APPENDIX B – SECTION 404(b)(1) EVALUATION
TO THE RECORD OF DECISION
FOR
SEATTLE, PORT OF
(1996-4-02325)

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1. Introduction. This document was prepared pursuant to Section 404 of the Clean Water Act in accordance with Guidelines promulgated by the Environmental Protection Agency (EPA) for evaluating discharges of dredged or fill materials into waters of the United States [40 CFR §230].

I have determined with the inclusion of special conditions, the discharges associated with the proposed construction comply with all requirements of the Section 404(b)(1) Guidelines.

2. Project Description. The Port of Seattle [hereafter 'Port'] proposes to place fill in wetlands, streams, and jurisdictional drainage channels for construction at the Seattle-Tacoma International Airport (STIA). The work proposed is part of the proposed Master Plan Update (MPU) and includes the construction of an 8,500 foot third runway, two Runway Safety Areas (RSA), the South Aviation Support Area (SASA), the mitigation both on-site and at Auburn, the relocation of South 154th/156th Way, the discharge of fill material in Borrow Area 1 and the upgrade of an existing gravel haul road (located northeast of Borrow Area 4). The construction involves permanently impacting wetlands on and off-site totaling 19.62 acres and temporarily impacting wetlands totaling 5.51 acres on-site and 23.27 acres at Auburn [1]. Up to 980 linear feet of Miller Creek will be filled and relocated. Drainage channels in the Miller Creek basin (1,290 linear feet) and in the Des Moines Creek basin (100 linear feet) will also be impacted. A breakdown of the impacts for each project component can be found in Table 1.

Table 1. Summary of impacts

	Wetlands (acres)		Stream (LF)	Drainage Channels (LF)
	Permanent	Temporary		
Third Runway[a]	15.48	4.94	980	1,390
RSA	0.14	0.40		
SASA	2.78	0.17		
Borrow area and haul road	1.10	0		
Auburn mitigation	0.12	23.27		
Total	19.62	28.78	980	1,390

[a] Includes relocation of S 154th/156th Way and temporary mitigation impacts

[1] This distribution of the impact acreages between permanent and temporary are slightly different than reported in the final public notice dated 17 January 2001. See Paragraph 6 in Appendix C for details.

Work also proposed in the MPU, but not within the U.S. Army Corps of Engineers (Corps) jurisdiction includes, but is not limited to, extending Runway 34R to the south, improving and expanding the main terminal and access system, constructing a new air traffic control tower, developing new and expanding existing parking facilities, and developing a new north unit terminal, roadway system, and parking facility. Several of these projects have been put on hold as a result of the events of September 11th.

2(a) Location. The project is located at the STIA at SeaTac, Washington, with the exception of a portion of the proposed mitigation, which is located in Auburn, Washington. The proposed 8,500 foot Third Runway is to be located parallel to and west of the two existing runways. There will be 1,000 feet separating 16X/34X and 16R/34L (the middle runway) and a 2,500-foot separation from 16L/34R (the east runway). The improvements to the RSAs are located on the north end of the two existing runways. The SASA is to be located to the southeast of the existing runways. The borrow areas are located to the south of the airport between South 196th Street and South 216th Street. The project is located in Sections 20, 21, 28, 29, 32, and 33 of Township 23N, Range 4E and Sections 4 and 5 of Township 22N, Range 4E of the Des Moines 7.5 minute U.S. Geological Survey topographic map.

The proposed off-site mitigation at Auburn, Washington, is located between Auburn Way North and the Green River and south of S 277th Street. The site is located in Section 31 of Township 22N, Range 5E of the Auburn 7.5 minute U.S. Geological Survey topographic map.

Wetlands occur throughout the approximately 700-acre airport project area. Larger wetland areas are associated with Miller Creek in the north, northwest, and west-central portion of the third runway project. In the southwest portion of the runway project a wetland is associated with Walker Creek. In the SASA development area wetlands are associated with Des Moines Creek or located on the Tyee Valley Golf Course. Wetlands are also present in Borrow Area 1, an on-site borrow area. At the off-site mitigation area in Auburn, much of the west third of the 67 acre parcel is wetland.

2(b) Description of the Discharge Sites. Three areas at STIA will receive discharges to wetlands and other aquatic resources: a) the west side (third runway); b) Borrow Area 1 and the upgrade of an existing access road; and c) the area designated by the Port as the SASA.

The STIA and vicinity are within the Des Moines Drift Plain of the Puget Lowland. The Puget Lowland consists of a series of north south oriented ridges and depressions bordered on the west by the Olympic Mountains and on the east by the Cascade Mountains. The area around STIA occupies the top of a north-south ridge comprised of deposits from the Vashon glacial period. This ridge is dissected by several swales and gullies, some which have been partially filled as part of the grading performed during initial construction of the airfield and subsequent expansions. Deposits of the older Salmon Springs glacial period are exposed along the walls of stream and river valleys.

The off-site mitigation area in Auburn is within the historic Green River floodplain, a linear valley (depression) part of the Puget Lowland. The area consists of recently deposited fluvial materials from floods occurring regularly prior to the construction of Howard Hanson Dam in 1961 on the Green River. The topography is relatively flat and was a prime agricultural area prior to encroachment by urban development. The current land use is a mixture of agriculture uses and urban development. The off-site mitigation area has been an abandoned pasture for approximately 10 years.

