impact as possible.

The Port would comply with standard specifications, best management practices (BMPs),[1] and applicable federal and state mitigation requirements during design, construction, and post-construction activities. The Port would meet all regulatory requirements and continue to meet or exceed avoidance and minimization measures related to these BMPs in adherence with federal and state regulations.

On Site Restoration

Temporary impacts to wetlands, streams, and buffers would be restored in-kind on site. For the purpose of this assessment, all temporary impacts are assumed to be short term (restored within one year). The amount of on-site restoration would be equal to the areas of temporary impacts identified in Table 7.

[1] BMPs include various methods and devices to control, remove, or reduce pollution, and are listed in the Airport's Stormwater Pollution Prevention Plan (https://www.portseattle.org/file-documents/sea-tac-stormwater-pollution-prevention-plan). BMPs include operational practices (e.g. training and spill prevention), structural controls (e.g. stormwater ponds and oil/water separators), and erosion and sediment controls (e.g. silt fence and filter strips).

Mitigation Approach

Compensatory Mitigation

For unavoidable permanent impacts from elements of the Proposed Action, the Port will develop a compensatory mitigation plan during the permitting phase in accordance with applicable federal and state requirements and guidelines. These guidelines are listed in the U.S. Army Corps of Engineers and EPA's Compensatory Mitigation for Losses of Aquatic Resources,[2] and Ecology's interagency guidance contained in Wetland Mitigation in Washington State: Parts 1 and 2.[3]

The mitigation plan will be developed in cooperation with resource agencies and tribes and will follow a mitigation sequencing approach based on a hierarchy of avoiding and minimizing adverse impacts through careful design, rectifying temporary impacts, and compensating for unavoidable adverse impacts. The specific portfolio of mitigation, including location, design, and timing of permitting and construction would be developed concurrent with the progression of design for elements of the Proposed Action, which will be required to adhere to mitigation sequencing guidelines. To the extent practicable, compensatory mitigation will be designed to replace the functions and values of the impacted resources.

The area needed for compensatory mitigation is dictated by federal and state guidance. For the purpose of this evaluation, we anticipate that the project will comply with the compensatory mitigation ratios recommended by an interagency review committee composed of the Corps, EPA, and Ecology (Ecology, et al 2021). Table 10 provides a summary of the recommended compensatory mitigation ratios.

Table 10. Interagency Recommended Compensatory Mitigation Ratios for Wetland Impacts

Category and Type of Wetland	Creation or Reestablishment	Rehabilitation	Enhancement
Category I: Mature Forested	6:1	12:1	24:1
Category I: Based on Functions	4:1	8:1	16:1
Category II	3:1	6:1	12:1
Category III	2:1	4:1	8:1
Category IV	1.5:1	3:1	6:1

[2] 33 CFR Parts 325 and 332/ 40 CFR Part 230

[3] *Wetland Mitigation in Washington State Part 1: Agency Policies and Guidance* (2021), and *Part 2: Developing Mitigation Plans* (2006)

Table 11 provides a summary of the compensatory wetland mitigation areas that are anticipated to be required based on the current preliminary design.

Table 11. Compensatory Wetland Mitigation Area Calculations

Project Element	Wetland Impact (acre/Rating)	Re-establishment Area Needed (acres)	Rehabilitation Area Needed (acres)	Enhancement Area Needed (acres)
Facilities	0.23/III	0.46	0.92	1.84
UMP Line	0.01/III	0.02	0.04	0.08
Utility Lines	0.01/II	0.03	0.06	0.12
StormwaterPonds	0.55/III	1.10	2.75	4.40
	Total Areas	**1.61**	**3.77**	**6.44**

The requirement to provide compensatory mitigation for buffer impacts is not stated in the regulatory guidelines and is typically evaluated on a case-by-case basis. For the purposes of this evaluation, it is conservatively assumed that all buffer impacts would be mitigated by reestablishing buffer in association with the wetland compensatory mitigation at a 1:1 ratio (impact to reestablishment).

Mitigation Area Need and Availability

Compensatory mitigation for wetland impacts of the NTPs is anticipated to require between 1.61 acres and 6.64 acres of mitigation site area. The lower end of this range assumes a mitigation approach based entirely on wetland re-establishment. The upper end of the range assumes a mitigation approach based entirely on wetland enhancement. Providing additional area to mitigate for buffer impacts at a 1:1 ratio would add 2.66 acres of needed mitigation to each of these ranges. Therefore, the project is anticipated to required mitigation site areas that total between 4.27 and 9.30 acres.

The Port has seven sites within its ownership that have been identified as being suitable for compensatory mitigation. Proposed mitigation approaches have been evaluated and described based on each site's opportunities and potential (Anchor 2019). Six sites are within the airport property and one site is located along the Green River in Auburn. These mitigation sites encompass over total 150 acres and include potential for more than 40 acres of wetland re-establishment, and 11 acres of wetland enhancement (Anchor QEA 2019). Based on these calculations, the mitigation areas identified by the Port have sufficient capacity to provide the needed compensatory mitigation for the anticipated impacts to wetlands and buffers occur due to the proposed action.

In addition to wetland and buffer impacts the project includes a small amount of permanent impacts to steams and jurisdictional tributaries (0.02 acre). Impacts to jurisdictional tributaries are generally mitigated by restoring the function of the impacted drainage system and typically do not require compensatory mitigation. Impacts to streams are not generally mitigated in terms of area. Mitigation is typically proposed to provide a functional uplift to the impacted system. Where there are insufficient opportunities to create functional uplift in the impacts system, it may be necessary to provide mitigation through other mechanisms such as purchasing mitigation credits from banks or in-lieu fee programs. While the project has not progressed to the point where these specific requirements are known, the amount of impact that would need to be mitigated through these programs is small (0.02 acre or less) and the Airport is within the service area of several existing banks and in-lieu fee programs.

Permitting Approach

The Proposed Action elements are in a conceptual phase of development and have not completed detailed designs. During the design process, the Port will confirm existence of regulated wetlands with the Corps to ensure that all waters of the U.S. subject to Corps jurisdiction are properly identified. At this time, all wetlands will be considered jurisdictional as this will be the basis for detailed calculations of impacts and mitigation for advanced project design.

With clarity on potential impacts and additional project design details, the Port will submit permit applications to the Corps and other regulatory agencies, as necessary, in compliance with Clean Water Act requirements, Washington State regulations, and local ordinances. These applications will provide design drawings, refined impact assessments, and detailed mitigation plans.

The permitting approach will be further informed by the location, schedule, and sequencing of individual projects with unavoidable impacts to waters of the U.S. Individual permit applications are expected to be submitted for most or all proposed action elements, but some may be combined into a single permit application, including if the selected mitigation activity to offset wetland/aquatic impacts for more than one proposed action element is combined into a single mitigation site. The decision on the number and timing of permit applications will be determined following further planning and design development.

As shown in the table below, four SAMP NTPs would result in impacts to wetlands, streams and/or their buffers. One of these projects may exceed the impact threshold for an applicable Nationwide Permit (NWP) of 0.5 acre, and would therefore require an Individual Permit from the Corps.

On-site mitigation at the project location is feasible for nearly all wetlands and streams impacted by the SAMP NTPs as land is available within the NTP area to support replacement of lost functions with each mitigation action. However, mitigation for impacts to Wetland E1 within the S01/Fuel Farm Expansion project would need to take place on Port-owned property at SEA or at the Port mitigation site in Auburn due to site constraints at the fuel farm facility.

Each project is planned to be permitted separately with the Corps and other regulatory agencies. If efficiencies are identified to bundle projects that have similar construction timeframes under a single permit, the Port will evaluate this option with regulatory agencies (Table 12).

Table 12. Anticipated Permit and Mitigation Method for SAMP NTPs with Impacts to CWA Jurisdictional Resources

NTP	Section 404 Permit	Mitigation Method	Planned Construction	Notes
A01/ Taxiway A/B Extension	n/a	On-site	2026-2029	Wetland buffer impacts only
L07/ Employee Parking Structure	NWP	On-site	2029-2031	
S01/ Fuel Farm Expansion	NWP	On Port property	2029-2031	On-site capacity is not available to mitigate for wetland impacts at the fuel farm facility.
S07/ Westside Maintenance Campus	Individual	On-site	2025-2027	Wetland impacts may exceed NWP threshold of 0.5 acre, assuming full take of Wetland A20.

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APPENDIX M

Water Resources

Impervious Area Impacts and Mitigation Measures

Gresham Smith

TECHNICAL MEMORANDUM

TO:	Sarah Potter, Landrum and Brown Steve Rybolt, Port of Seattle
FROM:	Gresham Smith
DATE:	June 14, 2024
SUBJECT:	**IMPERVIOUS AREA IMPACTS AND MITIGATION MEASURES** **SUPPLEMENTAL INFORMATION FOR ENVIRONMENTAL ASSESSMENT** **SEATTLE-TACOMA INTERNATIONAL AIRPORT** **SUSTAINABLE AIRPORT MASTER PLAN** Gresham Smith Project No. 42583.04

Gresham Smith prepared this Impervious Surface Analysis Technical Memorandum to analyze the potential impervious area changes resulting from the Sustainable Airport Master Plan (SAMP) Near-Term Projects (NTP). This report also identifies stormwater controls to address these impacts.

Description of the Proposed Action

The Port of Seattle (Port) identified a set of NTPs to address the near-term activity levels projected to occur at the Airport. The NTPs include 31 projects that would improve efficiency, safety, access to the Airport, and support facilities for airlines and the Airport.

In addition to the Proposed Action, the Port also evaluated a Hybrid Terminal Option. The impervious area impacts and stormwater controls described in this memorandum are associated with the Proposed Action and the Hybrid Terminal Option. For the purposes of analyzing changes to impervious surfaces, the Hybrid Terminal Option resulted in no differences from the Proposed Action. The No Action Alternative has no impervious area changes.

Potential Impacts Due to Site Imperviousness

Both the Proposed Action and Hybrid Terminal Option would involve the addition or expansion of impervious areas, as well as the replacement of existing impervious surfaces. Major impervious area changes include the reconfiguration of taxiways to meet safety and operational requirements, expansion of the fuel farm, construction of the westside maintenance campus, and the construction of new cargo and parking facilities on undeveloped sites north of SR 518. The addition of impervious surfaces would be at least partially offset by the demolition of select impervious surfaces along the taxiways and other hard surfaces.

The change in impervious surfaces between pre- and post-development conditions was analyzed in detail by overlaying proposed project footprints with existing airport drainage subbasin boundaries. Each subbasin has a unique drainage infrastructure system that drains to existing stormwater controls before draining to an outfall and leaving the airport. Impervious areas within both the Stormwater Drainage System (SDS) and Industrial Wastewater System (IWS) were included in this analysis. Please refer to **Exhibit 1** for IWS and SDS subbasins and detention facility locations. **Table 1** provides a summary of net impervious area changes within each drainage subbasin. As shown in the table, the total impervious area is expected to increase by about 75 acres.

Without appropriate stormwater quantity controls, this expansion in impervious area would be expected to increase stormwater runoff quantity and impact stormwater quality. A stormwater analysis was performed to evaluate the impacts of the proposed changes on stormwater runoff quantity, as well as the need for new or expanded detention facilities to address these quantity impacts. Table 1 includes a summary of the estimated percent increase in peak runoff rates in each drainage subbasin, upstream of existing and proposed stormwater controls (not accounting for existing and proposed stormwater quantity mitigation).

Proposed development conditions were simulated with existing stormwater controls to determine the need for new or expanded detention facilities to mitigate for stormwater quantity impacts and control stormwater discharges in accordance with local requirements. Impervious area changes within the new development areas north of SR 518 would require the implementation of new stormwater controls. The proposed impervious areas were also compared to existing water quality treatment capacities to determine the need for new or expanded water quality treatment best management practices (BMPs) in accordance with local requirements. Please refer to the Mitigation and Minimization Measures section for stormwater control improvements that are proposed to address the impervious area impacts.

TABLE 1: IMPERVIOUS AREA CHANGE SUMMARY

Drainage Subbasin[1]	Net Change in Impervious Area[2] (acres)	Estimated % Increase in 100-year Peak Runoff Rate Without Mitigation[3]
IWS	-29.20	N/A[5]
SDD05B	+0.42	4%
SDE4 & SDE4X	+34.18	24%
SDN2/3/4	+9.72	21%
SDN3A	+0.85	7%
SDS3 / SDS3A / SDS5	-3.46	N/A[5]
SDS4	+1.82	5%
SDS6-7A	+1.00	2%
SDW1B	+15.84	49%
SDW2	+8.54	61%
MC07	-2.87	N/A[5]
New Development North of SR518[4]	+37.59	82%
TOTAL (Existing + New Development)	**+74.43**	N/A[6]

1. "SDXX" nomenclature refers to drainage subbasin IDs within the storm drain system (SDS). The third character in each drainage subbasin ID (N/E/S/W) indicates the side of the airport where the drainage subbasin is located (north / east / south / west).
2. Although all projects and subbasins were evaluated for impervious area changes, the summary table above excludes subbasins with no net change in impervious area. The total impervious area change is inclusive of all impervious area changes. The net change in impervious area accounts for impervious changes due to development projects (both addition and demolition of paved surfaces), as well as shifts between subbasin boundaries. A positive net change indicates that total impervious area increased, while a negative net change indicates that total impervious area decreased. Impervious area changes were determined through GIS analysis performed by Aspect Consulting in March 2021.
3. The percent increase in peak runoff rates were calculated by WSP based on regression analyses and model-generated flow rates to illustrate the magnitude of the potential impact of development on stormwater quantity. These flow rates were then proportioned to reflect changes in the drainage basins since that analysis was performed. These flow rates do not account for mitigation at existing and proposed detention basins. Proposed improvements to existing detention facilities to address the identified impacts are summarized in Mitigation and Minimization Measures.
4. "New development north of SR 518" refers to isolated projects north of SR 518 that do not fall within existing drainage subbasins. The net change in impervious area represents the total impervious area within those project footprints. These new development areas are not currently served by stormwater controls and increases in impervious areas that would require the implementation of new controls, as described in Section J.3.
5. Reductions in impervious area were not evaluated for peak flow reduction as they do not result in an impact requiring mitigation.
6. Stormwater quantity impacts were evaluated for individual drainage basins with development, as summarized in the rows above.

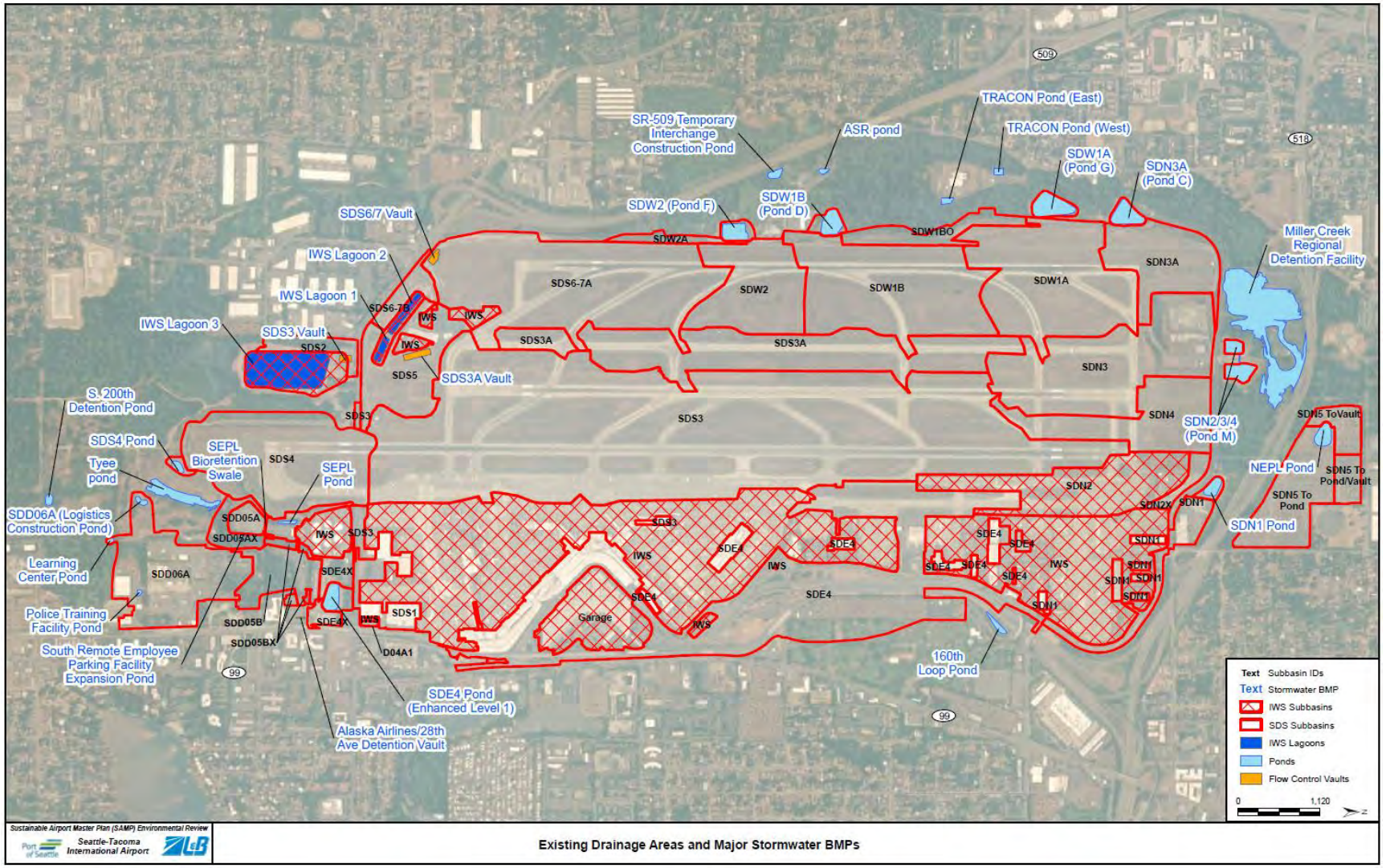


EXHIBIT 1: EXISTING DRAINAGE BASINS AND DETENTION FACILITIES

Mitigation and Minimization Measures

To minimize and mitigate for potential impacts to stormwater runoff quantity and quality associated with expanded impervious surfaces, grading activities, and airport activity areas, the Port would implement stormwater management measures for development projects in accordance with applicable local, state, and federal regulatory requirements. These include post-construction stormwater quantity and quality (treatment) controls, as well as source controls (structural and non-structural), and low-impact development. Proposed stormwater controls that are anticipated to be needed as mitigation and minimization measures for the Proposed Action within the SDS and IWS are described below under the SDS Measures and IWS Measures subsections.

Source Controls

The Airport's SWPPP describes existing non-structural (e.g., good housekeeping, spill response, employee training) and structural source controls (e.g., oil/water separators, containment berms) that are already in place, and the locations where they are implemented to minimize the potential for pollutant runoff from existing activity areas. New facilities may need to implement additional source controls or expand the area where existing controls are implemented, where appropriate, to reduce the risk of pollutants entering the SDS or IWS drainage systems. Specific source controls will be evaluated and selected for individual projects during the design phase based on project features, planned activities, pollutants potentially associated with those activities, and compliance with applicable regulations. The Airport's SWPPP would be updated to reflect any proposed change in facilities, activity areas, tenants, and the application of BMPs and source controls to new activity areas. Additionally, new facilities with qualifying oil storage tanks and equipment would implement appropriate spill response, containment measures, and other source controls in accordance with the Airport's Spill Prevention, Control, and Countermeasure (SPCC) Plan, which would also be updated accordingly.

6PPD / 6PPD-Quinone and Other Emerging Contaminants

During the design of stormwater controls for new projects, the potential for the release of emerging contaminants (e.g., 6PPD and 6PPD-quinone) will be considered where relevant. Available industry guidance such as the Washington State Department of Ecology's *Stormwater Treatment of Tire Contaminants Best Management Practices Effectiveness* (2022) will be referenced to select appropriate source control BMPs and/or flow and treatment BMPs to address these contaminants where applicable and to the extent feasible. These include BMPs that contribute to sediment capture, filtration, sorption, or infiltration. The Port has already implemented a large number of structural and non-structural BMPs, as documented in the Airport's SWPPP, that are likely to be effective at reducing 6PPD and 6PPD-quinone, including:

- Street sweeping
- Runway rubber removal (annual)
- Detention basins
- Constructed wetlands
- Cartridge filters
- Bioswales

- Filter strips
- Oil/water separators
- Industrial Waste Treatment Plant
- Sediment removal from Lagoons 1-3.

The types of post-construction stormwater controls identified to address the Proposed Action, as detailed in Table 2 (including detention basins, oil/water separators, infiltration BMPs, and bioretention) are included among the BMPs in Ecology's 2022 report recommended to address 6PPD and 6PPD-quinone.

Low-Impact Development

Low-impact development techniques and infiltration features would also be considered for implementation where feasible, as described in the SDS Measures subsection. Feasibility of LID would be evaluated during the detailed design phase to take into account the detailed facility layout, space constraints, project runoff characteristics, and site-specific geotechnical / hydrogeologic investigations and infiltration testing that will be performed at that time. This LID feasibility review would follow the process outlined by the Port of Seattle in the *Low Impact Development Guideline Seattle-Tacoma International Airport* (2018) and *Seattle Tacoma International Airport Stormwater Management Manual for Port Aviation Division* (2017), and would account for FAA regulations and competing needs for STIA operations. It would also reference previous studies conducted by the Port regarding technical feasibility of infiltration at STIA, including the *STIA Infiltration Feasibility Assessment* (2016) and *Infiltration Infeasibility Map* (2018).