2(b)(1) Third Runway. The site of the proposed third runway is underlain by glacial till, often with a thin covering of recessional outwash. Fill material ranging from 15 to 42 feet thick overlies the native soils at two locations within this area: one is located south of S. 176th Street and the second is located west of the airfield and north of S. 168th Street. The fill is of variable quality and consistency and contains variable amounts of asphalt and cement concrete and wood debris. Lenses of perched groundwater occur within the fill. Soft, wet soil and recessional outwash silt, ranging from 5 to 20 feet thick occur within swales extending across the proposed new parallel runway site.

The lower reaches of Miller Creek are salmon bearing waters. The upper reaches (starting about 0.2 miles upstream of SW 160th Street) are inaccessible to anadromous salmon. The other tributary streams flowing through the subject area are reaches functioning primarily as drainage or groundwater conveyances. The watershed is classified by Washington State Department of Ecology (Ecology) as having Class AA water quality, but stormwater runoff from residential, commercial, and agricultural properties has contributed to water quality degradation.

About 980 linear feet of the upper reaches of Miller Creek will be filled to allow construction of the runway. This portion of creek channel is a linear channel constructed to divert the creek around agricultural fields. This creek segment provides potential habitat for resident cutthroat trout and resident warm water fish (pumpkinseed, sunfish and sculpin). Barriers in the vicinity of 160th Street prevent anadromous salmon from using the upstream reaches of the creek. There are historic records of Sea-run cutthroat trout, coho salmon, and chum salmon occurring downstream. Currently, coho smolt and coho spawners have been report downstream of the barriers.

Chinook salmon are not known to occur in Miller (or Des Moines Creek). This is because the creek is probably too small to provide suitable habitat for this species. The streams do not provide suitable habitat for bull trout because of water quality conditions (high temperatures) and poor substrate conditions (excessive siltation).

In addition to filling a segment of Miller Creek, two drainage channels will also be filled, for a total of 1,390 linear feet. The drainage channels are located near 12th Avenue South and convey storm and surface water to down slope wetlands and Miller Creek. Portions of these channels are constructed drainage ditches. These channels are not known to contain fish and their small size, shallow water depths, and relatively steep gradients would prohibit significant fish use.

The third runway construction would result in the loss of about 15.48 acres of forested, shrub, and emergent wetlands. The construction would temporarily impact approximately 4.94 acres of emergent wetland. In addition, fill would be placed in 980 linear feet of stream channel, and 1,390 feet of drainage channels.

The Port proposes to mitigate adverse wetland impacts described above by restoring 11.95 acres and enhancing 15.8 acres of wetlands near STIA (on-site mitigation). The Port also proposes to establish about 49.98 acres of upland forested or shrub buffers near STIA to protect wetland and stream functions.

The Port proposes to mitigate (on-site) for loss of stream channel by constructing a new channel for Miller Creek (about 1,080 linear feet) and construction of over 1,290 linear feet of replacement drainage channels. In total, mitigation actions would restore wetland, stream, and riverine functions to approximately 1.5 miles of continuous reach of Miller Creek.

Off-site mitigation for impacts by the third runway would occur at a site in the City of Auburn, on the Green River. This project would convert about 19.50 acres of emergent wetland on abandoned farmland and 29.98 acres of upland grassland to emergent, shrub, and forested wetlands and open water wetlands. About 0.12 of an acre of emergent wetlands at Auburn would be lost due to construction of an access road. An additional 7.01 acres of emergent wetlands at the Auburn site would be temporarily impacted to facilitate construction of the new habitat features; this acreage will be restored after construction. Finally, about 15.9 acres of upland buffer would be established at Auburn to protect wetland habitats.

The west side of STIA where the third runway will be constructed contains a mixture of residential, commercial, and agricultural uses. Approximately 390 single-family residences, 260 condominium/apartment units, and 105 businesses have been or are in the process of being displaced for construction of the third runway and associated facilities.

2(b)(2) Borrow Area 1 and Haul Road. The Port proposes to use on-site source areas to provide fill for construction of the third runway and the SASA. These materials would be excavated from three on-site sources (designated by the Port as Borrow Areas 1, 3, and 4) and transported to the construction site. Wetlands exist at Borrow Areas 1 and 3, but the proposed excavation would directly impact only wetlands at Borrow Area 1. A Department of the Army permit is required because a discharge of fill material to wetlands would occur during the process of mechanical land clearing of Borrow Area 1 to access the borrow source. As such, the loss of wetlands in Borrow Area 1 is covered under this permit. Also, expansion of an existing gravel access road will require the replacement of an existing culvert with an extended culvert for a crossing on Des Moines Creek. This will impact a small area of wetland associated with the creek.

Wetlands in Borrow Area 1 are seasonally saturated forested and shrub-scrub wetlands. The project would result in the loss of 1.03 acres of forested and shrub-scrub wetlands. Expansion of the haul road would result in the loss of 0.07 of an acre of emergent wetlands associated with Des Moines Creek. Total wetland loss associated with Borrow Area 1 and the haul road is 1.10 acres.

2(b)(3) SASA. The SASA property consists of old fill materials (prior to 1970) on the southeast corner of the site. The lower, west side of the SASA is predominantly recessional outwash overlying glacial till. Lacustrine deposits, chiefly silt and clay, occur in the vicinity of Des Moines Creek near the western margin of the site. Fill material associated with the south end of the STIA covers the northwest corner of the site. Shallow (perched) groundwater occurs on the site at depths of 10 to 28 feet below ground surface.

Wetlands at the SASA are associated with seasonally wet depressions and hillside seeps. Placement of fill would result in the loss of 1.54 acres of forested wetland, and 0.14 of an acre of shrub wetland.

2(b)(4) Auburn Mitigation Site. This site is located in the northeast part of the City of Auburn. The site is located west of Auburn Way N. and south of 277th St. SE and consists of 67 acres of former agricultural lands. The Green River is located 200 feet to the east.

The site is nearly level with slopes ranging from 0 to 1 percent and elevations ranging from 45 to 50 feet above mean sea level. The geology of the site is characterized by relatively deep alluvial deposits that formed by historic channel migration and flooding of the Green River. Deposits on the site typically consist of silt and sand strata.

2(c) Method of Discharge. Material will be trucked onto the discharge sites from both on and off-site locations. The following sections summarize the discharge activities associated with each of the major construction sites.

2(c)(1) Third Runway. The new runway site would first be stripped of all vegetation and topsoil. Excavation of unsuitable subgrade materials beneath the proposed new runway, taxiways, and embankment toes would be required. Excavation would include 10 to 20 feet of soft soils in swales crossing the new runway and north safety area; two existing fills, ranging from 15 to 42 feet thick; and soils in wetlands. Temporary control of groundwater would be needed in the swale and wetland areas. Excavated materials would be either distributed over the infill area or disposed of at approved disposal sites.

Additional site preparation would include keying and benching along the existing embankment to create a stable fill base where the existing grades slope beneath the proposed new runway embankment. Streamflow within the swales crossing the proposed site would need to be intercepted and controlled to protect embankment fill stability. Subdrains will also be installed behind any reinforced earth slopes and walls.

The new runway would require construction of an extensive fill embankment to establish the proposed runway and runway safety area grades. Upon completion, runway grades would range from 410 feet above mean sea level (MSL) at the north threshold to 350 feet above MSL at the south threshold. To establish these grades, fill thickness would range up to approximately 160 feet at the maximum depth, with typical depths ranging between 30 and 100 feet. Cuts in existing grade of up to 20 feet would be required.

Fill slopes no steeper than 2 horizontal to 1 vertical are proposed for most of the safety area embankment west of the new parallel runway. The fill would be placed in layers using common construction techniques.

The Port proposes to construct three retaining walls to avoid and reduce embankment impacts on Miller Creek and wetlands. The walls range from 50 to 135 feet in maximum height. The retaining walls will be using mechanically stabilized earth (MSE) technology. MSE is a method of constructing earth embankments using a combination of compacted soil and reinforcing elements. MSE technology includes a range of steel and polymer (plastic) products (mesh, strips, and grids) used to retain and reinforce soil. The walls are part of the proposed embankment design minimizing the footprint of the fill in wetlands and Miller Creek.

MSE retaining walls are proposed in the following areas:

- At the north end of the embankment to limit the impacts to Miller Creek and the extent of filling of Wetlands A-1 and 9.
- Near the middle of the west side of the embankment to avoid filling part of Wetland 37a, and to avoid relocating part of Miller Creek.
- Near the south end of the new runway to limit the extent of filling of Wetland 44a.

2(c)(2) SASA Area. The SASA would require extensive earthwork to prepare the site for paving and construction of STIA support facilities. The finished area would be approximately 80 acres, of which about 56 acres would be paved including runway access to accommodate the movement and parking of aircraft. The remaining 24 acres will be buildings (primarily for aircraft maintenance); access roads and parking for cars and trucks, fill slopes, and landscaped buffers. The footprint area would be leveled to grades of about 0.7 percent by excavating the higher eastern side of the site and filling the lower west side of the site. Post-construction elevation would be about 450 feet above MSL. Fills up to 70 feet thick and cuts up to 60 feet would be necessary to achieve the proposed grades. Because groundwater has been observed at depths of less than 10 feet below ground surface, dewatering would be required in some areas during excavation.

Approximately 2.38 million cubic yards of material would be excavated, most of which would be used on-site as compacted backfill. About 0.22 million cubic yards of topsoil and other material not suitable for fill would need to be disposed of either on Port property for the runway safety area or off-site at an approved disposal site.

A series of retaining walls would be constructed around the site. A reinforced earth wall is proposed for the west side of the site. The walls would have a maximum height of 90 feet, and would be constructed in tiers about 30 feet in height with a 30-foot setback to the next tier. A permanent tieback pile wall would be necessary on the east side of the site. The tieback walls would have a maximum height of 63 feet and would be nearly vertical. Import fill would be needed to construct the wall, as on-site fill is unsuitable for this purpose because of its high moisture sensitivity.