SDS Measures

The Airport's SDS includes collection, conveyance, detention, and treatment infrastructure to manage stormwater runoff at the Airport. In support of the Utility Master Plan, a detailed analysis was performed to evaluate the impacts of the Proposed Action on stormwater runoff rates and assess the future demand for SDS conveyance infrastructure and stormwater control (i.e., detention and treatment) capacities. This analysis accounted for the remaining capacities of existing stormwater conveyance and controls (some of which had excess capacity to address a portion of the planned development); identified deficiencies in comparison to future demand; and made recommendations for improvements to address those deficiencies. Specific recommendations were identified for each drainage basin and watershed in which development is planned, in accordance with applicable stormwater development standards and regulations. Planned stormwater controls and preliminary sizing estimates are summarized in **Table 2**, as sized to address the anticipated impacts from planned development and impervious surfaces as defined for the Proposed Action. The proposed stormwater control expansions have been evaluated for feasibility based on site constraints, but site-specific layouts were not developed as part of this analysis. As projects are designed, stormwater controls site layouts would be developed and sizes would be adjusted as needed to comply with local, state, and federal stormwater regulations.

TABLE 2: PLANNED STORMWATER CONTROLS BY AREA

Drainage Basin / Area Served[1]	Stormwater Controls to be Added / Modified[2]
SDW1b	• Expand detention volume by 4.4 acre-feet. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration. • Provide source controls where required, including oil/water separator.
SDW2	• Relocate existing detention pond or convert to an underground vault to avoid proposed development. Provide a total storage capacity of 14.3 acre-feet (existing storage plus additional 2.4 acre-feet of storage). • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration to offset storage requirements. • Provide source controls where required, including oil/water separator.
SDE4 & SDE4X	• Expand detention volume by 2.0 acre-feet. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration. • Provide source controls where required, including oil/water separators. • Install canister filters for water quality treatment.
SDN2/3/4	• Expand detention volume by up to 4.7 acre-feet. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration at SR 518 pond to offset storage requirements. • Provide source controls where required.
SDS4	• Expand detention volume by 0.1 acre-feet to address development within subbasin only (assuming no diversion from SDS3/5). • Expand bioretention swale footprint by 90 square feet or provide equivalent detention and treatment alternative. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration to offset storage requirements. • Provide source controls where required.
SDD05B	• Expand detention volume by 2.3 acre-feet. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration to offset storage requirements. • Provide source controls where required.
SDD06A	• Expand detention volume by 6.4 acre-feet. • Integrate on-site low-impact development techniques as feasible. • Pursue opportunities for shallow / deep infiltration to offset storage requirements. • Provide source controls where required.

<table>
<tr><td rowspan="4">New Development North of SR 518</td><td colspan="2">• Integrate on-site low-impact development techniques as feasible.
• Pursue opportunities for shallow / deep infiltration to offset storage requirements.
• Provide source controls where required.
• Implement local detention facilities and water quality treatment as follows:</td></tr>
<tr><td>Projects</td><td>Detention and Water Quality Treatment Volume (acre-feet)</td></tr>
<tr><td>Off-site Cargo Phase 1 (C02) and Off-site Cargo Phase 2 (C03)</td><td>14.1</td></tr>
<tr><td>North GT Holding Lot (L05)[3], Employee Parking (L07), and Centralized Rec. & Dist. Center (S10)[4]</td><td>7.7</td></tr>
</table>

1. “SDXX” nomenclature refers to drainage basin IDs within the storm drainage system (SDS). The third character in each drainage basin ID (N/E/S/W) indicates the side of the airport where the drainage basin is located (north / east / south / west).
2. Stormwater control needs summarized above account for available capacity remaining within existing facilities. Drainage areas that experience an increase in impervious area but are not shown in this table were found to have sufficient capacity available within existing stormwater controls. Please refer to Exhibit 1 for existing drainage basin and detention facility locations.
3. “GT” = Ground Transportation
4. “Rec. & Dist.” = Receiving and Distribution

Source: Utility Master Plan (UMP): Sewer and Surface Water, HNTB (December 2022)

IWS Measures

The Airport’s IWS includes collection, conveyance, detention (three lagoons), and pretreatment infrastructure (Industrial Waste Treatment Plant, or IWTP) to manage runoff from designated industrial activity areas at SEA, including deicing runoff. While the IWTP provides treatment for solids, fuel, petroleum substances, and insoluble metals, additional activity-specific source controls may be necessary to mitigate other potential water quality impacts within the IWS. These will be evaluated and selected during the design of individual projects.

The Port maintains and upgrades the IWS as needed to comply with two associated discharge permits: (1) NPDES permit for discharges to surface water associated with industrial activities, and (2) IWD Permit for discharges to the King County sanitary sewer. Based on the conditions for the current NPDES and IWD permits, wastewater runoff rates associated with the Proposed Action were identified, and the future demand for IWS conveyance infrastructure, storage capacity, snow storage areas, and IWTP infrastructure was assessed. The Airport’s NPDES and IWD permits were renewed on 9/1/2021 and 7/2/2021, respectively. There were no changes to the NPDES permit; the renewed IWD permit has two tiers of reduced effluent limits, effective 10/1/22 and 03/31/26.

A concept was developed for IWTP enhancements, including additional storage and treatment capacity and infrastructure upgrades, to meet both tiers of reduced limits. The Port will proceed with the IWTP enhancement improvements as needed to comply with permit requirements in advance of planned development. Final mitigation will be determined once final project designs are completed.

APPENDIX M

Water Resources

FFRMS Worksheets

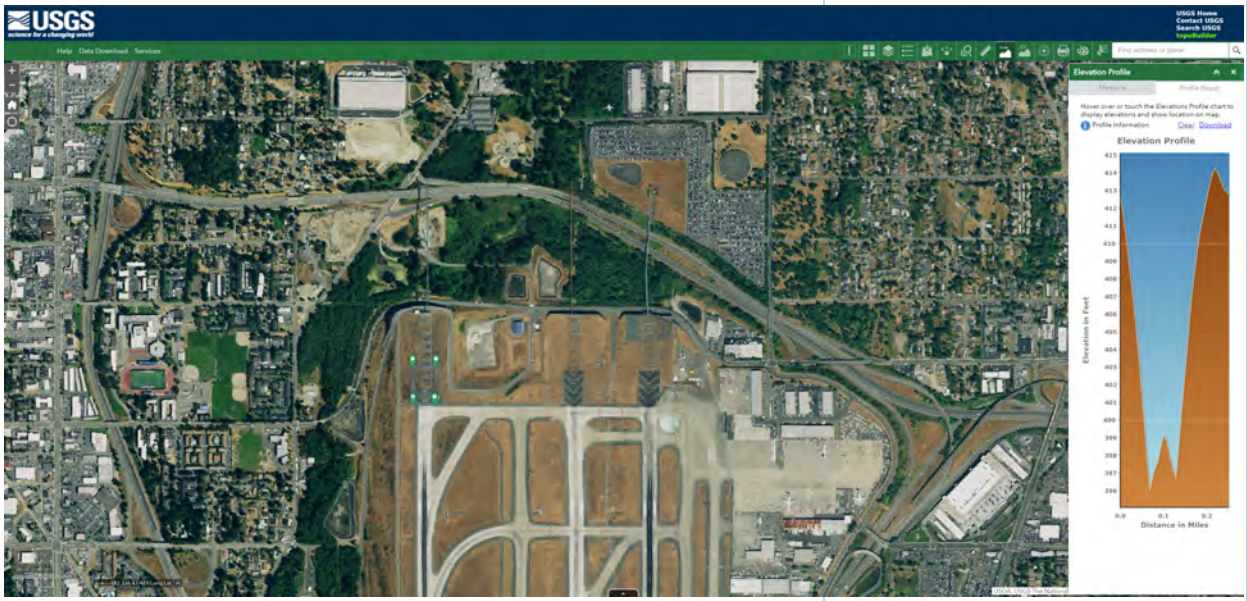
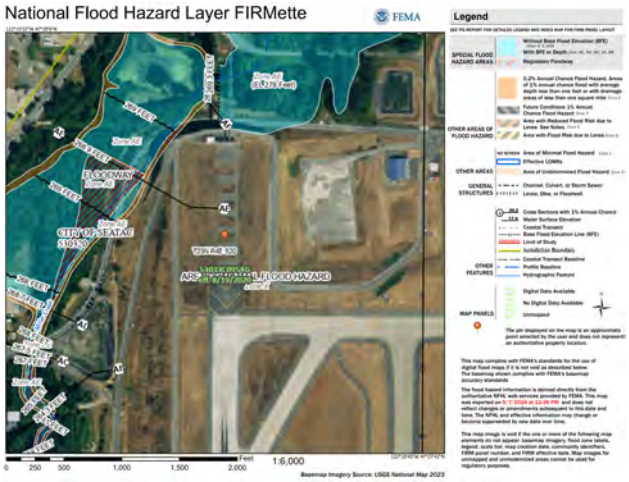
FFRMS Worksheet A02
FFRMS Worksheet L05
FFRMS Worksheet L07
FFRMS Worksheet S07
FFRMS Worksheet S10

Appendix B: FFRMS Floodplain Determination: Worksheet

This is a worksheet to assist in the FFRMS floodplain determination process. The spaces below follow the steps identified in this job aid. The case studies provide examples of how to use the table.

Basic Project Information	
Name and Organization of Person Completing the Form:	Kandice Krull - Federal Aviation Administration
Federal Agency (if different from above):	
Project Name:	SEA Sustainable Airport Master Plan Near-Term Projects
Project Type:	A02 - Runway 16 Blast Pad
Critical or Non-Critical Action:	Non-Critical Action
Coastal or Riverine:	Riverine
Select FFRMS Flood Determination Approach (CISA, FVA, 0.2PFA):	FVA

Steps with Images	Recorded Answers
1. Identify and record the site latitude/longitude.	**47.46497° -122.31838°** **47.46391° -122.31845°** **47.46391° -122.31710°** **47.46507° -122.31707°**

Steps with Images	Recorded Answers
Skip to step 7 if using 0.2PFA 2. Round the elevation(s) down for the most conservative estimate (for FVA or CISA) 	**A02N: 396' is lowest elevation**
3. Locate the floodplain zone and BFE if within the Special Flood Hazard Area, or nearest floodplain zone and BFE if action is outside, and round to the value that results in the largest potential floodplain. 	**Zone: Zone X** **BFE = 278' is highest elevation**

Steps with Images	Recorded Answers
4. Note action characteristics such as service life, criticality, risk tolerance (low, medium, high), and any other hazards of concern (flash floods, erosion).	
5. a. Determine the FFRMS flood elevation based on FVA (if applicable).	Non-Critical: BFE + 2' = 278' + 2' = 280' Critical BFE + 3' = 278' + 3' = 281'
b. Determine the FFRMS flood elevation based on simplified CISA (if applicable).	N/A
6. Compare the answer in step 2 to step 5 and determine if the site is in the FFRMS floodplain.	396' > 280' or 281' Not in FFRMS Floodplain
7. **For 0.2PFA only**, locate the site in the flood map and determine if it is in 0.2 percent-annual-chance hazard area (if applicable).	

Appendix B: FFRMS Floodplain Determination: Worksheet

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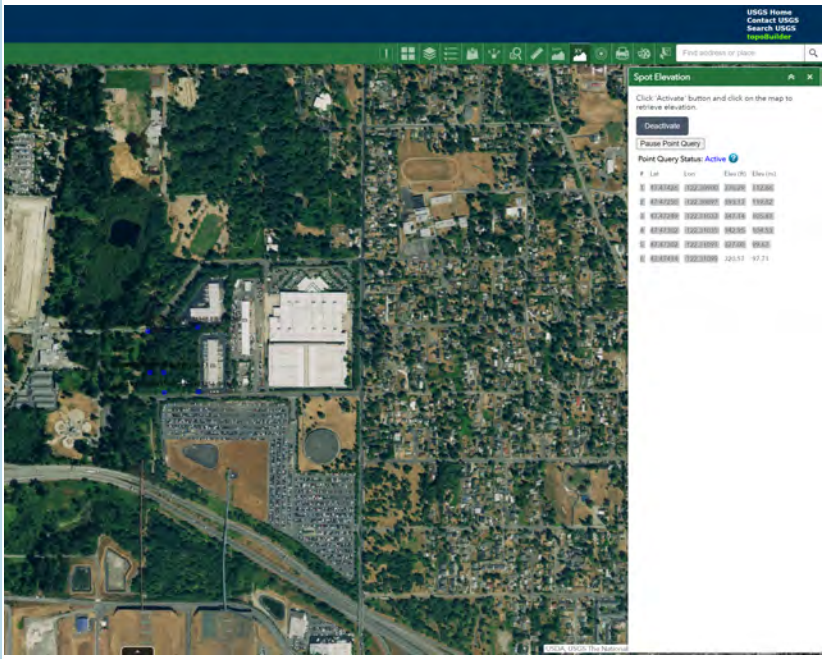
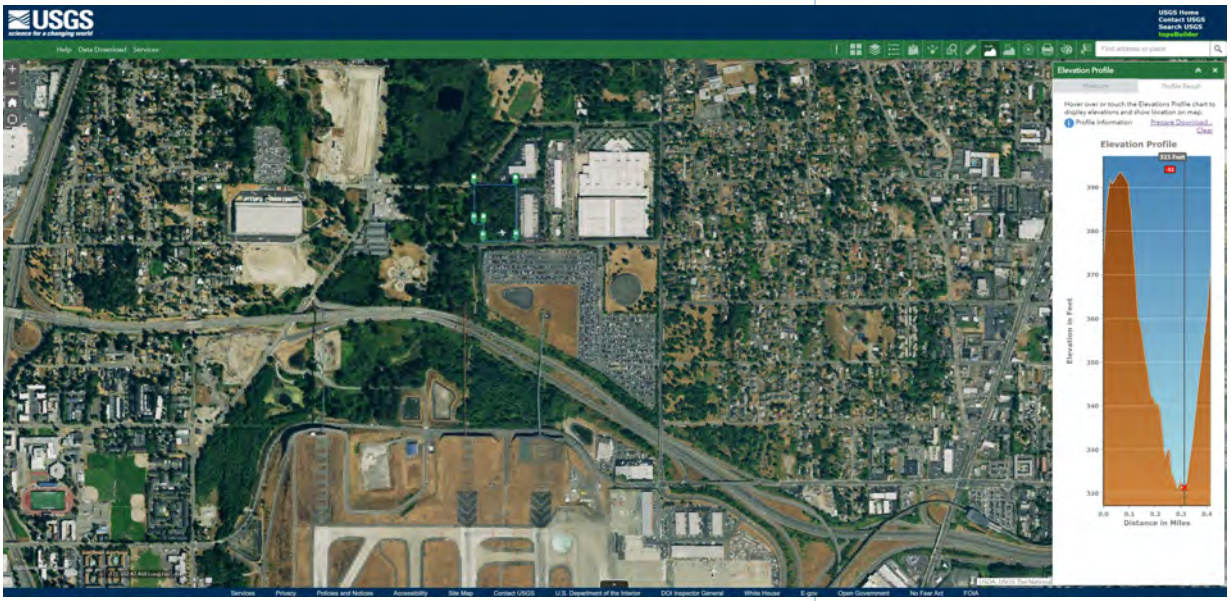
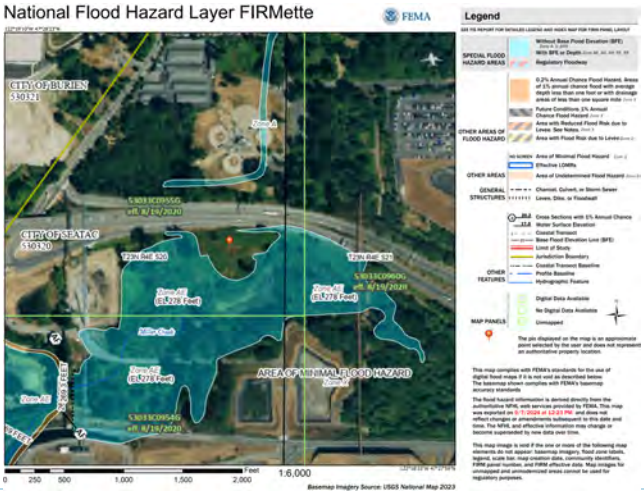
Basic Project Information	
Name and Organization of Person Completing the Form:	Kandice Krull - Federal Aviation Administration
Federal Agency (if different from above):	
Project Name:	SEA Sustainable Airport Master Plan Near-Term Projects
Project Type:	L05 - North Ground Transportation Holding Lot
Critical or Non-Critical Action:	Non-Critical Action
Coastal or Riverine:	Riverine
Select FFRMS Flood Determination Approach (CISA, FVA, 0.2PFA):	FVA

Steps with Images	Recorded Answers
1. Identify and record the site latitude/longitude. 	**47.47414°-122.31099°** **47.47302°-122.31091°** **47.47302°-122.31035°** **47.47249°-122.31033°** **47.47250°-122.30897°** **47.47246°-122.30900°**

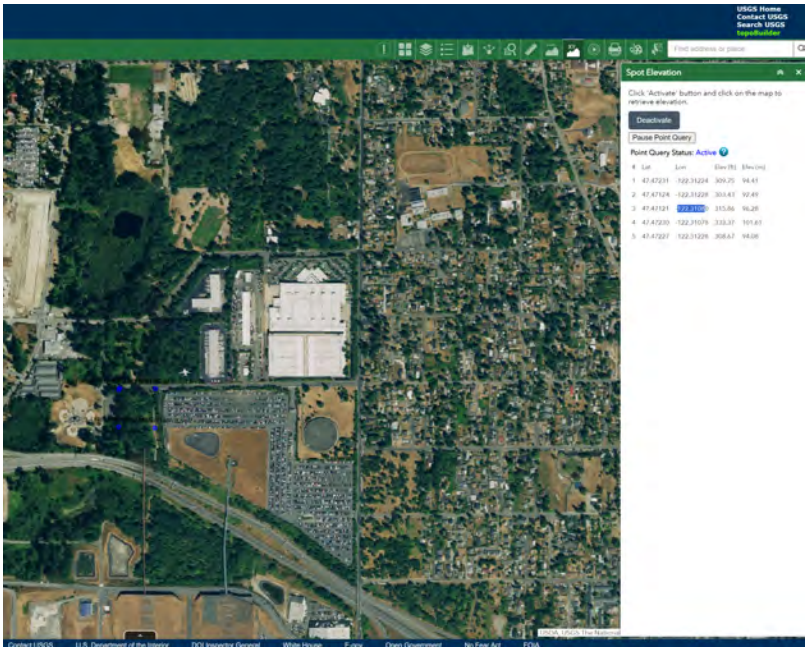
Steps with Images	Recorded Answers
Skip to step 7 if using 0.2PFA 2. Round the elevation(s) down for the most conservative estimate (for FVA or CISA) 	**L05: 321' is lowest elevation**
3. Locate the floodplain zone and BFE if within the Special Flood Hazard Area, or nearest floodplain zone and BFE if action is outside, and round to the value that results in the largest potential floodplain. 	**Zone: Zone X** **BFE = 278' is highest elevation**

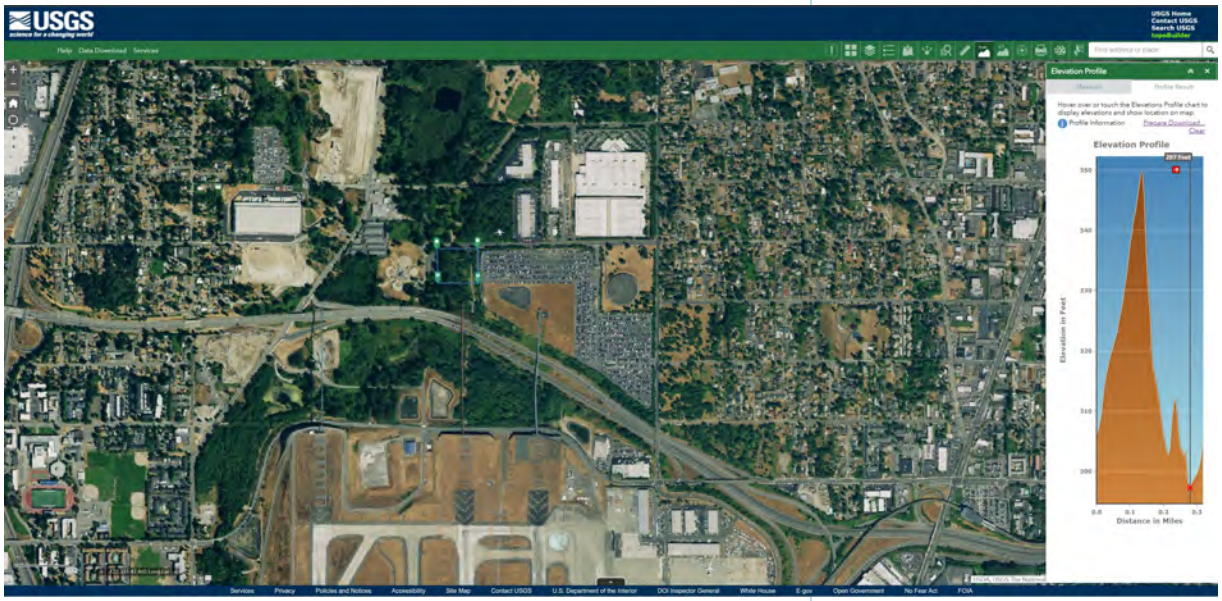
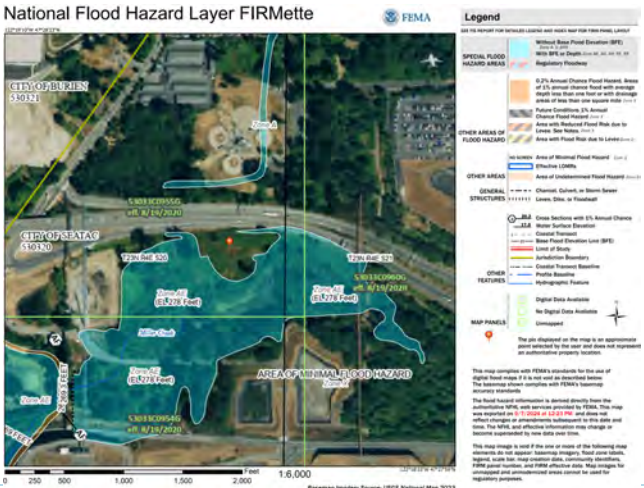
Steps with Images	Recorded Answers
4. Note action characteristics such as service life, criticality, risk tolerance (low, medium, high), and any other hazards of concern (flash floods, erosion).	• Long-term service life • Not a critical action • Area in Zone X but near Zone A floodplain
5. a. Determine the FFRMS flood elevation based on FVA (if applicable).	Non-Critical: BFE + 2' = 278' + 2' = 280' Critical BFE + 3' = 278' + 3' = 281'
b. Determine the FFRMS flood elevation based on simplified CISA (if applicable).	N/A
6. Compare the answer in step 2 to step 5 and determine if the site is in the FFRMS floodplain.	321' > 280' or 281' Not in FFRMS Floodplain
7. **For 0.2PFA only**, locate the site in the flood map and determine if it is in 0.2 percent-annual-chance hazard area (if applicable).	