2(c)(3) Borrow Area 1 and Haul Road. Approximately 4.2 million cubic yards of material will be excavated from Borrow Area 1. There are 1.83 acres of wetlands within Borrow Area 1 of which 1.03 acres will be lost due to project implementation. The excavation plan avoids several perimeter wetlands and maintains a 200-foot setback from the Des Moines Creek drainage system. The site will be graded after construction to create a slope draining toward the creek, through erosion, infiltration, and sediment control structures constructed along the west margins of the excavation. An existing access road will be upgraded to serve as a haul road for accessing the Borrow Areas. The road will need to be upgraded for the project, which includes extending an existing culvert for Des Moines Creek. This will require placing 580 cubic yards of fill in 0.07 of an acre of emergent wetlands associated with Des Moines Creek.

Topsoil will be replaced at the conclusion of the excavation at Borrow Area 1 and planted with grass or similar vegetation.[2]

2(c)(4) Auburn Mitigation Site. Construction of the wetland mitigation would include the following: A permanent access road would fill 0.12 of an acre of wetland through the placement of 18 inches of construction ballast consisting of 3 inches of crushed surface over 15 inches of shoulder ballast. Construction staging requirements, grading, excavating, installation of the irrigation system, and possible discing for planting would temporarily impact 23.27 acres of wetland. Following construction, the staging area will be removed and the wetlands enhanced by planting native trees and shrubs. Approximately 440,000 cubic yards of material will be excavated from wetland and non-wetland areas in order to create wetlands with a diversity of habitats. Approximately two-thirds of the material will be removed from the area and disposed of in an approved off-site location. The remaining will be stored and later used as replacement soil on site.

The wetlands being impacted to construct the off-site mitigation in Auburn are palustrine emergent wetlands dominated by pasture grasses. The wetlands have saturated soils during the winter and early spring months, and pond water to several inches in depth during periods of heavy rainfall.

2(d) Timing of Discharge. Site preparation and fill is planned between the months of March and October. However, should transport and discharge constraints occur,

[2] At this time the Port does not have any plans for redevelopment of the borrow areas. However, they do have an agreement with the city of SeaTac to pursue such redevelopment. If plans are developed in the future, the applicable permits must be obtained.

discharge may occur year round. Discharges related to the third runway are expected to be completed by 2006. Discharges related to the RSA are expected to be completed in 2007 and discharges associated with the SASA by 2009. Excavation of the on-site borrow source are expected to begin in early 2003 and be complete by end of 2009. Discharges at the Auburn mitigation site are expected to be completed by 2004.

2(e) Sources and General Characteristics of Material. Fill material to be delivered to the project site will come from State approved sources as directed by Ecology's Water Quality Certification (WQC) dated 21 September 2001 for this project. As described in Paragraphs 9(C) and 10(A)(7) in the ROD, the Pollution Control Hearing Board (PCHB) revised the fill criteria.[3] The Corps has reviewed the PCHB condition, the WQC, the USFWS BO, and the various other comments provided regarding the fill criteria and have determined the fill criteria provided in the WQC are protective of the aquatic environment. Therefore, the PCHB condition was not added as a special condition to the Corps permit.

2(e)(1) Third Runway. Approximately 17.2 million cubic yards of materials will be necessary for the construction of the runway. Of this 3.1 million has been delivered and stockpiled on the site on upland areas. An additional 14.1 million cubic yards will be necessary to complete the project. Approximately 6.1 million cubic yards will come from the on-site borrow sources of Borrow Area 1, 3, and 4. Borrow Area 1 is the only site impacting wetlands and is discussed in Section 2(e)(3) below. The remaining 8 million cubic yards will be imported from suitable off-site locations.

2(e)(2) SASA Area. Approximately 2.38 million cubic yards of material would be excavated, most of which would be used on-site as compacted backfill. About 0.22 million cubic yards of topsoil and other material not suitable for fill would need to be disposed of either on Port property for the runway safety area or off-site at a pre-approved disposal site.

2(e)(3) Borrow Area 1 and Haul Road. The quantity of material to be mechanically land-cleared at the Borrow Area 1 is unknown due to the nature of the mechanical land clearing and reclamation activities. All materials discharged into the wetlands will be from on-site sources, including stockpiled topsoil used to reclaim the site after use. Approximately 580 cubic yards would be used to expand a culvert under an existing gravel road for upgrading of the haul road. Fill materials suitable for the haul road will be imported from a suitable off-site location.

2(e)(4) Auburn Mitigation Site. Approximately 6,000 cubic yards of fill material for construction of the construction access roads (crushed rock) will be from a suitable source. Material excavated from the on-site grading activity for wetland construction

[3] Both the Port and Ecology are appealing the PCHB condition revising the fill criteria. ACC is also appealing the PCHB decision. The appeals are still pending. If the appeals changes the PCHB decision, then the DE has the option of modifying, suspending, or revoking the DA permit to comply with the revised decision.

and from the drainage ditch enlargement will be exported from the site to an approved disposal site.