Appendix B: FFRMS Floodplain Determination: Worksheet

This is a worksheet to assist in the FFRMS floodplain determination process. The spaces below follow the steps identified in this job aid. The case studies provide examples of how to use the table.

Basic Project Information	
Name and Organization of Person Completing the Form:	Kandice Krull - Federal Aviation Administration
Federal Agency (if different from above):	
Project Name:	SEA Sustainable Airport Master Plan Near-Term Projects
Project Type:	L07 - Employee Parking Garage
Critical or Non-Critical Action:	Non-Critical Action
Coastal or Riverine:	Riverine
Select FFRMS Flood Determination Approach (CISA, FVA, 0.2PFA):	FVA

Steps with Images	Recorded Answers
1. Identify and record the site latitude/longitude. 	**47.47231°-122.31224°** **47.47124°-122.31228°** **47.47121°-122.31080°** **47.47230°-122.31078°**

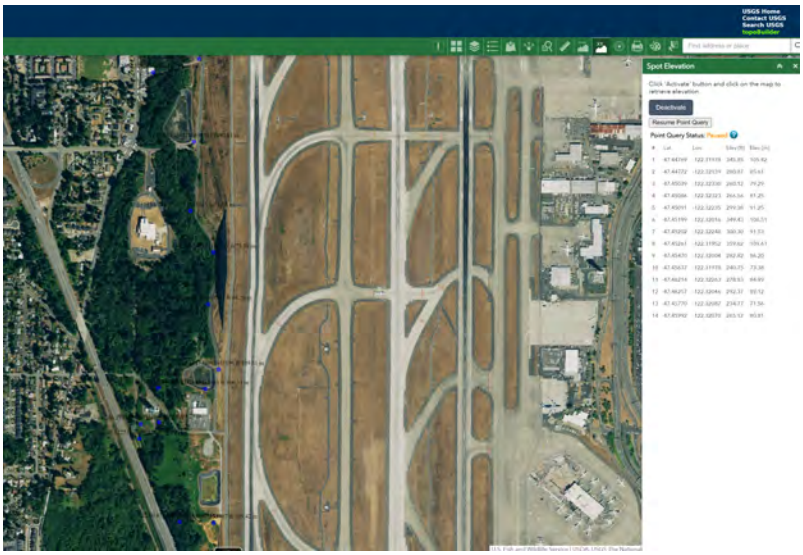
Steps with Images	Recorded Answers
Skip to step 7 if using 0.2PFA 2. Round the elevation(s) down for the most conservative estimate (for FVA or CISA) 	**L07: 297' is lowest elevation**
3. Locate the floodplain zone and BFE if within the Special Flood Hazard Area, or nearest floodplain zone and BFE if action is outside, and round to the value that results in the largest potential floodplain. 	**Zone: Zone AE** **BFE = 278' is highest elevation**

Steps with Images	Recorded Answers
4. Note action characteristics such as service life, criticality, risk tolerance (low, medium, high), and any other hazards of concern (flash floods, erosion).	• Long-term service life • Not a critical action • Area in Zone X but near Zone A floodplain
5. a. Determine the FFRMS flood elevation based on FVA (if applicable).	Non-Critical: BFE + 2' = 278' + 2' = 280' Critical BFE + 3' = 278' + 3' = 281'
b. Determine the FFRMS flood elevation based on simplified CISA (if applicable).	N/A
6. Compare the answer in step 2 to step 5 and determine if the site is in the FFRMS floodplain.	297' > 280'/281' Not in FFRMS Floodplain
7. **For 0.2PFA only**, locate the site in the flood map and determine if it is in 0.2 percent-annual-chance hazard area (if applicable).	

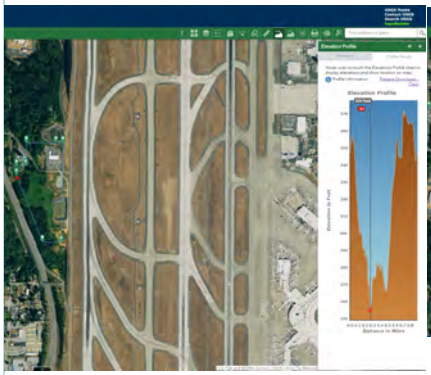
Appendix B: FFRMS Floodplain Determination: Worksheet

This is a worksheet to assist in the FFRMS floodplain determination process. The spaces below follow the steps identified in this job aid. The case studies provide examples of how to use the table.

Basic Project Information	
Name and Organization of Person Completing the Form:	Kandice Krull - Federal Aviation Administration
Federal Agency (if different from above):	
Project Name:	SEA Sustainable Airport Master Plan Near-Term Projects
Project Type:	S07 - Westside Maintenance Campus
Critical or Non-Critical Action:	Non-Critical Action
Coastal or Riverine:	Riverine
Select FFRMS Flood Determination Approach (CISA, FVA, 0.2PFA):	FVA

Steps with Images	Recorded Answers
1. Identify and record the site latitude/longitude. 	**47.45086°-122.32323°** **47.44769°-122.31978** **47.45199°-122.32016°** **47.45637°-122.31978°** **47.46257° -122.32046°**

Steps with Images	Recorded Answers
Skip to step 7 if using 0.2PFA 2. Round the elevation(s) down for the most conservative estimate (for FVA or CISA)	**S10:** **Campus: 255' lowest elevation** **Road: 229' lowest elevation** **271' in floodplain**



3. Locate the floodplain zone and BFE if within the Special Flood Hazard Area, or nearest floodplain zone and BFE if action is outside, and round to the value that results in the largest potential floodplain.

Zone: Zone AE
BFE = 224' is highest elevation next to campus
BFE = 265' is highest elevation access road floodplain
BFE = 224' is highest elevation next to lowest road

Steps with Images	Recorded Answers
4. Note action characteristics such as service life, criticality, risk tolerance (low, medium, high), and any other hazards of concern (flash floods, erosion).	• Long-term service life • Not a critical action
5. a. Determine the FFRMS flood elevation based on FVA (if applicable).	Non-Critical: Campus: BFE + 2' = 224' + 2' = 226' Road: BFE + 2' = 265' + 2' = 267' BFE +2' = 224' + 2' = 226' Critical BFE + 3' = 224' + 3' = 227' BFE + 3' = 265' + 3' = 268' BFE + 3' = 224' + 3' = 227'
b. Determine the FFRMS flood elevation based on simplified CISA (if applicable).	N/A
6. Compare the answer in step 2 to step 5 and determine if the site is in the FFRMS floodplain.	See Below
7. **For 0.2PFA only**, locate the site in the flood map and determine if it is in 0.2 percent-annual-chance hazard area (if applicable).	

Westside Maintenance Campus:
255' > 226'/227'
Not in FFRMS Floodplain

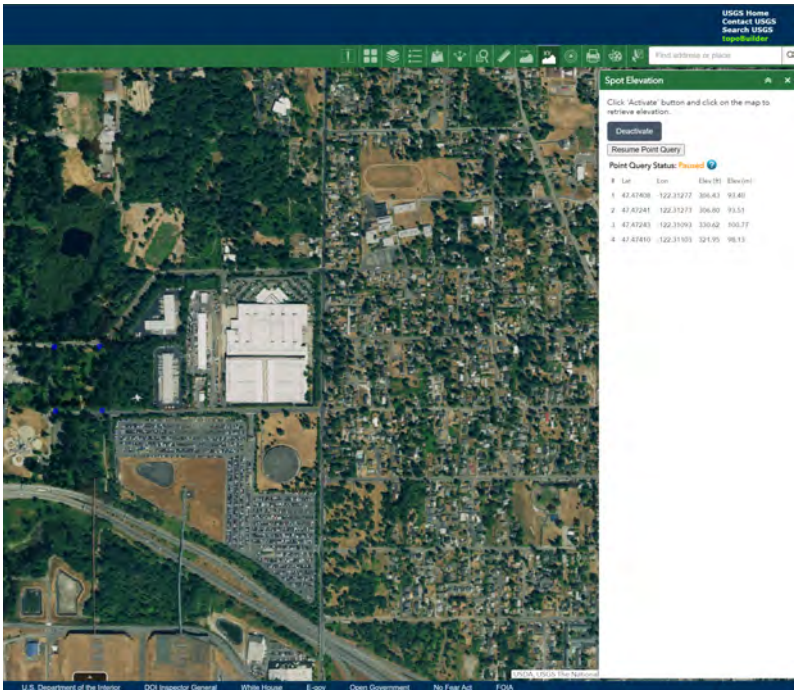
Road in Floodplain:
271' > 267'/268'
Not in FFRMS Floodplain

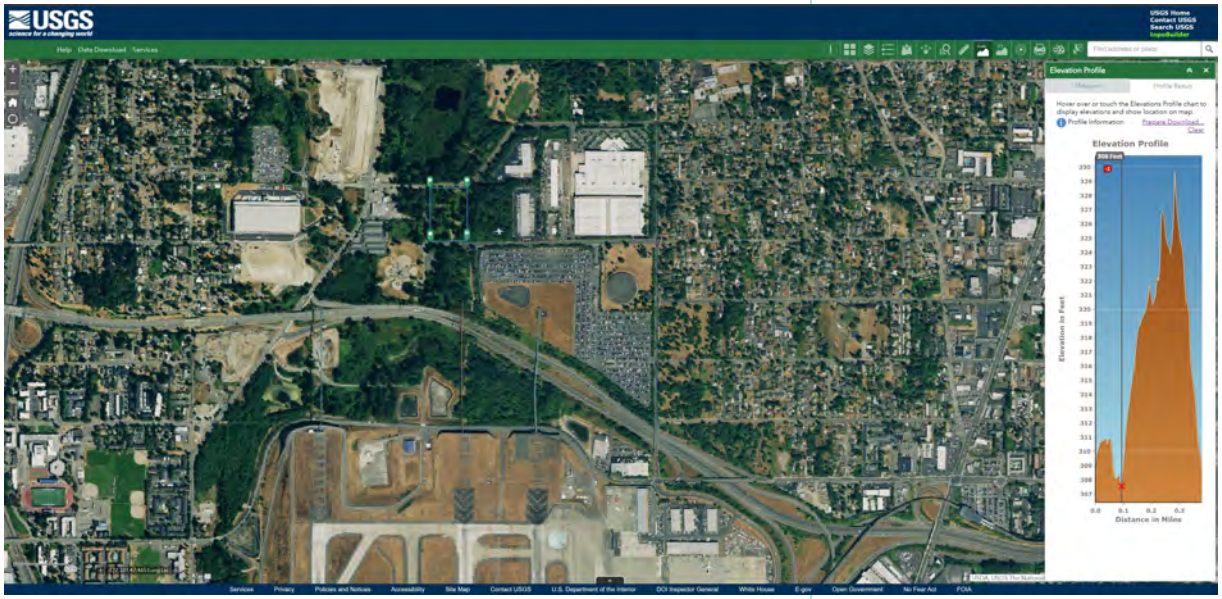
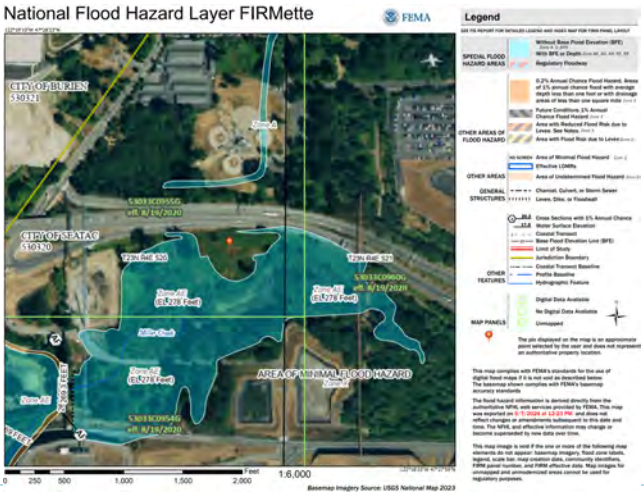
Road Lowest Point:
229' > 226'/227'
Not in FFRMS Floodplain

Appendix B: FFRMS Floodplain Determination: Worksheet

This is a worksheet to assist in the FFRMS floodplain determination process. The spaces below follow the steps identified in this job aid. The case studies provide examples of how to use the table.

Basic Project Information	
Name and Organization of Person Completing the Form:	Kandice Krull - Federal Aviation Administration
Federal Agency (if different from above):	
Project Name:	SEA Sustainable Airport Master Plan Near-Term Projects
Project Type:	S10 - Centralized Receiving & Distribution Center
Critical or Non-Critical Action:	Non-Critical Action
Coastal or Riverine:	Riverine
Select FFRMS Flood Determination Approach (CISA, FVA, 0.2PFA):	FVA

Steps with Images	Recorded Answers
1. Identify and record the site latitude/longitude. 	**47.47408°-122.31277°** **47.47241°-122.31273°** **47.47243°-122.31093°** **47.47410°-122.31103°**

Steps with Images	Recorded Answers
Skip to step 7 if using 0.2PFA 2. Round the elevation(s) down for the most conservative estimate (for FVA or CISA) 	**S10: 308' is lowest elevation**
3. Locate the floodplain zone and BFE if within the Special Flood Hazard Area, or nearest floodplain zone and BFE if action is outside, and round to the value that results in the largest potential floodplain. 	**Zone: Zone AE** **BFE = 278' is highest elevation**

Steps with Images	Recorded Answers
4. Note action characteristics such as service life, criticality, risk tolerance (low, medium, high), and any other hazards of concern (flash floods, erosion).	• Long-term service life • Not a critical action • Area in Zone X but near Zone A floodplain
5. a. Determine the FFRMS flood elevation based on FVA (if applicable).	Non-Critical: BFE + 2' = 278' + 2' = 280' Critical BFE + 3' = 278' + 3' = 281'
b. Determine the FFRMS flood elevation based on simplified CISA (if applicable).	N/A
6. Compare the answer in step 2 to step 5 and determine if the site is in the FFRMS floodplain.	308' > 280'/281' Not in FFRMS Floodplain
7. **For 0.2PFA only**, locate the site in the flood map and determine if it is in 0.2 percent-annual-chance hazard area (if applicable).	

APPENDIX M

Water Resources

References

SEA Stormwater Management Manual, pg 1-8
Port of Seattle Master Specification Section 01 57 13 - Temporary Erosion and Sediment Control Planning and Execution
Section 01 57 23 – Pollution Prevention Planning and Execution
Section 01 59 00 – Construction Water Management System

May 2017
Port of Seattle Aviation Environmental Programs

Seattle Tacoma International Airport
Stormwater Management Manual for Port Aviation Division

Chapter 1
INTRODUCTION

1.1 Objective

The objective of this Manual is to set forth the measures necessary to control the quantity and quality of stormwater produced by new development and redevelopment such that they comply with water quality standards and contribute to the protection of beneficial uses of the receiving waters. Application of the appropriate minimum requirements and Best Management Practices (BMPs) identified in this manual are necessary but sometime insufficient measure to achieve these objectives.

Water quality standards include:

- Chapter 173-200 of the Washington Administrative Code (WAC), Water Quality Standards for Ground Waters of the State of Washington
- Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington
- Chapter 173-204 WAC, Sediment Management Standards

This Manual includes minimum requirements for measures necessary to control stormwater discharges from new development and redevelopment to storm drain systems. This Manual also covers requirements for the discharge of stormwater to the Industrial Waste System (IWS) at Seattle-Tacoma International Airport (STIA).

Volume I of this Manual identifies minimum requirements for development and redevelopment projects of all sizes and provides guidance concerning how to prepare and implement stormwater site plans. These requirements are, in turn, satisfied by the application of Best Management Practices (BMPs) from Volumes II through V. Projects that follow this approach will apply reasonable, technology-based and water-quality-based BMPs to reduce the adverse impacts of stormwater.

The Washington State's (WSDOT) *Aviation Stormwater Design Manual* was also used as guidance when preparing this manual, particularly with respect to the design of flow control and runoff treatment (BMPs) and managing associated wildlife hazards at and around airports.

1.2 Organization of this Manual

1.2.1 Overview of Manual Content

To accomplish the objective described in Section 1.1, the Manual includes the following:

- *Minimum Requirements* that cover a range of issues, such as preparation of Stormwater Site Plans, pollution prevention during the construction phase of a project, control of potential

pollutant sources, treatment of runoff, control of stormwater flow volumes, protection of wetlands, and long-term operation and maintenance. The Minimum Requirements applicable to a project vary depending on the type and size of the proposed project.

- *Best Management Practices (BMPs)* that can be used to meet the minimum requirements. BMPs are schedules of activities, prohibitions of practices, maintenance procedures, managerial practices, or structural features that prevent or reduce adverse impacts to waters of Washington State. BMPs are divided into those for short-term control of stormwater from construction sites, and those addressing long-term management of stormwater at developed sites. Long-term BMPs are further subdivided into those covering management of the volume and timing of stormwater flows, prevention of pollution from potential sources, and treatment of runoff to remove sediment and other pollutants.
- *Guidance on how to prepare and implement Stormwater Site Plans.* The Stormwater Site Plan is a comprehensive report that describes existing site conditions, explains development plans, examines potential off-site effects, identifies applicable Minimum Requirements, and proposes stormwater controls for both the construction phase and long-term stormwater management. The project proponent submits the Stormwater Site Plan to the Port, who use the plan to evaluate a proposed project for compliance with stormwater requirements.

1.2.2 Organization of this Manual

Volume I of this Manual serves as an introduction and covers several key elements for developing the Stormwater Site Plan submittal to the Port. Following this introduction, Volume I contains three additional chapters. Chapter 2 identifies the Minimum Requirements for stormwater management at all new development and redevelopment projects. Chapter 3 describes the Stormwater Site Plan and provides step-by-step guidance on how to develop this plan. Chapter 4 describes the process for selecting BMPs for long-term management of stormer flows and quality. Appendices are included to support these topics. Volume I also includes the Glossary for all five volumes of the Manual.

The remaining volumes of this Manual cover BMPs for specific aspects of stormwater management. Volumes II through V are structured as addendums to the corresponding volumes of the Ecology Manual. **Therefore, project proponents should obtain and review all portions of the Ecology Manual that are referenced in this Manual.**
Volumes II through V of this Manual are organized as follows:

- Volume II of this manual is an addendum that adds to or amends Volume II of the Ecology Manual, which covers BMPs for short-term stormwater management at construction sites.
- Volume III is an addendum to Volume III of the Ecology Manual, which covers hydrologic analysis and BMPs to control flow volumes from developed sites.
- Volume IV is an addendum to Volume IV of the Ecology Manual, which addresses BMPs to minimize pollution generated by potential pollution sources at developed sites.

- Volume V is an addendum to Volume V of the Ecology Manual and presents BMPs to treat runoff that contains sediment or other pollutants from developed sites.

1.3 Applicability to Aviation Properties

This Manual is applicable to projects conducted on areas subject to STIA's individual National Pollution Discharge Elimination System (NPDES) Waste Discharge Permit No. WA-002465-1 (STIA NPDES Permit) as well as other projects on Port Aviation Division property consistent with the provisions and procedures of the Port's building permit process and the Interlocal Agreement with the City of SeaTac. It applies to most types of land development, including commercial, industrial, and roads.

This Manual is based on the Department of Ecology's Stormwater Management Manual for Western Washington (Ecology Manual) (Department of Ecology, 2014) and provides guidance on how the Ecology Manual is to be implemented at the STIA. It integrates requirements of STIA's NPDES Permit, the City of SeaTac interlocal agreement (ILA), and the Des Moines Creek Basin Plan. Administering and implementing development in accordance with the Ecology Manual and this Manual complies with associated elements of the Port's NPDES permit.

The Ecology Manual was originally developed in response to a directive of the Puget Sound Water Quality Management Plan (PSWQA 1987 et. seq.). The Puget Sound Water Quality Authority (since replaced by the Puget Sound Partnership, PSP) recognized the need for overall guidance for stormwater quality improvement. It incorporated requirements in its plan to implement a cohesive, integrated stormwater management approach through the development and implementation of programs by local jurisdictions, and the development of rules, permits and guidance by Ecology.

The Puget Sound Water Quality Management Plan included a stormwater element (SW-2.1) requiring Ecology to develop a stormwater technical manual for use by local jurisdictions. The Ecology Manual was originally developed to meet this requirement. Ecology has found that the concepts developed for the Puget Sound Basin are applicable throughout western Washington.

Information describing how this Manual relates to the Puget Sound Water Quality Management Plan (now the Puget Sound Action Agenda) is included in the Ecology Manual.

The Washington State Department of Transportation (WSDOT) Aviation Stormwater Design Manual was also used as guidance when preparing this manual, particularly with respect to managing wildlife hazards near airports.

1.4 STIA NPDES Permit

STIA has been regulated under an NPDES permit since 1980. The Port of Seattle's NPDES Permit No. WA-002465-1 regulates stormwater discharges associated with industrial and construction activities at the STIA. The STIA NPDES Permit is reissued every five years. The most recent

effective permit can be found on Ecology's website at http://www.ecy.wa.gov/programs/wq/permits/northwest_permits.html. The permit is organized into three sections:

- Part I - applies to Airport Industrial Wastewater System (IWS) discharges to Puget Sound and municipal sewer system.
- Part II - applies to Industrial Stormwater and regulates stormwater from areas associated with airport industrial activities discharging directly or indirectly to Des Moines, Miller, or Walker Creeks, Northwest Pond or Lake Reba.
- Part III - applies to Construction Stormwater, which includes construction stormwater and dewatering water from construction sites that drain to the SDS.

In general, individual NPDES permits authorize discharges from specific outfalls to regulated receiving waters. Therefore, the aerial extent of coverage for each of these parts is determined by the outfalls identified in the permit and their associated subbasins. Every five years when the permit is renewed, the Port and Ecology reexamine the extent of permit coverage and adjust as needed.

The aerial extent of permit coverage as of February 2016 for Parts I and II of the Airport's Individual Permit is shown in Figure I-1.4.1. Because it was not possible to identify construction outfall locations in advance of construction projects, the Port monitors specific stream segments for compliance with construction-related effluent limits (Part III). These segments are specified in the Individual Permit and are illustrated on Figure I-1.4.2 and discussed further in Section 1.7.4.

In addition to authorizing direct discharge to receiving waters, the STIA NPDES permit authorizes the discharge of certain industrial wastewaters to the Midway Sewage Treatment Plant. Authorized discharges to Midway along with monitoring and discharges limitations are described in STIA Permit Part I Condition S1.C.

DUWAMISH RIVER WATERSHED
1ST AVENUE SOUTH
SR 509
NEPL Vault
NEPL Pond
Miller Creek Regional Detention Facility
Lake Reba
SR 518
TUKWILA INTERNATIONAL BOULEVARD
Lora Lake
SDN2/3/4 Pond M
SDN1 Pond
MILLER CREEK WATERSHED
BURIEN
SEATAC
Miller Creek
SDN3X
SDN4X
SDN2X
SDN1
SDN3A
SDN4
SOUTH 156TH STREET
SDN3A (Pond C)
SDN1
SEATAC
TUKWILA
Gilliam Cr.
SDN3
SDW1A (Pond G)
SDW1A
SOUTH 160TH STREET
SDN1
SDE4
SDE4
SOUTH 160TH STREET
SOUTH 160TH STREET
TRACON Pond (West)
160th Loop Pond
SDE4
SDE4
GREEN RIVER WATERSHED
Miller Creek
TRACON Pond (East)
SDE4
SDW1B
SDW1B (Pond D)
SDE4
SDS3
SDE4
SR 509
NORMANDY PARK
BURIEN
Walker Creek
AIRPORT EXPRESSWAY
SDW2
SDW2 (Pond F)
SDS3
WALKER CREEK WATERSHED
DES MOINES CREEK WATERSHED
SDE4
SEA-TAC AIRPORT ARRIVALS
INTERNATIONAL BOULEVARD
SDS6-7A
DES MOINES MEMORIAL DRIVE
BURIEN
SEATAC
SDS3
Bow Lake
SDS6/7 Vault
IWS Lagoon #2
SDS5
SDS6-7B
IWS Lagoon #1
SDS1
SDS1
SDS3
SDS3
SDS3 Vault
SDS3
SOUTH 188TH STREET
SDS2
SDE4 Pond (Enhanced Level 1)
DES MOINES CREEK WATERSHED
IWS Lagoon #3
SDS4
SEPL Pond
SDD05B
GREEN RIVER WATERSHED
SDD05A
Northwest Ponds
SDS4 Pond
28TH AVENUE SOUTH
SDS4-POND
Tyee Pond
SDD06A
Angle Lake
West Branch
East Branch
Learning Center Pond
Des Moines Creek
SDD06A (Logistics Construction Pond)
BURIEN
DES MOINES
SEATAC
DES MOINES
DES MOINES MEMORIAL DRIVE SOUTH
NORMANDY PARK
DES MOINES
SOUTH 200TH STREET
SOUTH 200TH STREET
MILITARY ROAD SOUTH
N

NPDES Permit Application Boundary and STIA Retrofit Area
Storm Drainage Subbasin
Industrial Waste System (IWS) Area
Watershed Boundary
Flow Control Facilities
Conveyance
Stream
Surface Waterbody
City Limit

FIGURE I-1.4.1
STIA Retrofit Area and Storm Drainage System Subbasins
Volume I - Minimum Technical Requirements and Site Planning

0 700 1,400
Feet

MAP BY: Aspect CONSULTING
Port of Seattle

Tub Lake
DUWAMISH RIVER WATERSHED
SR 509
TUKWILA INTERNATIONAL BOULEVARD
L28
L28-A
L28-B
NEPL Pond
NEPL Vault
Miller Creek Regional Detention Facility
M14
M14-A
Lake Reba
Lora Lake
Pond M
L30
L30-A
L30-B
L30-C
L30-D
L30-E
SDN1 Pond
SR 518
MILLER CREEK WATERSHED
Miller Creek
M15
M15-A
M15-B
M16
M16-A
L29
L29-A
G28
G28-A
SDN3A (Pond C)
M17
M17-A
Gilliam Cr.
G26
G27
G27-A
SDW1A (Pond G)
TRACON Pond (West)
M19
M19-A
160th Loop Pond
GREEN RIVER WATERSHED
M18
M18-A
TRACON Pond (East)
Miller Creek
M20
M20-A
M21
M21-A
SDW1B (Pond D)
Walker Creek
W22
W22-A
SDW2 (Pond F)
W23
W23-B
W24
W24-A
AIRPORT EXPRESSWAY
INTERNATIONAL BOULEVARD
DES MOINES CREEK WATERSHED
WALKER CREEK WATERSHED
D29
Bow Lake
1ST AVENUE SOUTH
SDS6/7 Vault
IWS Lagoon #2
IWS Lagoon #1
SDS3 Vault
D10
D10-A
D-10B
SDE4 Pond (Enhanced Level 1)
SOUTH 188TH STREET
IWS Lagoon #3
D11
D11-A
SEPL Pond
D9
Northwest Ponds
D5
D5-A
D5-B
D4
D4-A
SDS4 Pond
D12
D12-A
D12-B
East Branch
Tyee Pond
SDD06A (Logistics Construction Pond)
West Branch
Des Moines Creek
D13
D13-A
D13-B
Learning Center Pond
D7
D7-A
Angle Lake
ORILLIA ROAD SOUTH
122°20'0"W 47°28'30"N
122°19'45"W
122°19'30"W
122°19'15"W
122°19'0"W
122°18'45"W
122°18'30"W
122°18'15"W
122°18'0"W
122°17'45"W
122°17'30"W
122°17'15"W
122°17'0"W
122°16'45"W 47°28'30"N
47°28'15"N
47°28'0"N
47°27'45"N
47°27'30"N
47°27'15"N
47°27'0"N
47°26'45"N
47°26'30"N
47°26'15"N
47°26'0"N
47°25'45"N
47°25'30"N
122°20'0"W 47°25'15"N
122°16'45"W 47°25'15"N
N

Industrial Waste System (IWS) Area
Watershed Boundary
Flow Control Facilities
Surface Waterbody
Conveyance
Stream

122°20'0"W 47°28'30"N
15 Arc-Second Latitude/Longitude Grid
(coordinates represent the center of each cell row/column)

W22 W22-A
Grid Cell with Permitted Outall(s)

FIGURE I-1.4.2
STIA NPDES Construction Permit Coverage
Volume I - Minimum Technical Requirements and Site Planning

0 750 1,500
Feet

MAP BY: Aspect CONSULTING
Port of Seattle

1.5 STIA Stormwater Management Systems

Stormwater at STIA is collected by one of two drainage systems: the stormwater drainage system (SDS) and the IWS. The following paragraphs describes each system and provides the general rules for determining into which system a project must drain. Under some circumstances, the Port may require the stormwater runoff from a site to drain to the sanitary system. The project proponent shall contact the Port's Environmental Program Manager to confirm which system is appropriate for their project.

1.5.1 Industrial Waste System

The IWS consists of a collection and conveyance system, a high and low strength BOD waste stream segregation system, three storage lagoons, an industrial wastewater treatment plant (IWTP) that includes dissolved air flotation, a direct discharge to Puget Sound through the Midway Sewer District's outfall and an alternate discharge to King County's Renton Treatment plant for the high strength BOD waste stream.

IWS flow is runoff collected from the North and South Service Basins which mainly consists of stormwater runoff from terminal air cargo, deicing areas, hangars, and maintenance areas. Due to the nature of activities in these areas, the water collected has variable levels of spilled fuel, de-icing/frost chemicals, and wash water and other minor process water sources. These flows are collected in a drain system and conveyed to the storage lagoons for subsequent treatment in the IWTP.

The IWTP was originally designed and constructed in 1963/1964 for the purpose of capturing and treating fuel spills. Since then, its storage and DAF treatment capacity has been enlarged. Most recently, the high and low strength BOD waste stream segregation system and alternate discharge to King County's Renton Treatment Plant have been added in compliance with AKART for aircraft deicing fluids and associated stormwater. The STIA NPDES Permit Part I defines effluent limits for low strength BOD waste streams discharging to Puget Sound.

The IWS utilizes the Midway Sewer District's Des Moines Creek Wastewater Treatment Plant (WWTP) outfall for low strength BOD discharges to Puget Sound. The outfall is covered under NPDES Waste Discharge Permit No. WA0020958. In 2002 URS prepared an Outfall Modeling Technical Memorandum No. 1 (TM-1) that documented mixing zone and hydraulics analyses performed in support of the Des Moines Creek WWTP Outfall Project for the Midway Sewer District (District) and identified the design criteria established for the new diffuser design. The outfall, now completed and in use, serves both the District and STIA's IWTP.

Subsequent to the preparation of TM-1, the original modeling was updated using the most current dilution modeling software. The September 2006 addendum was prepared to provide an updated mixing zone analysis for the final diffuser configuration to verify compliance with water quality standards in the mixing zone limits in accordance with the requirements of the NPDES discharge permits.

Based on the results of the reasonable potential calculations using the model-derived dilution factors and effluent analysis, the new outfall diffuser was found to provide adequate mixing to meet Washington State water quality standards. The final dilution factors to be applied for the new outfall were determined to be 72 for the acute boundary and 202 for the chronic boundary based on year 2020 District flows and maximum IWTP flows. These dilutions translate to an acute critical effects concentration (ACEC) of 1.4% and a chronic critical effects concentration (CCEC) of 0.50% for whole effluent toxicity (WET) bioassays for both the District and IWTP discharges. Appropriate BMPs for IWS operations are included in STIA's *Stormwater Pollution Prevention Plan* (SWPPP). The most current version of the SWPPP can be downloaded at http://www.portseattle.org/Environmental/Water-Wetlands-Wildlife/Stormwater/Documents/STIA_SWPPP_current.pdf.

1.5.2 Stormwater Drainage System

Part II of the permit covers stormwater associated with approximately 1,200 acres of the stormwater drainage system. Stormwater runoff is from roads, runways, taxiways, airfield, rooftops, cargo operations, flight kitchens, and other areas associated with airport industrial activities. Stormwater runoff is treated using ponds, grass swales, and other passive stormwater treatment methods. Treated stormwater discharges to freshwater streams, wetlands, and lakes around the airport.

The Airport stormwater management system underwent significant modifications over the last 15 years in response to NPDES permit conditions and requirements of a Section 401 Water Quality Certification issued in association with the 1997 Master Plan Update (MPU). A number of studies and planning documents were completed to enable these modifications. Significant studies and planning documents relevant to the current Airport stormwater management system and this Manual are described below.

1.5.2.1 Comprehensive Stormwater Management Plan

The Comprehensive Stormwater Management Plan (CSMP) (Parametrix 2001) provided a management plan of stormwater quantity and quality as required to mitigate potential effects to the environment from the 1997 MPU improvements at STIA.

Two documents were prepared that amend the CSMP: *Proposed Design Refinements to the Comprehensive Stormwater Management Plan Master Plan Update Improvements Seattle-Tacoma International Airport Des Moines Creek Basin* (Parametrix, August 2004) and *Proposed Design Refinements to the Comprehensive Stormwater Management Plan Master Plan Update Improvements Seattle-Tacoma International Airport Miller/Walker Creek Basins* (Parametrix, June 2005).

The Des Moines Creek amendment allowed the use of the Des Moines Creek Basin Plan's Regional Detention Facilities that modified the flow control requirements for the Des Moines Creek basin, refined land use assumptions used for analysis, and provided other design refinements for various other facilities described in the CSMP.

READ THIS FIRST

The Design Engineer shall modify this specification to address project specific needs.

Changes to this specification shall be approved by the Erosion Control / Stormwater Engineer.

This specification is for all Port of Seattle construction including Maritime and Airport projects. Designer to verify with Maritime Environmental or Aviation Environmental groups if there are additional environmental permit requirements.

Maritime projects located within the City of Seattle must comply with City of Seattle Stormwater Code SMC 22.800 – 22.808.

Maritime projects that discharge only to the Port Municipal Separate Storm Sewer System (MS4) must be reviewed by Maritime Environmental.

All Maritime projects must be designed and completed pursuant to City of Seattle Stormwater Code SMC 22.800 – SMC 22.808 as required by the Port of Seattle's Phase I National Pollutant Discharge Elimination System (NPDES) Permit WAR044701. Each project must comply with the City of Seattle Stormwater Code 22.805.020.D Minimum Requirements for Construction Site Stormwater Pollution Prevention Control. Evaluate applicability of best management practices (BMPs) from City of Seattle Stormwater Manual Volume 2 Construction Stormwater Control and Volume 4 Source Control, and include in the Construction Stormwater Control Plan (CSCP) or Pollution Prevention Plan as required.

Note specific requirements related to the amount of new plus replaced hard surface for the project and consider exemptions for pavement maintenance, utility facilities and railroad maintenance.

≥750 square feet: Submit project for Port of Seattle Stormwater Design Review or City of Seattle Drainage Control Review (dependent on project discharge location)

≥1,500 square feet: Complete on-site stormwater management evaluation

≥5,000 square feet: Stormwater treatment BMP required

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any "Notes" boxes such as this one--you should remove these "Notes" sections as you go. Also, do a search for all bracket characters " [ ] " as they are used to show you areas containing options or project specific details (you can use Microsoft Word's Find feature {Ctrl-F} to jump to an open bracket " [" character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document's built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style "Numbered Material" and can be promoted (Tab) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the "Numbered Material" format.

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. This item shall consist of planning, installing, inspecting, maintaining, upgrading and removing temporary erosion and sediment control Best Management Practices (BMPs) as shown in the Contract Documents, in the Contractor's Erosion and Sediment Control Plan (CESCP), or as ordered by the Engineer to prevent pollution of air and water, and control, respond to, and manage eroded sediment, turbid water and process water during the life of the contract.

Paragraph B: THIS IS NOT USED OFTEN BUT IS USEFUL FOR PROJECTS INVOLVING A LARGE VOLUME OF PROCESS WATER SUCH AS IN HYDRODEMOLITION. Delete if not needed.

B. This project shall be managed as a no discharge project. All stormwater shall be diverted away from work areas. All project and process water shall be collected, stored and discharged off Port property.

C. This work shall apply to all areas associated with contract work including, but not limited to the following:

1. Work areas
2. Equipment and material storage areas
3. Staging areas
4. Stockpiles
5. Access Roads

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

A. The following rules, requirements and regulations specified may apply to this work:

1. Surface Water Design Manual, King County, Department of Natural Resources, (Current Edition).
2. Washington State Department of Ecology Stormwater Management Manual for Western Washington (2014), Vol. 2 Washington State Stormwater Quality Standards (WAC 173-201A).
3. National Pollution Discharge Elimination System (NPDES) Waste Discharge Permit No. WA 002465-1.
4. Port of Seattle Regulations for Airport Construction (current edition).
5. Sea-Tac International Airport Rules and Regulations (current edition).

Some Airport Projects- Projects with one or more acres of disturbance may need to obtain this permit. Typically the Port obtains and transfers coverage to the Contractor.

Verify if applicable.

6. Construction General NPDES Permit #[ ]

1.03 SUBMITTALS

A. As part of the required Preconstruction Submittals, Section 01 32 19 - Preconstruction Submittals and before Notice to Proceed is given, the Contractor shall submit the following:

1. Contractor Erosion and Sediment Control Plan (CESCP)

(1) Including CESCL Certification Cards and ECL Qualifications

Add or Remove items to make this section project specific.

B. The following shall be submitted in accordance with Section 01 33 00 – Submittals:

1. Oil Absorbent Pads
2. Silt Fence
3. Straw Wattle
4. Erosion Control Blanket
5. Bonded Fiber Matrix
6. Catch Basin Protection
7. Temporary Piping Connections / Plugs
8. Construction Limits Fencing
9. Wheel Wash
10. Geotextile Fabric Check Dam
11. Plastic Sheeting
12. Temporary Organic Mulch
13. Water Filled Diversion Berm
14. Biofence

PART 2 MATERIALS

2.01 PROJECT INFORMATION

2.02 PREPARATION FOR MATERIALS

2.03 FABRICATION, PRODUCTION, & SUPPLY OF MATERIALS

2.04 MATERIAL REQUIREMENTS

Add/remove items to make this section project specific

A. GENERAL:

A. All products used to construct the Contractor selected BMPs shall be suitable for such use and submitted to the Engineer for approval.

B. OIL ABSORBENT PADS:

A. Oil absorbent pads shall be made of white, 100% polypropylene fabric that absorbs oil-based fluids and repels water-based fluids. Each pad shall be a

minimum of 15x19 inches in size and absorb no less than 50 ounces of oil-based fluids.

C. TESC – ASPHALT CURB & ASPHALT BERM:

A. Asphalt curb and asphalt berm shall be constructed as directed by the Engineer. The asphalt concrete shall meet the requirements of Section 32 12 16 – Bituminous Concrete Pavement.

D. SILT FENCE:

A. Geotextile material shall meet the requirements of WSDOT Specification Section 9-33 Table 6. Geotextile material shall be backed by 2”x4” wire mesh and shall be attached to steel “T” posts using wire or zip ties. Dimensions and spacing shall be as detailed on the drawings.

E. STRAW WATTLE:

A. Wattles shall consist of cylinders of biodegradable plant material, such as straw, coir, or compost encased within biodegradable or photodegradable netting. Wattles shall be a minimum of 5 inches in diameter, unless otherwise specified. Encasing material shall be clean, evenly woven, and free of debris or any contaminating material, such as preservative and free of cuts, tears or damage. Compost filler shall meet material requirements specified in WSDOT Section 9-14.4(8) Coarse Compost. Straw filler shall be 100% free of weed seeds.

F. EROSION CONTROL BLANKET:

A. Erosion Control Blanket shall meet the requirements of WSDOT Specification Section 9-14, paragraph 9-14.5(2) “Erosion Control Blanket”. Installation in ditches and swales shall be per WSDOT Standard Plan I-60.20-00 “Erosion Control Blanket Placement in Channel”. Installation on slopes shall be per WSDOT Standard Plan I-60.10-00 “Erosion Control Blanket Placement on Slope”.

G. BONDED FIBER MATRIX SOIL STABILIZATION:

A. Bonded Fiber Matrix soil stabilization shall be labeled as such on the unopened bags furnished by the manufacturer. Bonded fiber matrix shall be installed with seed and fertilizer included in the homogenous mix. Seeding shall be as specified in Section 32 92 19.16 – Hydroseeding for Erosion Control and Landscaping.

H. CATCH BASIN PROTECTION:

A. Catch basin protection shall be designed and installed for the purpose of preventing sediment from entering the storm system. Protection shall:

B. Be constructed of non-woven geotextile fabric with sewn seams;

C. Contain a built-in lifting strap;

D. Have a built-in, high flow bypass;

Be sized such that all water draining to the catch basin flows into the insert and does not flow directly into the storm drain.

E. Catch basin covers shall be 30 mil PVC liner material.

I. TEMPORARY PIPING/CONNECTIONS:

A. Temporary piping shall meet the requirements of the storm drain pipe as specified in Section 33 41 13 – Pipe for Storm Drains and Culverts. Temporary catch basin shall meet the requirements of Section 33 49 13 – Manholes, Catch Basins, Inlets and Inspection Holes.