2(f) Quantity of Material. The development of the third runway embankment will require 17.2 million cubic yards of fill. The SASA site will require 2.38 million cubic yards.

3. Relevant Background of Corps Involvement. The Federal Aviation Administration (FAA) required that the Port prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) for the proposed work. The Corps agreed to be a cooperating agency under NEPA with the FAA because of the Port's need for a Department of the Army permit under Section 404 of the Clean Water Act. FAA published the Draft EIS in April 1995 with the Final EIS (FEIS) published in February 1996. FAA issued a Final Supplemental EIS (FSEIS) on May 1997; the FSEIS addressed issues based on a new forecast analysis of predicted use. The EIS addressed long-term needs for STIA and the regional transportation network in general. It also addressed a range of alternatives, including alternative modes of transportation, construction of a new airport or modifications to an existing airport, improvements in systems management, development alternatives at STIA, and no action. The FAA and the Port concluded the only practicable course of action was to construct a third parallel air carrier runway and other air transportation facilities at STIA. The FAA and the Port also concluded it is necessary to construct extensions of the RSAs to bring the runways into compliance with FAA standards and it is necessary to construct the SASA. The FAA completed their ROD on 3 July 1997 with a revised ROD issued on 8 August 2001.

As a cooperating agency under NEPA, the Corps concluded a number of upgrades and improvements proposed as part of the work at STIA do not require a Department of the Army permit under Section 404 of the Clean Water Act. These projects include, but are not limited to, the proposed terminal improvements, extension of runway 34R, parking and access improvements, and relocation, redevelopment and expansion of support facilities. However, other portions of the work do require the placement of fill in adjacent wetlands and other waters of the United States so a permit will be required.

On 16 March 1995, the Corps received a preliminary application from the Port (1995-4-00461) to confirm the wetland boundaries within the proposed MPU expansion area. Only portions of the wetlands were actually delineated because the consultants could not gain access to the wetland areas on private property prior to acquisition by the Port. Therefore, the Corps only verified the boundaries for a portion of the wetlands. However, the Corps agreed to go to public notice with an estimate for the remaining wetlands. On 20 March 1996 a pre-application meeting was held at the Corps' office in Seattle with Federal, State, and local agencies present. In the meeting, the proposed Third Runway, SASA, and mitigation site in Auburn were discussed.

On 19 December 1996, the Corps received a more complete permit application (1996-4-02325) for the placement of fill for the construction of the third runway, RSA improvements, and SASA. On 19 December 1997, a public notice was issued and

impacts were estimated to be 11.42 acres of wetlands filled and filling of 980 feet of Miller Creek, 2,280 feet of drainage channels in the Miller Creek basin, and 2,200 feet of Des Moines Creek. A wetland mitigation plan was included with this proposal. On 9 April 1998, a joint public hearing sponsored by the Corps and Ecology was held to gather more input from the public.

After reviewing the comments received and development of more detailed designs, the Port made some changes to the MPU projects. One major change was the Port gained access to most of the wetlands and one waterway within the proposed project area. Delineations were completed and then confirmed by the Corps. As a result, the wetlands impacts increased from the 11.42 acres to 18.33 acres and the drainage channel impacts were reduced from 4,480 linear feet to 1,390 linear feet (1,290 feet in Miller Creek and 100 feet in Des Moines Creek), and the direct impact to 2,200 feet of Des Moines Creek was eliminated. The amount of fill required was also reduced because of the inclusion of a large retaining wall at the embankment mid-section along Miller Creek. As the potential impacts changed, the proposed mitigation was modified to include the addition of in-stream fisheries enhancement work in Miller Creek, increased riparian buffers, restoration of farmed wetlands, and overall expansion of the areas to be restored and/or enhanced. Another change included the excavation of new floodplain areas to compensate for filled floodplain areas. On 30 September 1999, the Corps issued a revised public notice documenting these changes. A second public hearing was then held on 3 November 1999.

Many comments were received as a result of the second public notice and public hearing. Over the next year and continuing until the permit decision was made, the Port worked with the Corps and Ecology to gather the necessary information to address issues raised during the comment period. Because of the length of time it took to gather the information, Ecology determined they could not make a decision regarding the WQC within the required 1 year from issuance of the public notice. Therefore, on 29 September 2000, the Port withdrew their request for a Section 404 permit from the Corps. Consequently, the WQC was no longer needed.

On 27 October 2000, the Port resubmitted an application for the placement of fill for the construction of the third runway, RSA improvements, and SASA. A third public notice was issued on 27 December 2000 including an announcement for a public hearing on 26 and 27 January 2001. Revision to the proposal since the second public notice was issued included additional mitigation acreage at the Auburn site, design revisions to the in-stream work in Miller Creek, and slight modifications to the wetland impact acreage. The revisions were a result of addressing many of the issues previously raised.

Coordination with the Port and others continued throughout the decision making process to insure all of the issues raised in and after all the public comment periods were addressed. This included several meetings with the opposition groups, the Airport Communities Coalition (ACC) and the Regional Commission of Airport Affairs (RCAA).