J. TEMPORARY PIPING PLUGS:

A. Installation in Pipe/Structure to be Demolished/Abandoned. Plug shall be concrete as specified in Section 03 30 00 – Cast-in-Place Concrete.

B. Installation in Pipe/Structure to Remain. Plug shall be a mechanical secured plug.

K. STORMWATER STORAGE TANK:

A. The tank shall be a fixed axle weir tank with a minimum 21,000 gallon.

L. STORMWATER STORAGE TANK PADS:

A. The stormwater storage tank pads shall be as detailed on the drawings.

M. CONSTRUCTION LIMITS FENCING:

A. Fencing material shall be standard size orange plastic mesh construction safety fence. Posts shall be steel “T” posts.

N. ROCK CHECK DAMS:

A. Rock check dams shall be constructed of quarry spalls per the details shown in the project drawings and as specified in Section 31 23 00 - Excavation and Embankment.

O. STABILIZED CONSTRUCTION ENTRANCE

A. Stabilized construction entrance(s) shall be constructed of stabilization geotextile fabric and quarry spalls as specified in Section 31 23 00 – Excavation and Embankment.

P. WHEEL WASH

A. The wheel wash shall be a high water pressure, low water volume system long enough to allow for at least two full tire rotations. Spray nozzles shall be directed at inner and outer side walls for all tires including duals, all treads from two directions, wheel wells and flaps, and truck sides up to the bottom of the windshield. For water line material and construction requirements shall be as specified in Section 33 10 00 – Water Distribution.

Q. GEOTEXTILE FABRIC CHECK DAMS

A. Geotextile check dam shall be a urethane foam core encased on Geotextile material. The minimum length of the unit shall be 7 feet. The foam core shall be a minimum of 8 inches in height, and have a minimum base width of 16 inches. The geotextile material shall overhang the foam by at least 6 inches at each end, and shall have apron type flaps that extend a minimum of 24 inches on each side of the foam core. The geotextile material shall meet the requirements for silt fence.

R. PLASTIC SHEETING

A. Plastic sheeting shall be clear, reinforced, and a minimum of 6 mil thick. Sandbags or other Engineer-approved material shall be used to secure the plastic sheeting in place. Black plastic may be used to cover stockpiles.

S. TEMPORARY ORGANIC MULCH

A. Temporary organic mulch shall consist of straw, wood chips, hog fuel, compost or other material approved by the Engineer.

T. WATER FILLED DIVERSION BERM

A. Berm shall be a minimum 6 inches high and 10 feet long and made of 10 mil polyurethane or 22 oz. PVC.

U. BIOFENCE

A. Biofence shall consist of 7 ounce or heavier uncoated burlap fabric at least 36 inches wide and 100 feet long. Wood stakes dimensions shall be a minimum 1 1/8 x 11/8 inches by 42 inches high.

2.05 MATERIAL HANDLING, DELIVERY, & STORAGE

2.06 DELIVERABLES

2.07 QUALITY ASSURANCE

PART 3 EXECUTION

3.01 PROJECT INFORMATION

A. GENERAL

1. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

2. No discharge of water shall be allowed that increases volume, velocity, or peak flow rate of receiving water background conditions, or that does not meet state of Washington water quality standards.

3. The Contractor's Erosion and Sediment Control Plan (CESCP) required by this section shall be based upon the Temporary Erosion and Sediment Control (TESC) requirements of the contract but shall specifically phase, adjust, improve and incorporate the TESC requirements into the Contractor's specific schedule and plan for accomplishing the work. The CESCP shall be modified as changes are made to improve, upgrade and repair best management practices used by the Contractor and as the work progresses and TESC needs change.

4. The Contractor shall be wholly responsible for control of water onto and exiting the construction site and/or staging areas, including groundwater, stormwater, and process water. Stormwater from offsite shall be intercepted and conveyed around or through the project and shall not be combined with onsite construction stormwater.

5. Design of, and modifications to, project hydraulic conveyances, detention facilities, and TESC plan sheets shall be stamped by a Professional Engineer (P.E.) licensed by the State of Washington. All other changes to the CESCP shall be signed by the ECL.

B. PROJECT REQUIREMENTS

1. DESCRIPTION OF WORK

a. In order to comply with the requirements of this section, the Contractor shall:

(1) Develop the Stormwater Pollution Prevention Plan (SWPPP) and submit a Contractor's Erosion and Sediment Control Plan (CESCP). The CESCP shall, at a minimum, include and address the following:

(a) Site Description and Drawings

(b) Contractor Erosion and Sediment Control Personnel

(c) Schedule and Sequencing

(d) BMP Installation

(e) BMP Maintenance

(f) BMP Inspection

(g) Record keeping

(h) BMP Removal

(i) Emergency Response

(j) Construction Dewatering

(k) Fugitive Dust Planning

(l) Utilities Planning

(m) Education

(2) Revise and modify the CESCP during the life of the contract and maintain records.

(3) Install, maintain, and upgrade all erosion prevention, containment, and countermeasures BMPs during the life of the contract, and removal at the end of the project.

(4) Contain, cleanup and dispose of all sediment and convey turbid water to existing or proposed detention/treatment facilities.

(5) Perform other work shown on the project drawings, in the Contractor Erosion and Sediment Control Plan, or as directed by the Engineer.

(6) Inspect to verify compliance with the CESCP requirements including BMPs; facilitate, participate in, and implement directed corrective actions resulting from inspections conducted by others including outside Agencies and Port employees/consultants.

(7) Educate all Contractor and sub-contractor staff about environmental compliance issues at weekly meetings and document attendance and content.

2. DEFINITIONS

   a. Process Water: All water including, but not limited to, that used for washing, cleaning, fire proofing and hydrodemolition is defined by the Department of Ecology as “process water” and shall be collected and disposed of in a manner that complies with all local, state and federal regulations. Disposal tickets shall be provided to the Engineer.

      (1) Process water shall not be discharged to the IWS or SDS

3. PERMITS

   a. Work shall be conducted in accordance with NPDES permit No. WA- 002465-1.

When the project requires a Construction General NPDES Permit and the contractor is to be completely responsible for compliance, the Port will obtain the permit and contractor shall have to accept transfer of permit from the Port. Otherwise delete paragraph below.

   b. The Contractor shall accept from the Owner complete transfer of Construction General NPDES Permit #[ ]. The Contractor shall submit a signed Notice of Transfer before Notice to Proceed. The form can be obtained at: http://www.ecy.wa.gov/biblio/ecy02087a.html

4. ADMINISTRATIVE REQUIREMENTS

   a. The provisions of this section shall apply to the Contractor, subcontractors at all tiers, suppliers and all others who may have access to the work site by way of the contractor’s activities.

   b. Failure to install, maintain, and/or remove BMPs shown on the drawings, in the approved Contractor Erosion and Sediment Control Plan and specified herein, or by order of the Engineer; or failure to conduct project operations in accordance with Section 01 57 13 - Temporary Erosion and Sediment Control Planning and Execution will result in the suspension of the Contractor's operations by the Engineer in accordance with Section 00 70 00 - General Conditions.

   c. The Contractor shall be solely responsible for any damages, fines, levies, or judgments incurred as a result of Contractor, subcontractor, or supplier negligence in complying with the requirements of this section.

   d. Any damages, fines, levies, or judgments incurred as a result of Contractor, subcontractor, or supplier negligence in complying with the requirements of this section will be deducted from payment due by Modification.

   e. Any time and material costs incurred by the Port due to damages, fines, levies, or judgments incurred as a result of Contractor,

subcontractor, or supplier negligence in complying with the requirements of this section will be deducted from payment due by Modification.

f. The Contractor shall be solely responsible for any schedule impacts from damages, fines, levies, judgments, or stop work orders incurred as a result of Contractor, subcontractor, or supplier negligence in complying with the requirements of this section. The project schedule will not be changed to accommodate the time lost.

Add/remove items to make this section project specific

g. Contractor shall not clear, grub, grade, demolish, or perform any earthwork after Notice to Proceed until the following has been installed per the project drawings, the approved Contractor Erosion and Sediment Control Plan, or as directed by the Engineer:

(1) Silt Fence or other perimeter controls are in place.

(2) Areas not to be disturbed are delineated with construction fence.

(3) Temporary ponds and ditches are installed and vegetated or covered.

(4) Permanent ponds used for sediment control during construction have been installed and vegetated or covered and modified with riser.

(5) Water flows from off site are tight lined and directed away from work area.

(6) All construction entrances are stabilized and wheel wash systems in place and operational.

(7) Catch basin inserts are installed in all catch basins that receive drainage from the Work area and haul roads.

(8) Stormwater storage tanks are located onsite to provide for additional storage volume and/or treatment volume required for treatment by settlement.

(9) Materials on hand, in quantities sufficient to cover all bare soil, divert all flows, contain all sediments, and prevent turbid discharges from the site during all stages of construction. These materials include, but are not limited to the following:

(a) Reinforced 6 mil plastic sheeting

(b) Straw Wattles

(c) 6” pipe

(d) 8” pipe

(e) Sand bags, filled

(f) Wire-backed silt fence

(g) Steel “T” posts

5. AUTHORITY OF ENGINEER

a. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing, excavation, and fill operations, and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, wetlands or other areas of water impoundment.

b. In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or are ordered by the Engineer, such work shall be performed by the Contractor at his/her own expense.

c. The Engineer may increase or decrease the area of erodible earth material to be exposed at one time as determined by analysis of project conditions.

d. In the event that areas adjacent to the work area are suffering degradation due to erosion, sediment deposit, water flows, or other causes, the Engineer may stop construction activities until the situation is rectified.

e. In the event that the Washington State Department of Ecology issues an Inspection Report, a Notice of Non-Compliance, Notice of Violation or Enforcement Action, the Engineer may stop all construction activities until it has been determined that the project is in compliance. The Engineer may require the Contractor to send additional staff to successfully complete Contractor Erosion and Sediment Control Lead (CESCL) training before construction activities may begin. The number of working days will not be changed to accommodate the work stoppage. All costs associated with work stoppages, mitigation of the event, and/or training shall be paid by the Contractor.

f. In the event that the Contractor discharges storm water, ground water, or process water to storm drains, ditches, gutters or any conveyance that discharges to a receiving water as defined by the Department of Ecology without prior approval of the Engineer, the Engineer may stop all construction activities and require additional Contractor staff training and may require that all parties involved in the unapproved discharge be removed from the project for a time determined by the Engineer. The project schedule will not be changed to accommodate the time lost. All costs associated with mitigation of the unauthorized discharge, work stoppages, training and/or removal of personnel from the project shall be paid by the Contractor.

6. COORDINATION MEETINGS

a. The Contractor shall be available, at a minimum, for a weekly coordination meeting with the Engineer, other Port Staff and outside agency representatives to review the ongoing contract work for compliance with the provision of this specification.

b. The Contractor's Erosion Control Lead (ECL) shall attend a quarterly environmental staff meeting scheduled by the Erosion Control/Stormwater Engineer to discuss and resolve relevant environmental, stormwater and erosion control issues on Port of Seattle projects.

3.02 PREPARATION FOR EXECUTION OF WORK

A. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

1. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP). The contents of a construction SWPPP may vary with the amount of new or replaced impervious surface, acres of land disturbing activity and the classification of water.

2. The Contractor shall prepare a CESCP. The contents of a CESCP may vary with the amount of new or replaced hard surface, acres of land disturbing activity and the classification of water. The CESCP shall comply with the Director's Rules based on the City of Seattle "Stormwater Code", SMC Chapters 22.800 through 22.808, and must contain enough detail to demonstrate controls sufficient to determine compliance with City of Seattle Stormwater Code SMC 22.805.020.D.

Note to Designer: Verify all conditions of the Seattle Stormwater Code are met with the requirements in this specification. http://www.seattle.gov/dpd/Codes/default.asp#construction Adjust as needed.

3. The SWPPP shall consist of the following documents:

a. Temporary Erosion and Sediment Control Plan sheets in the Contract documents;

b. Section 01 57 13 - Temporary Erosion and Sediment Control Planning and Execution;

c. Section 01 57 23 - Pollution Prevention, Planning and Execution;

d. Contractor's Erosion and Sediment Control Plan (CESCP), submitted by the Contractor;

e. Pollution Prevention Plan per Section 01 57 23, submitted by the Contractor;

Typically for Airport projects, the Port develops the Storm Water Monitoring Plan. Coordinate with PM and make selection below. If Contractor developed, add this plan to Submittal section and include requirements for plan as 3.02 B

f. Construction Storm Water Monitoring Plan, developed by the [Port] [Contractor].

4. Contractor's Erosion And Sediment Control Plan (CESCP)

In order to comply with these requirements, the Contractor shall include and address the following in the CESCP portion of the SWPPP:

a. Site Description and Drawings

(1) Included in the CESCP shall be a written description of the construction site, including location of staging areas, stockpile areas, material storage areas, natural and constructed drainage systems within the work area and staging areas, and proximity to other construction projects.

(2) Drawings shall be included in the CESCP which show the location of the construction site, including location of staging areas, stockpile areas, material storage areas, natural and constructed drainage systems within the work area and staging areas, and proximity to other construction projects.

(3) The drawings shall show locations of BMPs during each phase of construction as identified by the Contractor in the Project Schedule.

(4) The drawings and written description shall detail temporary stormwater conveyance facilities and other measures proposed by the Contractor to limit the contributing drainage areas to not exceed the capacity of each of the stormwater ponds.

Adjust qualifications depending on the complexity of the project. At a minimum, a ECL is required.

b. Contractor Erosion and Sediment Control Personnel

(1) The Contractor shall designate sufficient employees as the responsible representatives in charge of erosion and sedimentation control. These employees' responsibility will be the oversight of all water and air quality issues.

(2) The designated employees responsible for erosion and sedimentation control as discussed above shall be the Erosion Control Lead(s) (ECL) responsible for developing, maintaining and modifying the CESCP for the life of the Contract and ensuring compliance with all requirements of this section.

(3) An ECL shall be onsite at all times when any work activity is taking place. An ECL shall be required for each shift.

(4) The ECL shall be qualified in the preparation of erosion and sediment control plans, in the installation, inspection, monitoring, maintenance of BMP's, and documentation required for NPDES permits as well as sensitive resource identification, water treatment, and restoration and stabilization of unstable slopes, shorelines, stream banks, and wetlands.

(5) The ECL shall have authority to direct all Contractor and sub-contractor personnel.

(6) The ECL shall have no other duties aside from developing, maintaining, modifying, inspecting, implementing the CESCP and ensuring compliance with all requirements of this section, and, all other environmental regulations, or as directed by the Engineer.

(7) Qualifications of the ECL shall be as follows:

Complex projects may require minimum training at the CPESC level – coordinate with Erosion Control/Stormwater Engineer to determine.

(a) Have successfully completed Contractor Erosion and Sediment Control Lead (CESCL) training given by a Washington State Department of Ecology-approved provider, and have five years experience in construction site erosion and sediment control regulatory requirements and BMPs, erosion and sediment control plan development, and stormwater/water quality monitoring, or

(b) Currently certified as a Certified Professional in Erosion and sediment Control (CPESC) offered by CPESC, Inc. (www.cpesc.org) and have one year experience in state of Washington construction site erosion and sediment control regulatory requirements and BMPs, erosion and sediment control plan development and stormwater monitoring.

(8) The ECL shall also have done the following:

(a) Coordinated, developed, and implemented erosion and sediment control plans for NPDES permit compliance in the State of Washington.

(b) Completed at least two erosion and sediment control plans for earthwork projects.

(c) Developed phased construction work schedules addressing all ground disturbing activities.

(d) Designed temporary and permanent erosion and sediment control measures (BMPs) during clearing, demolition, existing road improvement, and for emergency situations.

(e) Designed excavation dewatering plans.

(f) Designed plans for dust abatement, embankment stabilization, and restoration

(g) The Contractor shall submit for approval all documentation listed above necessary to prove ECL qualifications including but not limited to resumes, certificates, degrees, recommendation letters, and plan examples.

(9) Duties and responsibilities of the ECL shall include:

(a) Maintaining permit file on site at all times which includes the the SWPPP, and any associated permits and plans;

(b) Directing BMP installation, inspection, maintenance, modification, and removal;

(c) Shall be onsite at all times when work is taking place.

(d) Availability 24 hours per day, 7 days per week by telephone throughout the period of construction;

(e) Updating all drawings with changes made to the plan;

(f) Keeping daily logs, one report per ECL is to be submitted;

(g) Prepare and submit for approval a Contractor Erosion and Sediment Control Plan (CESCP) as part of the SWPPP;

(h) Immediately notify the Engineer should any point be identified where storm water runoff potentially leaves the site, is collected in a surface water conveyance system (i.e., road ditch, storm sewer), and enters receiving waters of the State;

(i) If water sheet flows from the site, identify the point at which it becomes concentrated in a collection system.

(j) Inspect CESCP requirements including BMPs as required to ensure adequacy; facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies, Port employees, and Port consultants.

(k) Set up and maintain a construction stormwater monitoring plan that includes monitoring locations and procedures. At a minimum, the plan will include monitoring points everywhere construction stormwater discharges from the project.

(l) The ECL shall have authority to act on behalf of the Contractor.

(m) The CESCP shall include the name, office and mobile telephone numbers, fax number, and address of the designated ECL and all Contractor personnel responsible for erosion and sediment control.

(n) In addition to the ECL, at a minimum, the Contractor's superintendent, foremen, and lead persons shall have successfully completed "Contractor Erosion and Sediment Control Lead" (CESCL) training given by a Washington State Department of Ecology-approved provider. On matters concerning erosion control, they shall report to the ECL.

c. Schedule and Sequencing

(1) Schedules for accomplishment of temporary and permanent erosion control work, that include as a minimum all specific work items as are applicable for clearing and grubbing; grading; construction; paving; structures at watercourses, sawcutting, and dewatering, underground utilities; Stormwater conveyances, and seeding.

(2) Proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials;

(3) Estimated removal date of all temporary BMPs;

(4) Estimated date of final site stabilization.

(5) Dates of earthwork activities.

(6) Dates when construction activities temporarily or permanently cease on any portion of the site.

(7) Dates when any stabilization measures are installed.

(8) Dates when structural BMPs are initiated.

(9) Dates for all work performed within 200 feet of sensitive environmental areas including wetlands, streams and ponds.

(10) Erosion control work activities consistent with the CECSP shall be included in the Project Schedule for each work area and project activity as shown on the drawings.

d. BMP Installation

(1) The CESCP shall include installation instructions and details for each BMP used during the life of the Project;

(2) To prepare or modify Contractor's Erosion and Sediment Control Plans, use BMPs from the Washington State Department of Ecology, Stormwater Management Manual for Western Washington, Vol. 2, and (Current Version). May be downloaded at: http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

(3) The ECL shall certify that all BMP installers are trained in proper installation procedures.

e. BMP Maintenance

(1) The CESCP shall include a description of the maintenance and inspection procedures to be used for the life of the project.

(2) BMPs shall be maintained for the life of the project, the completion of a work phase and/or until removed by direction of the Engineer;

(3) BMPs shall be maintained during all suspensions of work and all non-work periods;

(4) BMPs shall be maintained and repaired as needed to assure continued performance of their intended function and in accordance with the approved CESCP;

(5) Sediments removed during BMP maintenance shall be placed away from natural and constructed storm water conveyances and permanently stabilized.

(6) All maintenance shall be completed within 24 hours of inspection

f. BMP Inspection

(1) The ECL shall inspect all TESC best management practices daily during workdays and anytime 0.5" of rainfall has occurred within 24 hours on weekends, holidays, and after hours. Rainfall amounts can be determined by contacting the National Weather Service. .

(2) Deficiencies identified during the inspection shall be corrected within 24 hours or as directed by the Engineer.

(3) Observe runoff leaving the site during storms, checking for turbid water;

(4) Implement additional BMPs, if needed, to address site-specific erosion control;

(5) Inspect streets surrounding site for dirt tracking;

(6) Inspect for dust.

(7) The ECL shall visually inspect all stormwater runoff that discharges from the project for petroleum or chemical sheen, or “rainbow”. Occurrences of sheen shall be reported immediately to the Engineer and shall follow procedures specified in Section 01 57 23 – Pollution Prevention, Planning & Execution.

(8) The ECL shall collect samples and test all stormwater runoff that discharges from the project for turbidity using a calibrated turbidimeter, and for pH using test strips that measure from pH 0 - 14. Turbidity that exceeds 25 NTUs or pH that is below 6.5 or above 8.5 shall be reported immediately to the Engineer.

g. Record keeping

(1) Reports summarizing the scope of inspections, the personnel conducting the inspection, the date(s) of the inspection, major observations relating to the implementation of the CESCP, and actions taken as a result of these inspections shall be prepared and retained as a part of the CESCP;

(2) All inspection reports shall be kept on-site during the life of the project and available for review upon request of the Engineer.

(3) Copies of all inspection records and updated CESCP shall be submitted to the Engineer weekly.

(4) The CESCP shall include the Contractor’s inspection form which includes the following:

(a) All best management practices to be inspected and monitored for all work areas and work activities identified in the schedule for the life of the contract.

(b) Inspection time and date.

(c) Weather information including current conditions, total rainfall since last inspection and rainfall in the 24 hours prior to the current inspection.

(d) Locations of BMPs inspected.

(e) Locations of BMPs that need maintenance and reasons why.

(f) Locations of BMPs that failed to operate as designed or intended.

(g) Locations where additional or different BMPs are needed and reasons why.

(h) A description of stormwater discharged from the site. The ECL shall note the presence of suspended sediment, turbid water, discoloration, and/or petroleum sheen.

(i) Any water quality monitoring performed during inspection.

(j) General comments and notes, including a description of any BMP repairs, maintenance or installations made as a result of the inspection.

(k) A statement that, in the judgment of the person conducting the site inspection, the site is either in compliance or out of compliance CESCP. If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the remedial actions required to bring the site back into compliance, as well as a schedule of implementation. If the site inspection indicates that the site is out of compliance, the ECL shall notify the Engineer immediately.

(l) Name, title, and signature of the ECL conducting site inspection and the following statement: “I certify that this report is true, accurate, and complete, to the best of my knowledge and belief.”

h. BMP Removal

(1) After cleaning and removal, the drainage system shall not be used for temporary construction stormwater conveyance or storage.

(2) Sediment removed shall be placed away from drainage conveyances and permanently covered with hydro seed or other material as directed by the Engineer.

(3) Stormwater ponds used to contain construction stormwater runoff shall be returned to elevations shown on the plans.

(4) Temporary BMPs shall be removed upon permanent stabilization or as directed by the Engineer.

(5) Areas disturbed during removal of temporary BMPs shall be permanently stabilized.

(6) Permanent stabilization shall occur upon installation of:

(a) Concrete or asphalt pavement.

(b) On grades 3:1 and less, soil is covered by a minimum of 85% grass growth, as determined by the Engineer.

(c) On grades greater than 3:1 soil is covered by an approved erosion control blanket or bonded fiber matrix and a minimum of 85% grass growth, utilizing the “Line Intercept Method”.

(d) All stormwater discharges from the project meet the following criteria:

(i) 0-25 NTUs.

(ii) 6.5-8.5 pH.

(iii) No visible sheen.

(iv) No settleable solids.

(v) Washington State Stormwater Quality Standards (WAC 173-201A) at the receiving water, as determined by the Engineer.

i. Emergency Response

(a) The CESCP shall contain information on how the Contractor shall control and respond to turbid water discharges, sediment movement, and fugitive dust. At a minimum, the Contractor's employee responsible for, or first noticing, the discharges shall take appropriate immediate action to protect the work area, private property, and the environment (e.g., diking to prevent pollution of state waters). Appropriate action includes but is not limited to the following:

(i) Hazard Assessment - assess the source, extent, and quantity of the discharge.

(ii) Securement and Personal Protection - If the discharge cannot be safely and effectively controlled, then immediately notify the ECL and the Engineer. If the discharge can be safely and effectively controlled, proceed immediately with action to protect the work area, private property, and the environment.

(iii) Containment and Elimination of Source - Contain the discharge with silt fence, pipes, sand bags or a soil berm down slope from the affected area. Eliminate the source of the discharge by pumping turbid water to a controlled area, building berms, piping clean water away from the area or other means necessary.

(iv) Cleanup - when containment is complete, remove sediment, stabilize, dispose of contaminated water and prevent future discharge.

(v) Notification - report all discharges immediately to the Engineer.

j. Construction Stormwater Management

Designer to verify specific discharge requirements and modify this section accordingly. In some cases, no construction stormwater discharge is allowed and alternative disposal methods, such as sanitary sewer or trucking off site need to be included.

(1) Storm water and construction dewatering operations shall not discharge to the Storm Drain System (SDS) unless free from pollutants. Before discharge, water shall be measured using a properly calibrated, approved turbidity meter. Discharged water shall not exceed 25 Nephelometric Turbidity Units (NTUs) and pH levels shall be between 6.5 and 8.5.

(2) Storm water and construction dewatering water shall not be discharged to the Industrial Wastewater System (IWS) unless free from pollutants. Before discharge, water shall be measured using a properly calibrated, approved turbidity meter. Discharged water shall not exceed 200 Nephelometric Turbidity Units (NTUs) and pH levels shall be between 6.0 and 9.0. There shall be no discharge to any catch basin without specific approval of the Engineer.

(3) The CESCP shall address how the Contractor plans to manage clean and polluted water during the life of the project. Specific procedures shall be developed and included in the CESCP when work includes excavation within 10 feet of any water, sewer, or storm system. Procedures shall address, at a minimum, locating, protecting, and connecting to existing pipes, as well as response plans for broken pipes.

(4) The Engineer shall be notified before any disposal, hauling, pumping, or treatment of water occurs. Notification shall include location of disposal and methods of treatment. Disposal tickets shall be provided to the Engineer upon request.

(5) Water shall not be pumped into ditches, gutters, drainage conveyance, catch basins, or any area that drains to one of these unless it meets the specifications outlined in this section and with prior approval of the Engineer.

(6) Chlorinated water used for disinfecting water pipes shall not be discharged to the storm drain system.

k. Fugitive Dust Planning:

(1) The CESCP shall detail the Contractor proposed approach to fugitive dust management. The plan shall include the following:

(a) Identification of all fugitive dust sources for each work activity.

(b) Description of the fugitive dust control measures to be used for each source.

(c) Schedule, rate of application and calculations to identify how often, how much, and when the control method is to be used.

(d) Provisions for monitoring and recordkeeping.

(e) Contingency plan in case the first control plan does not work or is inadequate.

(f) Name and telephone number of the person responsible for fugitive dust control.

(g) Source and availability of fugitive dust control materials.

(2) The Contractor shall provide whatever means is necessary to keep fugitive dust on site and at an absolute minimum during working hours, non-working hours and any shut-down periods.

(3) The Contractor's methods for fugitive dust control will be continuously monitored and if the methods are not controlling fugitive dust to the satisfaction of the Port, the Contractor shall improve the methods or utilize new methods at no additional cost.

(4) The Contractor shall maintain as many water trucks on a site during working and non-working hours as required to maintain the site free from fugitive dust.

(5) During time periods of no construction activity, water trucks must be ready with on-site Contractor's personnel available to respond immediately to a dust or debris problem as identified by the Engineer.

(6) At no time shall there be more than a 10 minute response time to calls concerning fugitive dust/debris problems during work hours and a 90 minute response at all other times on a 24 hour basis.

l. Utilities Planning:

(1) The CESCP shall identify when and how all underground utility work will be conducted so that water quality compliance is maintained. At a minimum, the Contractor shall:

(a) Have all shut off valves located and have procured the means to shut off valves within 10 minutes of a water line break.

(b) Before cutting into an existing water line, the Contractor shall verify to the Engineer that the water line is not pressurized.

(c) The Contractor shall not cut into an existing storm drain or connect new stormwater conveyance systems into existing systems until it has been verified to the Engineer there will be no discharge of non-compliant water during and after cutting and connection operations.

(d) The Contractor shall grout all holes, seams, cracks, joints, cast iron rings and grates within 24 hours of installation of each item.

(e) Storm systems to be demolished in place shall be first blocked at the point of connection to existing section to prevent contamination of existing storm system.

(f) Chlorinated water shall be discharged to sanitary sewer or removed from the site.

(g) Air plugs shall not be utilized for more than 24 hours and shall be in new condition with no leaks and monitored daily for proper air pressure.

(h) Mechanical plugs shall not be utilized for more than 5 calendar days and shall be used according to the manufacturer's instructions and engineering parameters. The Contractor shall submit instructions and engineering documentation before use.

(i) When a plug needs to remain in place longer than 5 days, the Contractor shall utilize grout. The grout shall be installed so that the length is one and a half times the diameter of the pipe.

m. Low Impact Development (LID) Protection Planning

(1) The CESCP shall identify how all LID BMPs are to be protected from sedimentation, pollution and compaction.

n. Education:

(1) The Contractor shall provide narrative in the CESCP on how they will educate all personnel including subcontractors. At a minimum, the Contractor shall:

(a) Train staff through regularly scheduled meetings to discuss environmental protection subjects as related to this project. This may be added to any existing weekly meetings (such as safety meetings).

(b) Training shall emphasize water quality compliance, BMP installation and maintenance, sensitive areas, emergency response, spill prevention, and inspections.

(c) Minutes of the meetings detailing attendees and subjects discussed shall be kept and submitted to the Engineer weekly.

(d) Prior to commencing work, all Contractor and subcontractor personnel at any tier shall complete a Port of Seattle Environmental Compliance Orientation given with the required Safety Orientation.

3.03 EXECUTION OF WORK

A. CONSTRUCTION REQUIREMENTS

Remove anything that doesn't apply to work.

1. Saw cutting

a. Saw cut slurry and cuttings shall be vacuumed during cutting operations;

b. Saw cut slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight;

c. Saw cut slurry and cuttings shall not drain to SDS, IWS, or any other natural or constructed drainage conveyance;

d. Collected slurry and cuttings are the responsibility of the Contractor and shall be disposed of off site in a manner that does not violate groundwater or surface water quality standards.

2. Soil and Construction Debris Stockpiles

a. Soils and construction debris, including broken concrete and asphalt paving, shall be stockpiled within the work site or off site.

b. Stockpiles shall be covered with plastic and secured from blowing wind and/or jet blast.

c. Plastic shall be a minimum thickness of 6 mil.

d. Materials to be stockpiled on pavement shall be placed on plastic and contained within a bermed area.

e. Clean storm water runoff from the plastic covering shall be directed away from bare soil using pipes, sandbags, or other temporary diversion devices.

f. Stockpiles shall be covered so that no soil or debris are visible and shall be covered at the end of each work day, weekends and holidays

g. Stockpiles on the AOA shall not be allowed unless approved by the Engineer.

3. Construction Entrances, Exits and Haul roads

a. Before leaving project site, all trucks and equipment shall be inspected for mud and debris.

b. At no time shall mud, debris, or visible sediment be allowed outside of the project boundaries and on any Port-owned and public roads.

c. Mud and debris shall be removed from pavement by vacuum sweeping and shoveling and transported to a controlled sediment disposal area identified in the CESCP.

d. Mud and debris shall be considered contaminated by fuels, grease, metals or other pollutants and shall be disposed of in accordance with Section 01 57 23 - Pollution Prevention, Planning and Execution.

e. Use of water to wash concrete or asphalt pavement shall be allowed only after sediment has been removed by vacuum sweeping and shoveling, and a Road Wash Plan has been submitted and accepted by the Engineer.

f. Washing pavement, shall first be approved by the Engineer. Wash water shall not drain into the SDS, IWS or any other natural or constructed storm water conveyance and shall be contained and removed from Port property and disposed of off-site in accordance with local, state, and federal regulations. Disposal tickets shall be provided to the Engineer.

g. Power brooms shall not be utilized without prior approval by the Engineer.

h. Contractor shall have sufficient working vacuum sweepers on site at all times work is being performed. All sweepers shall have on-board water spray systems that shall be operating at all times.

i. Vacuum sweepers shall be dedicated to this project and shall not be utilized by any other contract, nor be hired out to another contractor.

j. Sweeper systems shall function per manufacturer specifications, including, but not limited to, spray water systems, blowers, vacuum nozzles, hoses, debris hopper, hydraulics and electrical.

k. At no time shall debris hopper seals leak debris and or liquids.

l. At least one driver shall be assigned to a vacuum sweeper and shall do no other work.

m. Coverage shall be provided during lunch breaks, and during unfilling activities.

n. If, in the Engineer's opinion, the Contractor does not adequately manage the tracking of sediment, the Port may subcontract out the control of sediment tracking at the Contractor's expense.

4. Asphalt Curb and Asphalt berm

a. Asphalt curbs or asphalt berms shall be constructed on project perimeters, when the project is surrounded by impervious surfaces.

b. Asphalt curb and berm shall be a minimum height of four inches.

c. Diesel shall not be used to clean tools and equipment

5. Catch Basin Protection

a. All catch basins within the project limits, and outside the project limits but within the project drainage basin, including haul roads, shall be protected.

b. Catch basin protection shall be installed where shown in the project drawings, in all storm drainage structures within the work area, or as otherwise directed by the Engineer.

6. Concrete Truck and Equipment Washing

a. Concrete truck chutes, concrete pumps, hand tools, screeds, floats, trowels, rollers and all other tools shall be washed out only into Washington State Department of Ecology (WDOE)-approved covered steel containers..

b. All contained concrete waste shall be disposed of offsite in a manner that does not violate groundwater or surface water quality standards.

c. All water used for washing, is defined by the WDOE as "process water" and shall be collected and disposed of in a manner that complies with all local, state and federal regulations.

7. Wheel Washes

a. All haul vehicles exiting the work site to public roads shall pass through a wheel wash system to control sediment tracking. Any required modification, alteration or improvement needed on the existing wheel wash systems or supplemental vehicle washing for the successful control of dirt, debris or sediment tracking beyond

the wheel wash, either on Port haul roads or public roads, for the duration of the contract shall be the responsibility of the Contractor.

b. No modifications of the wheel wash system are allowed that alter the design of a contained operation with recycled wash water with no release of sediment laden wash water. The sediment shall be contained and disposed of at an appropriate disposal facility off Port Property.

c. Wheel wash water shall be replaced weekly with fresh, clean water.

d. The wash water is “process water” and shall not be released on site or to the storm drain system and shall be disposed of in accordance with all water quality regulations.

e. Wheel wash water shall not exceed 100 NTU.

f. Contractor shall sample wheel wash water for turbidity 2 hours after start and 2 hours before shutdown of the system. Sampling results shall be entered into Contractor’s daily inspection report.

8. Silt Fence

a. Silt fence shall be constructed at the locations shown in the project drawings, in the approved Contractor Erosion and Sediment Control Plan, or otherwise directed by the Engineer.

b. The geotextile shall be attached to the up-slope side of the posts and the wire mesh using staples, wire rings, or in accordance to the manufacturer’s recommendations.

c. Where seams are required to join two sections of fence material, the seams shall be taped together, wrapped three times around a 2” steel post and the post driven into the ground. All rips, tears, holes, and other damage to silt fences shall be repaired within 24 hours of locating the damage When sediments deposits reach approximately one-third the height of the silt fence, the deposits shall be removed and disposed of outside Port property.

9. Straw Wattle

a. The installation of straw wattles shall be per WSDOT Standard Plan I-30.30-00 “Wattle Installation on Slope”, or as directed by the Engineer.

b. Straw Wattles shall not be installed on impervious surfaces.

10. Bonded Fiber Matrix Soil Stabilization

a. The installation of Bonded Fiber Matrix Soil Stabilization shall be applied at a minimum rate of 3,000 pounds per acre and provide a minimum of 95% soil cover. Seed and fertilizer shall be included.

b. Contractor shall provide all Bonded Fiber Matrix, seed and fertilizer bags to the Engineer upon request.

11. Temporary Organic Mulch

a. Temporary organic mulch shall be applied at a minimum rate of 1.5 tons per acre.

12. Swale Construction

    a. Grass-lined swales shall be constructed to the lines and grades shown on the drawings. The swale includes excavating, grading, placement of topsoil, placement of erosion control blanket, and hydroseeding as detailed on the drawings. Excavated material from the swale construction shall be considered Excess Soil as defined in Section 31 23 00 – Excavation and Embankment.

13. Temporary Piping/Connections

    a. The Contractor shall install temporary piping, catch basins and connections to the existing storm drain system in locations shown on the drawings. At the completion of the work, the piping shall be removed and the temporary connections plugged.

14. Temporary Pipe Plugging

    a. The locations of piping to be temporarily plugged are indicated on the drawings. At the completion of the work, the plugs shall be removed.

15. Construction Stormwater Management

    a. The Contractor shall construct stormwater tank pads in the size, location and as detailed on the drawings.

    b. The Contractor shall install stormwater storage tanks, as specified, in the locations and quantities shown on the drawings.

    c. The Contractor is responsible for conveying construction stormwater within each work area to the stormwater storage tank area shown on the drawings.

    d. Temporary piping, structures and pump facilities required for the conveyance are the responsibility of the Contractor.

    e. The construction stormwater shall be held in the storage tanks until hauled and disposed of by the Contractor on a Force Account basis.

    f. The storage tank facilities including pads, access roads, ramps, temporary structures and piping shall be removed at the completion of the work or as directed by the Engineer

16. Surface Roughening:

    a. All soil shall be roughened, loose and friable, by ripping or with equipment tracks before being permanently stabilized.

17. Water Filled Diversion Berms

    a. Water filled diversion berms shall be installed such that offsite water is prevented from entering the job site and site water is kept within the project boundary.

    b. Berms may be used to prevent contaminants and water from entering catch basins.

c. Berms may be used on impervious surfaces.

18. Biofence

a. Stakes shall be driven into the ground a minimum of 12 inches and be spaced no more than 6 feet apart.

b. Fence ends shall be joined by wrapping ends together around a post 3 times and driven into the ground.

c. Burlap fabric shall be attached to the post in at least 3 places using staples or other method approved by the Engineer.

d. When used as a barrier fence, fabric shall not be trenched into the ground. When used as a silt fence, a minimum 8 inch flap shall be left at the bottom and held in place with straw wattles staked in as detailed in item 9 above.

19. Process Water Collection, Storage and Disposal

a. The Contractor shall provide and install stormwater storage tanks of sufficient size and volume to enable collection of 100% of the process water generated by the project.

b. The Contractor is responsible for conveying process water within each work area to storage tank(s).

c. Temporary piping, structures and pump facilities required for the conveyance are the responsibility of the Contractor.

d. The storage tank facilities including pads, temporary structures and piping shall be removed at the completion of the work or as directed by the Engineer.

e. Contractor shall provide process water disposal locations to the Engineer for review.

20. Low Impact Development (LID) Protection

a. At a minimum, the Contractor shall:

1) At no time shall water exceeding 25 NTUs drain into bioretention, rain garden, or pervious pavement BMPs.

2) At no time shall water exceeding pH range of 6.5 to 8.5 drain into bioretention, rain garden, or pervious pavement BMPs.

3) At no time shall water containing sheen drain into bioretention, rain garden, or pervious pavement BMPs.

4) Upon reaching final grade, native soils below infiltration BMPs shall be maintained such that designed infiltration is not impacted. Areas shall be fenced to prevent vehicle and foot traffic from entering.

5) Pervious pavement BMPs fouled with sediment or debris such that designed infiltration rates are reduced shall be cleaned to the satisfaction of the Engineer, or replaced at the Contractor's expense.

3.04 DELIVERABLES

3.05 QUALITY ASSURANCE

PART 4 MEASUREMENT AND PAYMENT

Replace all of Part 4 language with following only with approval by the Erosion Control/Stormwater Engineer:

No separate measurement or payment will be made for the work required by this section. The cost for this portion of the Work will be considered incidental to, and included in the payments made for the applicable bid items in the Lump Sum price bid for the Project.

Otherwise, review items below, one or more may be used – add/remove to customize for specific project. If all TESC can be defined, Item A can be used independently. Any items where quantities cannot be defined (quantities may vary), select unit price items and/or Force Account to address variances

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4.01 MEASUREMENT

A. Measurement for “TESC – Plan and Execution” will be as a unit.

B. Measurement for “TESC – Bonded Fiber Matrix Soil Stabilization” and “TESC-Temporary Organic Mulch” will be per square yard.

C. Measurement for “TESC – Silt Fence”, “TESC – Straw Wattle”, “TESC – Asphalt Curb”, “TESC – Grass Lined Swale”, TESC-Biofence” , will be per linear foot.

D. Measurement for “TESC – Catch Basin Protection”, “TESC – Temporary Piping/Connections”, “TESC – Temporary Pipe Plug”, “TESC – Construction Roads, Entrances and Exits” , “TESC – Stormwater Storage Tank Pad” and “TESC – Water Filled Diversion Berms” will be per each.

E. Measurement for “TESC – Stormwater Storage Tank” shall be per each per month.

F. Measurement for “TESC – Force Account” and “TESC – Construction Stormwater Hauling” will be on a Force Account basis in accordance with Document 00 70 00 – General Conditions. An estimated amount has been entered in the Schedule of Unit Prices.

4.02 PAYMENT

A. Payment for “TESC – Plan and Execution” will be made at the contract lump sum price as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials and tools to develop, implement and maintain the temporary erosion and sedimentation control plan including implementation of temporary stormwater conveyance facilities either as shown on the drawings or as required to complete the work, dust control, operation, maintenance and modification of wheel wash systems, construction of the stormwater tank pad areas as detailed on the drawings, control of sediment tracking, providing and operating vacuum sweepers and water trucks, and other measures as required as detailed on the drawings and specified herein through the duration of the contract, with the exception of those items measured and paid for separately. Payments will be made as follows:

Payment percentages may be adjusted (ie 20/60/20) to reflect specific project.

1. Upon acceptance of the Contractor's Erosion and Sediment Control Plan (CESCP) 25%.
2. After NTP and before Substantial Completion, 50% will be prorated and paid monthly for compliance with the CESCP. Non-compliance will result in withholding of payment for the month of the non-compliance.
3. After Substantial Completion, 25% for a clean and stabilized site.

B. Payment for "TESC – Silt Fence" will be made at the contract unit price per linear foot as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials and tools necessary to complete the installation of the silt fence as detailed on the drawings or as directed by the Engineer and specified herein. The unit price shall include all maintenance, the removal of silt fencing, and restoration of the area at the completion of the work.

C. Payment for "TESC – Biofence" will be made at the contract unit price per linear foot as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials and tools necessary to complete the installation of the biofence as detailed on the drawings or as directed by the Engineer and specified herein. The unit price shall include all maintenance, the removal of biofence, and restoration of the area at the completion of the work

D. Payment for "TESC – Catch Basin Protection" will be made at the contract unit price per each as stated in the Schedule of Unit Prices and shall be full compensation for all labor, equipment, tools, and materials to install inlet protection or filter on catch basins as shown on the drawings and specified herein. The unit price shall include all maintenance, removal and disposal of sediment material and the removal of the protection at the completion of the work.