3(a) Determination of Extent of Jurisdiction. On 16 March 1995, the Port requested a confirmation of jurisdiction in their project area under application number 1995-4-00461. The Corps received a delineation report in February 1995 entitled 'Jurisdictional Wetland Delineation for Seattle-Tacoma International Airport Master Plan Update.' The Corps' Memorandum for Record (MFR) (18 October 1996) confirmed wetlands numbered 1-32 as these were wetlands on Port property to which they had access. The 1995 report also identified wetlands numbered 33-54, but these were on property the Port did not have access to and could not be verified by the Corps. The Corps agreed to use size estimates for these wetlands until an on-site inspection was possible.

When access became possible and new information was made available through the project development process, the Corps continued to work with the Port to update wetland delineation information. In December of 2000, the Port submitted a document entitled 'Wetland Delineation Report – Master Plan Update Improvements, Seattle-Tacoma International Airport.' This document included all data and boundaries for wetland originally confirmed in the 18 October 1996 MFR and all new data and boundaries for wetlands identified and delineated during 1998-2000. The delineation report covered all wetlands at the proposed project site and at the Auburn mitigation site. The Corps confirmed that the December 2000 report correctly indicated the extent of jurisdiction at the project site (see MFR 'Field Review and Jurisdictional Summary, Final Edits February 2001').

3(b) Determination of Project Need. The Port, in conjunction with FAA, participated in studies demonstrating what they considered to be significant delays at STIA during poor weather conditions. The existing parallel runways only allow the use of one runway for landing during poor weather. The Port identified this condition as one that currently results in severe congested conditions during poor weather and will continue to be a worsening problem as airport operations increase in the future.

	FAA Delay Measurement
Suitable Delay	≤4 Minutes
Moderate Delay	5-7 Minutes
Severe Delay	>7 Minutes

The FAA recognizes a 4-minute delay average as a valid measure of suitable delay for efficient airport operation. FAA studies of airfield capacity and delay indicate delays will start escalating quickly at the 4-minute average. FAA considers average delays of 5 to 7 minutes for air carriers over a period of time as a moderate level of delay and considers average delays of 7 minutes as severe. Under current conditions at STIA, the Port stated the level of delay for good weather conditions is acceptable under FAA standards for current conditions and also very likely acceptable for foreseeable future condition. However, the Port identified their concern when weather transitioned from good weather to poorer conditions (Visual Flight Rules (VFR) 2 or worse), because average arrival delay dropped from 1.0 minute to 11.4 minutes.

The Corps asked the Port to further define the delay concern and any expected impacts associated with delay. They provided information originally included in the FSEIS,

which shows the expected (based on modeling projections) impacts of delay without the project. As demonstrated by the numbers in Table 2, STIA existing conditions can accommodate demand, but only in good weather conditions. Once weather conditions deteriorate, delay increases to what FAA has defined as 'severe delay.' The Port's additional information also stated that as the population of the greater Seattle-Tacoma metropolitan area increases, demand for airline travel would also increase. As such, the Port concluded transportation delays associated with air travel would likely increase with exponential effects during poor weather conditions as air travel demand increases.

Table 2
Projected Delays (in minutes) Based on Number of Yearly Operations

# of Operations	Delays (minutes)				
	VFR1[4]	VFR2	IFR1[5]	IFR2/3	All Weather
345,000	1.0	11.4	21.7	21.7	7.7
425,000	1.6	41.8	71.2	101.3	22.2
525,000	3.1	163.6	181.3	219.4	63.7

According to these projected results, STIA currently experiences severe delays pursuant to FAA's definition during poor weather conditions. The Port's projections indicate increased operations at any time (now and in the future) would exacerbate the current conditions.

The Corps requested the Port verify (or calibrate) the modeling results with actual data regarding the severity of delays during poor weather conditions. Early documents stated there are poor weather conditions 44% of the time at STIA, but the Corps was unsure how this related to actual delays during critical time periods. In addition, the Corps was unsure how the delay related to actual congestion at the existing facility.

The Port and FAA met with Corps on 13 April 2001 to discuss the implications of delay and how they relate to conditions at STIA. FAA and the Port provided information on the extent of their modeling efforts and how on-site data is used for model verification. Although the Corps was satisfied regarding the use of the model, the Corps requested that FAA and/or the Port demonstrate the delay pattern with actual numbers from STIA. FAA submitted a letter dated 19 September 2001 providing site-specific data in relation to the modeling projection. The Corps believes this information substantiated the pattern of recognizable delay associated with poor weather conditions (VFR2 or worse).

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[4] Visual Flight Rule or 'VFR' refers to weather conditions affecting the runway operating configuration. VFR 1 refers to conditions of good weather, which allows independent arrival and departures with dual approach streams. VFR 2 refers to more restricted visibility, which results in a single arrival stream. More information on the effects of weather conditions on runway operation are found at 'Seattle-Tacoma International Airport – Capacity Enhancement Plan Update, July, 1995.'

[5] Instrument Flight Rule or 'IFR' refers to weather conditions severe enough to limit visibility. IFR 1, IFR 2 and IFR 3 all refer to decreasing stages of weather severity and increasing restrictions on the runway operating configuration. All IFR conditions result in a single approach stream to the STIA. More information on the effects of weather conditions on runway operation are found at 'Seattle-Tacoma International Airport – Capacity Enhancement Plan Update, July, 1995.'