E. Payment for "TESC – Straw Wattle" will be made at the contract unit price per linear foot as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools necessary to install the straw wattles as directed by the Engineer. The unit price shall include all maintenance, removal and disposal of the material at the completion and the restoration of the area at the completion of the work.

F. Payment for "TESC – Asphalt Curb" will be made at the contract unit price linear foot as stated in the Schedule of Unit Prices and shall be full compensation for all labor, materials, tools, and equipment necessary to complete the work to install the asphalt curb or berm as shown on the drawings or directed by the Engineer and specified herein, and remove and dispose of the material at the completion of the work.

G. Payment for "TESC – Bonded Fiber Matrix Soil Stabilization" will be made at the contract unit price per square yard as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools including site preparation, and installation of the material as described in this section and as detailed on the drawings. The unit price shall be full compensation for multiple applications, in areas as required by the Engineer as the work progresses. The minimum application will be 500 square yards. The unit price shall include mobilization/demobilization for each application required.

H. Payment for “TESC – Temporary Organic Mulch” will be made at the contract unit price per square yard as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools including site preparation, and installation of the material as described in this section and as detailed on the drawings. The unit price shall be full compensation for multiple applications, in areas as required by the Engineer as the work progresses. The unit price shall include mobilization/demobilization for each application required.

I. Payment for “TESC – Temporary Piping/Connections” will be made at the contract unit price per each as stated in the Schedules of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools to install the temporary piping of various sizes as shown on the drawings and described in this section, including the site preparation, excavation, hauling and disposal of material, required maintenance, including sediment removal, and removal of the piping and restoration of the area at the completion of the work or as directed by the Engineer. This item shall also include bends, anchors, supports, etc. necessary for a complete and operational system.

J. Payment for “TESC – Temporary Pipe Plug” will be made at the contract unit price per each as stated in the Schedules of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools to furnish, install, maintain and remove the specified temporary pipe plug in location shown on the drawings or as directed by the Engineer.

K. Payment for “TESC – Construction Roads, Entrances and Exits” will be made at the contract unit price per each as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, materials, equipment, tools to construct the construction entrance, regardless of size, including site prep, grading, furnishing and the installation of quarry spalls, crushed aggregate base, asphalt concrete, piping, as required to construct and maintain the entrances as shown on the drawing and specified herein. The unit price shall include maintenance, removal of the temporary improvement and restoration of the area at the completion of the work.

L. Payment for “TESC – Grass Lined Swale” will be made at the contract unit price per linear foot as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, equipment, materials, and tools to construct the swale as detailed on the drawings, including the required site preparation, excavation, hauling and disposal of excavated material off Port Property, erosion control blanket, seeding and all incidentals to complete the work and the removal the swale and restoration of the area at the completion of work.

M. Payment for “TESC – Stormwater Storage Tank Pad” will be made at the contract unit price per each as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, tools, equipment and material to construct the pad as detailed on the drawings including all excavation, crushed aggregate base, piping, grading, asphalt concrete pavement, maintenance of the pads, removal and restoration of the site at the completion of work or as directed by the Engineer.

N. Payment for “TESC – Stormwater Storage Tank” will be made at the contract unit price per each per month as stated in the Schedule of Unit Prices, and shall be full compensation for furnishing the specified storage tank. The unit price per each per month shall include the cost of mobilization/demobilization, cleaning, hauling and all

incidentals for the number of storage tanks required by the Engineer for a minimum of one month through the maximum for the duration of the contract.

O. Payment for “TESC – Water Filled Diversion Berms” will be made at the contract unit price per each per month as stated in the Schedule of Unit Prices, and shall be full compensation for furnishing the specified diversion berms. The unit price per each shall include the cost of mobilization/demobilization, cleaning, hauling and all incidentals for the number of diversion berms required by the Engineer for the duration of the contract.

P. Payment for “TESC – Construction Stormwater Hauling” as stated in the Schedule of Unit Prices will be made on a Force Account basis in accordance with Document 00 70 00 –General Conditions and shall be full compensation to transfer construction stormwater from the stormwater storage tanks to trucks for hauling and disposal in an existing stormwater pond.

Item of Work “TESC – Force Account “will be added to the Schedule of Unit Prices in Specification Section 00 41 00 – Bid Form. The Unit Price and Amount will be set by the Designer along with the Erosion Control / Stormwater Engineer.

Q. Payment for “TESC – Force Account” as stated in the Schedule of Unit Prices will be made on a Force Account basis in accordance with Document 00 70 00 – General Conditions and shall be full compensation to complete only temporary erosion control measures that are not part of the contract work, not covered under existing bid items and are at the specific direction of the Engineer.

End of Section

READ THIS FIRST

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “[ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [“ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built-in styles and formatting your outline should be fine. Most paragraphs can be promoted (Shift) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to ‘format paint’ to reapply the format.

PART 1 GENERAL

1.01 SUMMARY

A. This section consists of planning for and implementing the temporary measures indicated herein, shown on the Contract Documents, or as ordered by the Engineer to prevent pollution of soil and water, and control, respond to, and dispose of potential pollutants or hazardous materials during the life of the Contract.

B. This work shall apply to all areas associated with Work including, but not limited to the following locations:

1. Project Site, including equipment and material storage areas
2. Remote Laydown Staging Areas (LSAs), including Logistics Lots (reference Section 01 50 00 – Temporary Facilities and Control for details and restrictions)
3. Stockpile areas

1.02 DESCRIPTION OF WORK

A. In order to comply with this specification the Contractor shall:

1. Develop and submit a site-specific Pollution Prevention Plan
2. Revise the Pollution Prevention Plan during the life of the Contract
3. Install, maintain, and remove all spill prevention, containment, countermeasures, and pollution prevention Best Management Practices during the life of the Contract
4. Contain, cleanup and dispose of all hazardous materials or potential pollutants
5. Maintain good housekeeping practices at the jobsite and laydown staging areas
6. Perform other work shown on the Contract Documents or as directed by the Engineer

7. Maintain any required Contractor pollution liability insurance including insurance liability for the transportation of hazardous materials for the duration of the Contract

8. Maintain a proper Hazardous Material Endorsement for any driver that is transporting hazardous material in a vehicle that requires the driver to maintain a valid and current Commercial Driver's License in the State of Washington

1.03 POLLUTION PREVENTION PLAN

A. The Contractor shall develop and submit to the Port a site-specific Pollution Prevention Plan. The Pollution Prevention Plan must be a site-specific document that outlines the administrative, operational, and structural Best Management Practices that will be implemented on the project.

B. The Pollution Prevention Plan must, at a minimum, include the following:

1. Site specific description and drawings

2. Contractor pollution prevention contact personnel

3. Known or potential hazardous materials inventory list

4. Safety Data Sheets (SDSs) for hazardous materials identified on the inventory list

5. Hazardous material containers labeling system

6. Hazardous material container storage and handling procedures

7. Hazardous material spill prevention planning and execution

8. Hazardous material spill control and response planning and execution

9. Hazardous material cleanup and disposal planning and execution

10. Pollution Prevention BMP Selection

11. Pollution Prevention BMP Maintenance planning, execution, and inspection

12. Subcontractor's acknowledgment

13. Education

1.04 SUBMITTALS

A. As part of the required Preconstruction Submittals, Section 01 32 19 - Preconstruction Submittals, and before Notice to Proceed is issued, the Contractor shall submit the following information:

1. Pollution Prevention Plan and the required contents.

2. Insurance Endorsements verifying liability coverage for job-site work and any transportation of hazardous materials to or away from the jobsite.

3. Copy of a completed MCS-90 Certificate if required under the Motor Carrier Act of 1980 for transportation of hazardous material which verifies compliance with the financial responsibility requirements of the Act;

4. A list of all drivers who will be hauling hazardous material in a vehicle that requires the driver to maintain a Commercial Driver's License in the State of Washington under RCW 46.25.080. These drivers must show evidence

of a proper Hazardous Material Endorsement in accordance with Washington RCW 46.25.070 and 46.25.085.

1.05 DEFINITIONS

A. Absorbent: Any material capable of absorbing oils, water-based materials, solvents, acids, and other hazardous materials. Absorbent materials include: pads, kitty litter, floor dry, and other commercially available materials.

B. Best Management Practice (BMP): The variety of administrative, operational, and structural measures that will be implemented to prevent and reduce the amount of contaminants in stormwater and the environment. (Examples: covering concentrated galvanized materials and providing secondary containment for liquid storage are BMPs).

C. Container: Any portable device, in which a material is stored, transported, treated, disposed of, or otherwise handled.

D. Dangerous Waste: Solid wastes designated by the State of Washington Under Chapter 173-303 WAC and regulated as Dangerous Waste, Extremely Hazardous Waste, or Mixed Waste. (The State of Washington is authorized to implement Federal Hazardous Waste Regulations - see also Hazardous Waste Definition)

E. Hazardous Material: A substance or material, including a hazardous substance, hazardous waste, marine pollutant, including but not limited to: diesel, gasoline, petroleum products, solvents, paints, acids, lubricants, curing compounds, form release agents, adhesives, sealants, and epoxies. (See also Hazardous Waste definition)

F. Hazardous Material Storage Area: The area used by the Contractor to store hazardous material.

G. Hazardous Material Container Labeling System: The system used by the Contractor for identifying the secondary containers used to store hazardous materials or wastes. Acceptable methods include: Department of Transportation (DOT), Hazardous Material Information System (HMIS); National Fire Protection Association Fire Diamond (NFPA Hazard Rating).

H. Hazardous Waste: Solid wastes designated by 40 CFR Part 261, and regulated as hazardous or mixed waste by the United States EPA.

I. Laydown Staging Area (LSA): Remote office, equipment and materials laydown staging areas, including Logistics Lots 1-5, Radisson Lot 6, Cell Lot, West, and North LSAs.

J. Project Site: The location(s) where the Work will be performed or constructed by the Contractor as set forth in the Drawings and Specifications. Project Site specifically includes areas identified by the Port for Contractor’s logistics or staging but does not include any areas separately secured by the Contractor, a Subcontractor of any tier, or Supplier for use in connection with the Work (e.g. Contractor’s home office, an off-site fabrication plant, etc.).

K. Safety Data Sheet (SDSs): Written or printed material available for each chemical that includes information on: the physical properties, hazards to personnel, fire and explosion potential, safe handling recommendations, health effects, fire-fighting techniques, and reactivity and disposal.

L. Secondary Container: Any container, other than the original container that is used for transferring, holding, storing or otherwise containing hazardous materials or wastes.

M. Secondary Containment: A device designed, installed, or operated to prevent any migration of wastes or accumulated liquid to the soil, ground water, or surface water. The device must, at minimum, hold 110 percent of the volume of the largest container being stored. The device must have the strength to contain a spill and be made of materials that will not be degraded by the wastes or accumulated liquids it is intended to contain.

N. Sorbent: A material used to soak up free liquids by either adsorption or absorption, or both.

O. Storm Drainage System (SDS): Consists of any drain, inlet, catch basin, slot drain, pipe, gully, fissure, ditch, or other form of conveyance that collects and transports stormwater.

1.06 REFERENCES

A. The following rules, requirements and regulations specified may apply to this work:

1. Washington State Dangerous Waste Regulations: Chapter 173-303 WAC, September, 2020 or current edition.
2. National Pollution Discharge Elimination System Waste Discharge Permit No. WA-0024651 (Seattle-Tacoma International Airport).
3. Part C - Hazardous Communication: Chapter 296-62-054 WAC, “Right to Know”.
4. Port of Seattle Regulations for Airport Construction (Current Edition).
5. Puget Sound Stormwater Management Plan, Puget Sound Water Quality Action Team; 1998.
6. Title 40 Code of Federal Regulation Subchapter I - Solid Wastes 261, 262, 263, 265, 268, 273, 279, 370 (Federal Hazardous Waste Regulations).
7. Sea-Tac International Airport Rules and Regulations (Current Edition).
8. Sea-Tac Airport Stormwater Pollution Prevention Plan, as required by NPDES permit No. WA-0024651.
9. Seattle-Tacoma International Airport Programmatic Construction Stormwater Pollution Prevention Plan: NPDES Permit WA0024651, November 2021
10. Seattle-Tacoma International Airport Spill Prevention Control and Countermeasure (SPCC) Plan: January 2021. Gresham Smith
11. Stormwater Management Manual for Western Washington, Department of Ecology; July 2019 (or current edition).
12. Surface Water Design Manual, King County Public Works, September 2021 (or current edition).
13. WAC 173-201 A, Water Quality Standards of the State of Washington.
14. Revised Code of Washington - 46.25.085, 46.25.080, 46.25.070, 46.48.170, 4.24.314.

1.07 PERMITS

Coordinate with PM and POS ENV – add/edit/delete as applicable.

A. Work shall be conducted in accordance with STIA NPDES Permit WA-0024651.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 SITE SPECIFIC DESCRIPTION AND DRAWINGS

A. A written site description shall be included in the Pollution Prevention Plan that addresses the following:

1. Physical description and location of the construction site and staging areas;
2. Construction activities that will involve the use of hazardous materials or generate hazardous waste;
3. Location of material storage areas and project staging areas;
4. Designated fueling areas;
5. Proximity to any natural or manmade drainage conveyance including ditches, catch basins, ponds, wetlands, and pipes;
6. Public areas relating to construction project;
7. Proximity to other construction sites;

B. Drawings shall be included in the Pollution Prevention Plan that show the construction site(s), location of fueling areas, equipment storage areas, catch basins and other man-made and natural drainage conveyances within the work area and storage areas. The drawings shall show locations of Pollution Prevention BMPs during each phase of construction. The drawings may be hand drawn sketches but must include the appropriate spatial information.

3.02 CONTRACTOR POLLUTION PREVENTION CONTACT PERSONNEL

A. The Contractor shall identify in the Pollution Prevention Plan at least one project personnel that will be available 24 hours a day to administer and respond to hazardous materials management requirements of the Contract and provide the following information:

1. Contact Name
2. Contact Phone Number
3. Contact E-mail Address

B. Duties

1. Maintain permit file on site at all times which includes the Pollution Prevention Plan, Contractor Erosion and Sediment Control Plan and any associated permits and plans;
2. Direct BMP installation, inspection, maintenance, modification and removal;

3. Available 24 hours per day, 7 days per week by telephone;
4. Update all drawings with changes made to the Pollution Prevention Plan;
5. Maintain daily logs;
6. Immediately notify the fire department (911) of any hazardous material spill that cannot be contained (see Paragraph 3.08.A.5 for detailed reporting requirements).
7. Immediately notify the Engineer of any and all spills, regardless of size.
8. Inspect for Pollution Prevention Plan requirements including BMPs as required to ensure adequacy. Facilitate, participate in, and take corrective actions within 24 hours resulting from inspections performed by outside agencies, Port employees, and Port designees.

C. Qualifications

1. The Pollution Prevention Plan Inspector shall have the following experience:
   a. Prevention, control and clean-up of construction caused pollution from petroleum, hazardous materials and construction wastes.
   b. Knowledge of basic hazard and risk assessment techniques.
   c. An understanding of basic hazardous materials terms.
   d. Ability to perform basic control, containment or confinement operations within the capabilities of the resources and personnel protective equipment available.
   e. Installation, inspection, maintenance, reporting, record keeping, and removal of Pollution Prevention BMPs.

3.03 HAZARDOUS MATERIAL INVENTORY LIST

A. A complete list of all known or potential hazardous materials or waste to be used or generated during all phases of the construction project shall be included in the Pollution Prevention Plan.

3.04 SAFETY DATA SHEETS (SDSs)

A. A Hazardous Material Inventory List supported by a corresponding SDS for all materials that have an SDS shall be included in the Pollution Prevention Plan.

B. For all hazardous materials not submitted in the original Hazardous Material Inventory List, the Contractor shall provide SDSs to the Engineer prior to bringing the material on site and submit a revised inventory list (or plan if required) within 7 days.

1. Hazardous materials shall be permitted on the work site only with prior written acknowledgement of receipt of SDSs by the Engineer.

3.05 HAZARDOUS MATERIAL CONTAINERS LABELING SYSTEM

A. The Pollution Prevention Plan shall address and the Contractor shall implement the following:

1. Identification of container with a legible label containing the materials product name, as was written on the material’s original container label.

2. Include the name of the material's manufacturer, as was written on the chemicals original container label.

3. Include appropriate hazard warnings, which identify the chemicals associated risks to health, flammability, or reactivity.

4. Contractor shall mark each container with the Contract project number and company owner of the container.

5. The mark shall be permanent, easily identifiable and placed with care to prevent defacing of the marker through abrasion, chemical reaction, or other means that would hinder marker identification.

6. At all times during the Work, the Contractor shall assure that proper and identifiable labels are attached to all hazardous materials and secondary containment

3.06 HAZARDOUS MATERIAL CONTAINER STORAGE AND HANDLING

A. Solid Chemicals, chemical solutions, paints, petroleum products, solvents, acids, caustics solutions, and any waste materials, including used batteries, shall be stored in a manner that will prevent the inadvertent entry of these materials into waters of the state, including groundwater. Storage shall be in a manner that will prevent spills due to overfilling, tipping, or rupture. In addition, the Pollution Prevention Plan shall address and the Contractor shall implement the following specific requirements:

1. All liquid products must be stored on durable, impervious surfaces and within a berm or other means of secondary containment capable of containing 110% of the largest single container volume in the storage area.

2. Waste liquids shall be stored under cover, such as tarps of roofed structures, in addition to secondary containment. Any waste storage areas, whether for waste oil or hazardous waste, shall be clearly designated as such and kept segregated from products to be used on the site.

3. In the event that the Contract Document Drawings designate a hazardous material storage area, the Contractor shall be restricted to storing hazardous materials or waste specific to the Project work to the area designated in the Contract Document Drawings.

4. All hazardous materials and waste containers shall be stored with the container lid secured, to prevent spills or leaking.

5. Upon completion of a specific task for which hazardous material(s) were used, the Contractor shall document in the Daily Report (Form CM03), the amount of hazardous material removed from the site, and the product and manufacturer name(s) of such material(s).

3.07 HAZARDOUS MATERIAL SPILL PREVENTION

A. The Pollution Prevention Plan shall address and the Contractor shall implement the following:

1. Hazardous Material Transfer

a. All hazardous materials shall be transferred from primary to secondary containers using secondary containment with spill kits in close proximity.

2. Vehicle and Equipment Fueling
    a. All equipment fueling operations shall utilize pumps and funnels and absorbent pads and / or drip pans;
    b. Fueling shall not take place within 25 feet of any natural or manmade drainage conveyance including ditches, catch basins, ponds, wetlands, and pipes;
    c. Fueling shall be restricted to designated fueling areas as shown on the Contract Documents or as submitted and accepted by the Engineer as a part of the Pollution Prevention Plan;
    d. A spill kit will be located within 25 feet of the fueling operation;
3. Vehicle and Equipment Maintenance
    a. Engine, transmission, and hydraulic oil may be added, as needed utilizing funnels and drip pans;
    b. Absorbent pads shall be placed to prevent fluid contact with soil;
    c. No fresh or used engine fluids will be stored on the project site;
    d. No vehicle maintenance other than emergency repair shall be performed on the project site.
4. Small Engine Fueling and Maintenance
    a. All fueling operations and engine fluid additions shall utilize funnels and be performed over drip pans.
    b. Absorbent pads shall be placed to prevent fuel and engine fluid contact with soil.
    c. Fueling shall not take place within 25 feet of any natural or manmade drainage conveyance including ditches, catch basins, ponds, wetlands, and pipes.
    d. Contractor shall not drain and replace engine fluids on Port property.
5. Equipment Storage
    a. Drip pans and absorbent padsshall be placed under all large fuel-powered and/or engine/hydraulic oil containing equipment that is unused for more than 4 hours, overnights, weekends, and holidays.
    b. Small fuel powered and/or engine/hydraulic oil containing equipment (i.e. generators, light plants, etc) shall be stored inside properly sized secondary containment at all times.
6. Spill Response Kits
    a. Spill kits shall be stored at designated locations on the project site, at the hazardous material storage areas, and in close proximity to any fueling operation.
    b. The contents of the spill kit must be appropriate to the types and quantities of materials stored and used, and spill kit contents shall

be replaced after use. Spill Kits shall, at a minimum, contain the following:

(1) 1-spill response procedures sheet

(2) 12-oil absorbent pads (17”x19”)

(3) 12-water-based absorbent pads (17”x19”)

(4) 3-oil absorbent socks/booms (3’x4’)

(5) 2-oil absorbent socks/booms (3’x10’)

(6) 1-roll of plastic sheeting

(7) 5-gallons (or ~25 lbs) of loose absorbent material (i.e. kitty litter or floor dry)

(8) 24-heavy duty garbage bags

(9) 1-shovel (non-metallic)

(10) 1-broom

(11) 1-pair splash resistant goggles

(12) 1-water resistant nylon bag

(13) 3-pair nitrile gloves

(14) 10-copies spill report form

3.08 HAZARDOUS MATERIAL SPILL CONTROL AND RESPONSE

A. The Plan shall contain information on how the Contractor shall control and respond to hazardous material spills. At a minimum, the Contractor’s employee responsible for the spill must take appropriate immediate action to protect human health and the environment (e.g., diking to prevent contamination of state waters).

1. Hazard Assessment - assess the source, extent, and quantity of the spill.

2. Containment and personal protection - If the spill cannot be safely and effectively controlled, then evacuate the area and immediately notify outside response services (go to Step 5). If the spill can be safely and effectively controlled, secure the area and proceed immediately with spill control (impacts to waters of the state should be given the highest priority after human health and safety)

3. Containment and elimination of Source - Contain the spill with absorbent materials or a soil berm around the affected area. Eliminate the source of the spill by closing valves, sealing leaks, providing containment, or deactivating pumps.

a. Spill control measures may include damming the spill, covering floor drains, catch basins, or preventing the contaminant from entering water systems. Contaminants include turbidity as well as chemicals.

4. Cleanup - when containment is complete, clean or remove the spill with absorbents or by pumping and containerizing the material for off-site disposal.

5. Notification

a. Report all spills that cannot be contained immediately to the Port of Seattle Fire Department:

(1) Port Phone: 911

(2) External Phone: (206) 787-5380

(3) Provide the following information:

(a) Time spill occurred or was discovered

(b) Location of the spill and equipment involved

(c) Material spilled and estimated quantity

(d) Measures taken to contain the spill and secure the area

b. Report all spills (regardless of size) immediately to the Engineer.

c. Complete spill report form within 24 hours and submit to Engineer.

(1) The report shall include items from 3.08.5.a.3 above

(2) The report shall describe/propose preventative future measures

(3) An example spill report form is provided in the Pollution Prevention Plan template

3.09 HAZARDOUS MATERIAL CLEANUP AND DISPOSAL

A. The Plan shall contain information on how the Contractor shall characterize, cleanup and remove all hazardous material and waste generated from Contractor operations. At a minimum, the Plan shall include or communicate the following:

1. For the purposes of this section, clean shall be defined as the Work site being free of all hazardous material(s), product (or oil) sheen, waste(s) container(s), containment device(s), scrap material(s), used spill pads or absorbent pads, or any other hazardous material debris resulting from the Contractor activities.

2. The Port of Seattle will retain title to all existing hazardous waste on site if encountered during demolition, removal, or excavation. This does not include hazardous materials generated, or left behind by the Contractor, such as used motor oils, paints, lubricants, cleaners, spilled materials, etc. Contractor will be the generator and owner of these wastes and shall clean and dispose of such waste according to the Contract Documents and follow local, State, and Federalregulations. Any contractor materials brought onsite for the construction project that remain unused shall be removed from Port property following completion of the project, unless otherwise specified by the Contract. The Port of Seattle will be shown as the hazardous waste generator and will sign all hazardous waste manifests for non-Contractor generated hazardous wastes. Nothing contained within these Contract Documents shall be construed or interpreted as requiring the Contractor to assume the status of owner or generator of hazardous waste substances for non-Contractor generated hazardous wastes.

3. Hazardous material(s) and other waste(s) shall be disposed in a fully permitted disposal facility with the approvals necessary to accept the waste

materials that are disposed. Use of the Port of Seattle's EPA Identification Number for disposal purposes must be coordinated with the Engineer and all documentation such as manifests, land disposal restriction forms, and profiles must be delivered to the Engineer if the Port of Seattle's EPA Identification number is being used for disposal on the project.

4. Handling of any contaminated soils resulting from a contractor spill shall be coordinated with the Engineer. Contaminated soil stockpiles must be on a plastic liner, covered with plastic, secured and labeled. Contaminated soils from a contractor spill of unknown source must be characterized for disposal purposes. Use of the Airport Environmental Soil Stockpile Facility is prohibited unless authorized by the Engineer.

5. Contaminated materials, such as absorbent materials, rags, containers, gloves, shall be collected, placed into labeled containers and properly disposed

6. Any unanticipated hazardous materials, waste, or contaminated soils encountered during construction that are not generated by the Contractor shall be immediately brought to the Engineer's attention for determination of appropriate action. Contractor shall not disturb such hazardous materials or contaminated soils until directed by the Engineer.

3.10 Pollution Prevention BMP Selection

A. The contractor shall document temporary Pollution Prevention BMPs that will be implemented during the duration of the project. Approved BMPs may be found in the Stormwater Management Manual for Western Washington, Department of Ecology, July 2019, or current edition.

B. At a minimum, the following Pollution Prevention BMPs will be required on the project site and at any LSA utilized by the contractor:

1. Housekeeping – Contractor areas and pavement shall remain free of loose trash/debris (including cigarette butts) and sediment at all times.

2. Concentrated galvanized materials shall not be stored directly on pavement and shall be under cover (or covered and secured with plastic sheeting or tarps) at all times.

3. Products with SDSs and small fuel-powered equipment shall be stored inside properly sized and maintained secondary containment.

4. Lids are required on all dumpsters and/or trash cans, and shall be secured at all times.

3.11 Pollution Prevention BMP Maintenance Planning, Execution and Inspection

A. Planning and execution

1. BMPs shall be maintained for the life of the project, the completion of a work phase and/or until removed by direction of the Engineer.

2. BMPs shall be maintained during all suspensions of work and all non-work periods.

3. BMPs shall be maintained and repaired as needed to assure continued performance of their intended function.

4. Sediments removed during BMP maintenance shall be placed away from natural and constructed storm water conveyances and permanently stabilized or removed from the project site or LSA.

5. All maintenance shall be completed within 24 hours of inspection.

B. Inspection

1. Contractor shall inspect all BMPs daily when work is occurring onsite and anytime 0.5" of rainfall has occurred within 24 hours on non-working days including, but not limited to, weekends, holidays, after hours, and suspension days. Rainfall amounts can be determined by contacting the National Weather Service.

2. Deficiencies identified during inspection shall be corrected within 24 hours or as directed by the Engineer.

3.12 SUBCONTRACTOR ACKNOWLEDGEMENT

A. The requirements of the Pollution Prevention Plan are the responsibility of the Contractor and compliance must be communicated at all tiers of the Contract. The Contractor must provide a written acknowledgement from all subcontractors that they have read, understand, and will comply with the requirements of the Pollution Prevention Plan. This written acknowledgement must be included in the Pollution Prevention Plan as part of the preconstruction submittal. The subcontractor acknowledgement section of the Pollution Prevention Plan must be updated as needed throughout the life of the Contract.

3.13 EDUCATION

A. The Contractor shall provide narrative in the Pollution Prevention Plan on how they will educate all personnel including subcontractors. At a minimum, the Contractor shall train staff through regularly scheduled meetings to discuss environmental protection subjects as related to this project. This may be added to any existing weekly meetings (such as safety meetings). Training content shall emphasize identifying Pollution Prevention team members, pollutant sources, sensitive areas, emergency response, spill prevention and inspections. Keep minutes of the meetings detailing attendees and subjects discussed. Submit the minutes to the Engineer monthly.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

Based upon unit cost Bid Item "Pollution Prevention Planning and Execution", payments will be made as follows:

A. Upon receipt of the Pollution Prevention Plan 25%

B. After NTP and before Substantial Completion, 50% will be pro-rated and paid monthly for compliance with the Pollution Prevention Plan. Non-compliance will result in withholding of payment for the month of non-compliance.

C. After Substantial Completion, 25% for completion of work onsite.

[OR]

A. No separate measurement or payment will be made for the work required by this Section. The cost for this portion of the Work will be considered incidental to, and included in, the payments made for the applicable bid items in the [Schedule of Unit Prices] or [Lump Sum price] bid for the Project.

End of Section

READ THIS FIRST

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “ [ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [“ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style “Numbered Material” and can be promoted (Tab) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the “Numbered Material” format.

Changes to this specification shall be approved by the Erosion Control / Stormwater Engineer.

This specification is for all Port of Seattle construction including Seaport and Airport projects. Designer to verify with Seaport Environmental or Aviation Environmental groups if there are additional environmental permit requirements.

The Design Engineer shall modify this specification to address project specific needs.

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. This item shall consist of the management of all construction water including collection, conveyance and treatment of onsite stormwater and groundwater, diversion of offsite water away from the project sites, and collection and offsite disposal of process water.

B. The Contractor shall be solely responsible for design, installation, operation and maintenance of all collection, conveyance and treatment systems and shall modify as needed to meet the requirements of this Section. The Contractor shall take full responsibility for fines imposed due to exceeding the discharge limits.

C. The minimum treatment system effluent performance requirements shall include oil/water separation, turbidity reduction, solids removal and pH treatment as required to meet the minimum effluent performance requirements listed in this Section.

D. Any treatment system used shall be approved for use by the Washington State Department of Ecology (Ecology).

E. All components of the construction water management system shall meet the requirements of the Ecology Chemical Treatment Assessment Protocol (CTAPE)

and the Stormwater Management Manual for Western Washington (SWMM). At a minimum, the following shall apply:

A. BMP C250 Construction Stormwater Chemical Treatment

B. BMP C251 Construction Stormwater Filtration

C. BMP C252 High pH Neutralization Using CO2

D. BMP C253 pH Controls for High pH Water

1.02 DESCRIPTION OF WORK

A. In order to comply with the requirements of this section, the Contractor shall:

1. Develop and submit a Construction Water Management Plan (CWMP).
2. Install temporary structures, modifications, sumps, piping, by-passes, connections, and pumps to contain and convey stormwater to the treatment facility prior to treatment.
3. Provide any pre-treatment of water using oil/water separation, pH adjustment, or other approved methods as required prior to treatment.
4. Treat stormwater with an approved, Contractor-designed, furnished and installed, Construction Water Treatment and Monitoring System.
5. The operating treatment capacity shall be as specified on the drawings.
6. Discharge all treated water at the location shown on the drawings or as directed by the Engineer.
7. Perform all required monitoring, testing and recordkeeping.
8. Remove all temporary system components and restore the Port's stormwater facilities to their original condition.
9. Clean all Port storm conveyances, structures, vaults and facilities to the satisfaction of the Engineer.

1.03 SUBMITTALS

A. As part of the required Section 01 32 19 - Preconstruction Submittals, the Contractor shall submit the following:

1. Construction Water Management Plan.

1.04 PERMITS

Permit #s below are for Airport projects. Coordinate with PM and POS ENV – add/edit/delete as applicable.

A. Work shall be conducted in accordance with [STIA] NPDES permit number [WA-002465-1].

B. Work shall be conducted in accordance with Stormwater Pollution Prevention Plan, as required by the [STIA] NPDES permit number [WA-002465-1].

PART 2 PRODUCTS

2.01 PRIMARY WATER TREATMENT EQUIPMENT

A. The Contractor shall be solely responsible for the water treatment system design, operation, and maintenance, including full responsibility for fines imposed due to exceeding the discharge effluent limits.

B. The Contractor shall provide a water treatment and monitoring system with the treatment and storage capacity to manage stormwater without causing construction delays.

C. Contractor shall keep on hand, or have immediate access to, spare equipment and/or materials for any breakdown(s).

D. The materials and equipment used for the water treatment system shall be no older than 3 years and suitable for the Work and be maintained in good condition.

E. Contractor shall provide and maintain at all times an ultrasonic totalizing flow meter to record effluent discharge. The flow meter shall display instantaneous flow and record cumulative flow. The Engineer reserves the right to install a redundant flow meter in series with the Contractor meter.

F. Contractor shall choose the type and size of equipment and components needed to accomplish the functions designated.

G. Contractor shall construct the treatment system with sampling ports and the necessary valves as required to collect water treatment samples.

H. The Contractor shall maintain dedicated redundant pumps at the treatment facility to provide immediate back-up pumping capacity at the designed treatment and discharge rates.

2.02 WATER TREATMENT SYSTEM CONTROL

A. Unattended treatment plant operation shall not occur.

B. The Contractor shall provide a notification system to alert the Operator if system experiences conditions that will potentially cause the treatment system to shut down.

C. Contractor shall provide high-level alarms on the tanks to prevent overflow conditions. Alarms may cause automatic actions to relieve the condition or may warn the Operator. Contractor shall also set a dedicated overflow level alarm at an elevation as directed by Engineer and notify Port immediately when the alarm is activated.

D. Contractor shall design the control system to accomplish the functions designated. The control system is subject to review and approval by the Engineer.

E. If an upset condition occurs which may result in a release or non-conformance with the discharge requirements, Contractor shall immediately suspend operation and notify the Engineer.

2.03 STORMWATER STORAGE TANK

A. Storage tanks shall consist of a weir tank with a capacity adequate to contain the volume determined in the Contractor’s analysis. The Port reserves the right to limit the maximum height for tanks and the available location for tank placement. Coordinate with the Engineer for tank placement.

2.04 PUMPING

A. The Contractor is responsible for all pumping and shall identify structures utilized as sumps for pumping locations. These shall be augmented with other on-site

pumps utilized for collection of standing water and continuous dewatering of excavations.

B. Pumps shall be sized to provide the minimum conveyance capacity as determined in treatment facility sizing calculations.

2.05 TEMPORARY PIPING

A. Temporary above ground piping shall be PVC/Woven Synthetic Fibers, EPDM, Ductile Iron, or HDPE Pressure Pipe meeting AWWA C901/C906.

B. All above ground piping and fittings shall be sized and pressure rated for their application, water tight, free of leaks or tears, and maintained in working condition.

PART 3 EXECUTION

3.01 GENERAL

A. Design and modifications to conveyances, pumps, sumps, detention facilities and any hydraulic calculations necessary for implementation of this Section shall be stamped by a Professional Engineer licensed in the State of Washington.

B. Damage to any portion of the Construction Water Management System caused by Contractor operations, weather or negligence shall be repaired immediately at sole cost to the Contractor.

C. The system shall be designed to handle the specified maximum peak influent flow rates, treat the water to the minimum specified effluent performance criteria, and discharge the treated water at the specified maximum peak effluent flow rates determined in the treatment sizing calculations.

D. The Contractor shall install elevation gauges in detention facilities.

E. The Contractor shall initiate treatment system operation and pumping immediately after 0.1 inches of rainfall has fallen in the previous 24 hours unless otherwise approved by the Engineer.

F. All system components that require fueling shall be maintained with a minimum of 50% fuel in their tanks.

G. Contractor shall provide all utilities and power required for treatment and water management activities.

3.02 CONSTRUCTION WATER MANAGEMENT PLAN (CWMP)

A. The Contractor shall prepare a CWMP that describes and includes the management of construction stormwater and non-construction stormwater. The plan shall include procedure outlines for start-up, normal operations, process monitoring sampling and analysis, monitoring and control of residual flocculent, control philosophy, alarm conditions and responses, freeze protection, normal shutdown, and decommissioning.

B. This plan shall describe the management of construction stormwater and by what means non-construction stormwater is segregated from the project site. This consists of planning/phasing, installing, onsite collection, conveyance, plugs, pumps, treatment as required, discharge of water and/or collection, infiltration, and disposal of all construction water collected or related to construction activities or as

ordered by the Engineer to prevent pollution of water, and control, respond to, and manage turbid water and pH during the life of the Contract.

C. In addition, the CWMP shall include and address, at a minimum, the following:

1. Site Description and Site Drawings
    a. Provide a detailed project description including phasing and schedule for major work activities.
2. Construction Water Management Description and Drawings
    a. Contractor shall provide sufficient detail to show that all site water is managed per the requirements of this Section and to the satisfaction of the Engineer.
    b. Installation layout drawing for treatment systems.
3. Design Calculations
    a. Contractor shall provide product information and/or supporting calculations indicating that their selected pumps and hoses will meet the pump conveyance requirements.
    b. Contractor shall provide calculations demonstrating that their Construction Water Treatment System can meet or exceed the minimum specified operating capacity.
    c. Contractor shall provide design calculations for any additional conveyance utilized in their Construction Water Management Plan or that represent a change to Construction Water Management approach.
    d. All Contractor calculations shall be approved and stamped by a Professional Engineer licensed in the State of Washington.
4. CTAPE Documentation
    a. CTAPE documentation shall meet Department of Ecology requirements.
5. Treatment System Operations Manual
    a. The treatment system operations manual shall meet Department of Ecology requirements, remain onsite and be submitted to the Engineer.
6. Construction Water Management Personnel
    a. Treatment systems shall only be operated by Constructing Water Treatment Operators (Operators) trained and certified by Ecology requirements.
    b. Operators shall have no other duties other than those specified in this section and shall be onsite at all times the system is operating.
    c. Operators shall have a minimum of three (3) years full time documented experience operating Ecology-approved treatment systems.

d. Operators shall be Ecology-certified and current Contractor Erosion and Sediment Control Leads (CESCL).

e. Contractor shall submit resumes and certification documentation.

3.03 EFFLUENT DISCHARGE PERFORMANCE CRITERIA

A. All discharge from the project site shall be treated to meet the minimum effluent performance criteria for oil/water separation, pH, and turbidity as described in Table 1 of this Section.

Measurement Parameter for Treated Water (flow-through)	**Monitoring Location**	**Frequency of Sampling Flow Through Treatment**	**Frequency of Sampling Batch Treatment**	**Minimum Performance Criteria**
Turbidity	Pre-treatment in detention facility	Every 15 minutes	1 per batch	<500 NTU
Turbidity	Post-treatment Effluent	Every 15 minutes[1]	1 per batch	5 NTU Maximum daily average[2]
pH	Post-treatment Effluent	Every 15 minutes[1]	1 per batch	6.5-8.5
Total Petroleum Hydrocarbon	Detention Facility	4 times per operating day	1 per batch	No visual Sheen. If visual sheen then 5 mg/L.[3]
Flow	Post-treatment Effluent	Every 15 minutes[1]	1 per batch	Report, including maximum discharge rate

TABLE 1- EFFLUENT DISCHARGE PERFORMANCE CRITERIA

3.04 SAMPLING AND CHEMICAL ANALYSIS

A. Sampling and laboratory analysis of effluent discharges shall be performed by the Contractor per Table 1 in this Section.

B. The Contractor shall be responsible for all additional sampling and analysis necessary to monitor system performance and verify compliance with this Section.

C. Residual flocculent testing shall be completed daily

3.05 RECORDKEEPING

A. Daily treatment logs shall be submitted to the Engineer as part of the Contractor Daily Report.

B. At a minimum, the daily treatment logs shall include:

1. CTAPE reporting and record keeping requirements
2. Cumulative inflow volumes using ultrasonic totalizing meter
3. Cumulative discharge volumes using ultrasonic totalizing meter
4. Total hours of system operation
5. Total hours of discharge
6. System maintenance items
7. Test data as specified in this Section
8. Documentation of analysis conducted in Section 3.03

C. The Contractor shall submit a monthly summary report to the Engineer by the 7th of each month. The report shall summarize the following results for the previous month:

1. Minimum and maximum average daily turbidity
2. Minimum and maximum pH
3. Visual sheen and any required test results for TPH.
4. Minimum, maximum and average daily flow
5. Total monthly flow
6. Residual flocculent test results.
7. Electronic format of all records.

D. Reports of non-conformances or upset conditions including releases shall be documented in the Contractor Daily Report.

E. Reports of changes in system configuration or operation due to changing conditions shall be documented in the Contractor Daily Report.

F. All records shall be kept in hard copy and electronic format suitable to the Engineer.

3.06 SYSTEM REMOVAL AND CLEANING

A. The Contractor shall clean, flush, jet and vactor out all sediment accumulated in Port conveyances including, but not limited to, storm pipes, manholes, vaults, ponds and ditches. The cleaning operation shall not flush sediment laden water or debris into the active downstream storm system.

3.07 EMERGENCY RESPONSE

A. The Contractor shall be available 24 hours per day, seven days per week to respond to system emergencies.

B. The Contractor shall respond to system emergencies within one hour of notification by the Engineer.

3.08 DISPOSAL OF OTHER RESIDUALS

A. Contractor shall manage oil and sediment/sludge produced by the treatment system for disposal with excavated soil ensuring that they meet all transportation laws and regulations and the receiving landfill requirements.

B. Contractor shall manage any spent filtration media with excavated soil

3.09 STORMWATER STORAGE

A. It is the responsibility of the Contractor to verify the adequacy of the existing, specified facilities for use with their proposed water treatment system. The Contractor shall supplement the storage of the existing facilities as required with stormwater storage tanks.

B. The Contractor shall install additional stormwater storage tanks, within the allowable stormwater storage and treatment area as required.

C. The Contractor is responsible for conveying construction stormwater within each work area to the specified stormwater storage and treatment area.

D. Temporary piping, structures and pump facilities required for the conveyance are the responsibility of the Contractor.

E. The construction stormwater shall be held in the specified storage until treated, hauled and disposed of by the Contractor.

F. Contractor furnished storage and treatment facilities including pads, access roads, ramps, temporary structures and piping shall be removed at the completion of the work or as directed by the Engineer.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

Coordinate with Design Engineer and Erosion Control/Stormwater Engineer to estimate the maximum number of gallons that will need to be processed for the specific project. This may also be edited to include an end date for the LS and/or a Force Account for additional gallons.

A. Measurement and Payment for “Construction Water Management System” will be made at the contract lump sum price as stated in the Schedule of Unit Prices and shall be full compensation for furnishing all labor, hardware, equipment, materials, consumables, rentals, and tools to implement and maintain the CWMP to manage up to [____] gallons of water. It includes implementation of temporary stormwater conveyances, storage systems, truckin, discharging, sampling, documentation, and other measures as specified herein through the duration of the Contract, with the exception of those items measured and paid for separately. Payments will be made as follows:

Payment percentages may be adjusted (ie 20/60/20) to reflect specific project.

1. Upon receipt of the Construction Water Management Plan 25%
2. After NTP and before Substantial Completion, 50% will be pro rated and paid monthly for compliance with the CWMP. Non-compliance will result in withholding of payment for the month of non-compliance.

3. After Substantial Completion, 25% for completion.

[OR]

A. No separate measurement or payment will be made for the work required by this Section. The cost for this portion of the Work will be considered incidental to, and included in the payments made for the applicable bid items in the Lump Sum price bid for the Project.

End of Section