Year 2000 data indicated the average delay for IFR weather was approximately 15.13 minutes and the good weather average delay was 12 minutes. On a specific day of good weather (9 August 2001), average delay was 8.73 minutes while a VFR2 day (23 July 2001) resulted in an average delay of 17.71 minutes. While the Corps recognizes a delay is the result of a complex combination of factors, the Corps believes the FAA clearly demonstrated a pattern of increased delay during poor weather when safety conditions allowed only a single arrival stream on the existing runways.

During the processing of this application, the United States was attacked by terrorists on September 11th. This had, and continues to have, a profound implication on airline operation and the operation of airport facilities all over the nation. The Corps requested the Port re-evaluate their project need in light of the terrorist attack. The Corps asked whether or not decreased demand for flights and changes in airline patterns would result an improvement in the delay patterns. The Port responded in a letter dated 26 October 2001 and stated:

> …fundamental disparity between poor weather (single arrival streams) and good weather (dual arrival streams) remains the sole focus of the Port's proposed project to build the third runway – to enable the airport to have adequate separation between runways to enable dual arrival streams during poor weather conditions.

The FAA provided additional information in a letter dated 7 August 2002 stating "operational levels nationwide are expected to return to pre-September 11th levels sometime in 2003 or 2004." They further stated "[e]ven with fluctuations in traffic levels, improvement of poor weather operational capability is needed." The Corps is satisfied poor weather delay is a serious issue adversely impacting the current and future operation of this regional air transportation facility.

3(c) Determination of Project Purpose and Alternatives. An essential aspect of applying the "practicable alternative" provisions of the Section 404(b)(1) Guidelines to a particular Section 404 permit application is to decide what is the overall purpose of the planned activity requiring the proposed discharge of dredged or fill material. This is because alternatives under evaluation must be able to satisfy the project purpose. The Guidelines state "an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" [40 CFR §230.10(a)(2)].

The Corps makes independent determinations of what the project purpose is and whether all the Section 404(b)(1) Guidelines' practicable alternative analysis requirements have been satisfied. Although comments from the applicant, resource agencies, and the public are given full and complete consideration, none of these views are given any undue deference. While the Corps believes it is very important to consider the applicant's views regarding the project's purpose and the existence of (or lack of) practicable alternatives, the Corps must determine and evaluate these matters

independently. The project purpose must not be so narrowly defined so as to unduly restrict a reasonable search for potential practicable alternatives.

The Port's project purpose (as stated in the 27 December 2000 public notice) contained the following language:

> "The project purpose is to meet the public need for an efficient regional air transportation facility to meet anticipated future demand. The purpose is also described in the original and first revised public notices and remains the existing purpose of record for this application. The applicant proposes to accomplish the project purpose by implementing specific measures at STIA which are summarized as follows:
>
> - **Third Runway.** *Improve the poor weather airfield operating capability to accommodate aircraft activity with reduced delay in aircraft takeoffs and landings.* As aircraft operations at SeaTac have increased over the years, aircraft delay, particularly during poor weather conditions, has worsened. Recent forecasts predict continued increases in aircraft operations and continued worsening of aircraft delay during poor weather conditions. A third runway would allow SeaTac to operate two runways for landing during times of poor weather.
>
> - ***Runway Safety Areas (RSAs)****. Provide RSAs that meet current Federal Aviation Administration (FAA) standards.* An RSA is the ground surface surrounding a runway suitable for reducing the risk of injury/damage in the event that an airplane undershoots, overshoots, or veers off the runway. The RSAs on the two existing runways at SeaTac do not meet current FAA standards.
>
> - **South Aviation Support Area (SASA)**. *Develop an additional South Aviation Support Area* (SASA) *to accommodate aircraft maintenance facilities and air cargo facilities.* Expansion of main air terminal Concourse A and development of the new North Terminal would displace existing maintenance and air cargo facilities. These terminal facilities are required to accommodate projected passenger demand."

The Port proposed to accomplish this by implementing specific measures, which are summarized as follows:

- Improve the poor weather airfield operating capability to accommodate aircraft activity with reduced delay in aircraft takeoffs and landings.
- Provide runway safety areas meeting current FAA standards.
- Develop an additional South Aviation Support area (SASA) to accommodate aircraft maintenance facilities and air cargo facilities.

The Corps reviewed this project purpose and believes an efficient air transportation facility addresses the need identified by FAA and the Port. However, the Corps believes the implementing measures should not be used as part of the project purpose

because it would unduly restrict the review of potential alternatives to meet the project purpose. These should be viewed, rather, as the alternative proposed by the Port. Accordingly, the Corps defines the project purpose as:

> The project purpose is to meet the public need for an efficient regional air transportation facility to meet anticipated future demands.

The Corps has determined achievement of this project purpose does not require the project to be located in or adjoining waters of the United States, including wetlands as defined in 33 CFR § 328.3(a). Therefore, this project is not "water dependent". Pursuant to the 404(b)(1) Guidelines, alternatives with environmental impact to aquatic ecosystems are presumed to be available for non-water dependent projects unless clearly demonstrated otherwise [40 CFR § 230.10(a)(3)]. Accordingly, the Corps has conducted an independent analysis of the project to determine if a less environmentally damaging practicable alternative is available to meet the project purpose. This analysis is provided in the following Section (Section 4).

4. Analysis of Practicable Alternatives. The Port completed the Airport Comprehensive Planning Review and Airspace Update Study in the mid-1980s. The study concluded the existing runway system at STIA would not be capable of efficiently serving the increasing demand for air traffic in the future. During the same time period, the FAA also initiated an Airport Capacity Enhancement Study, which concluded there was extensive delay at STIA in poor weather conditions as a result of the close spacing of the two existing runways.[6] In 1995, the FAA conducted a Capacity Enhancement Update Study, which confirmed the results of the earlier capacity study.[7]

In 1989, the Port and the Puget Sound Regional Council (PSRC) initiated a Flight Plan Project to study alternatives and recommend solutions for meeting the region's long-term air transportation needs.[8] As part of the Flight Plan Project, the Flight Plan Programmatic EIS ("FPEIS") analyzed 34 alternative strategies for meeting the region's air transportation needs.[9]

The Flight Plan Report concluded there was a need in the Puget Sound region to meet increasing demand for air transportation services, and it recommended implementation of a multiple airport system, including the addition of a new air carrier runway at STIA.[10] A search was conducted of potential sites for a replacement or supplemental airport and a detailed study was conducted of the most likely sites. The sites studied in detail included Boeing Field, Paine Field, Arlington Airport, McChord Air Force Base, and potential new sites in central Pierce County and in the Black Lake area of Thurston County.

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[6] Seattle-Tacoma International Airport Capacity Enhancement Plan (June 1991).
[7] FAA Capacity Enhancement Update Study (1995).
[8] The Flight Plan Project – Final Environmental Impact Statement (October 1992).
[9] Flight Plan Draft and Final EIS.
[10] Flight Plan FEIS, supra.

In April 1993, in response to the recommendations in the Flight Plan Study, the PSRC General Assembly amended the Regional Transportation Plan to authorize development of a third runway at STIA, with certain contingencies. Those contingencies included demonstrating the feasibility of the development of a supplemental airport site and the feasibility of demand management and system management programs to replace the need for a third runway. The Port also needed to develop and implement noise reduction performance objectives based on independent evaluation and measurement of noise impacts.[11]

In early 1994, the PSRC conducted the *Major Supplemental Airport Feasibility Study* ("MSA") to consider the feasibility of a major supplemental airport. The study concluded "there are no feasible sites for a major supplemental airport within the four-county region" and further studies of alternative sites would not be undertaken.[12]

Following the MSA and other studies, the PSRC determined they would continue to support a third runway at STIA, with additional noise reduction measures.[13] On 11 July 1996, the PSRC General Assembly recommended a third runway at STIA, with additional noise reduction measures.

The 1992 FPEIS considered site-specific and programmatic alternatives to construction of a third runway at STIA as possible solutions to the projected capacity. These alternatives included:

- No action
- Limited expansion of STIA
- Expansion of STIA, including a new air carrier runway
- Closure of STIA and development of a replacement airport
- Multiple airport system involving STIA and one or more smaller supplemental airports
- A single remote airport to be functionally linked to STIA
- Demand management measures
- New air navigation and airplane technologies
- High-speed ground transportation

The Puget Sound Air Transportation Committee ("PSATC") evaluated these system alternatives based on a series of criteria which included: i) airspace and the presence of conflicts with other airports or terrain; ii) operational capacity; iii) accessibility to the region's residents; iv) economic impacts; and v) implementation feasibility. The screening process resulted in a recommendation for further study of: a multiple airport system including the addition of a third runway at STIA; a replacement airport; use of Boeing Field as a close-in remote airport; and continued use of STIA in conjunction with

[11] See Master Plan EIS ("EIS").I (Project Background).
[12] PSRC Executive Board Resolution EB 94-01 (10-27-94).
[13] April 25, 1996 Minutes of PSRC Executive Board

demand management, new technologies, and alternate modes of transportation. The following is a summary of this analysis:

- The PSATC rejected the no action alternative because it would not have aleviated the region's projected air capacity shortfall. The estimates indicated STIA would soon reach its efficient capacity. They projected delays to be unacceptable, especially during times of peak travel or inclement weather. The PSATC believed failure to take action would also result in negative environmental impacts, including increased air pollution and noise, and could potentially impact the safety of the flying public.
- The PSATC considered various demand management strategies, including optimizing aircraft size and varible ticket pricing, to maximize the efficient use of the existing airspace capacity. The PSATC concluded, while such stragegies might provide some short-term relieve while capacity improvements were made, demand management techniques alone would not solve the region's air transportation problems.
- The PSATC concluded new technologies, such as super-sized or tilt-rotor aircraft can play a role in operational efficiency but were too speculative and could not be relied upon to provide sufficient capacity relief and avert the expected shortfall.
- The PSATC assumed high speed ground transportation could reduce flight operations to Portland, Oregon and Vancover, British Columbia by about one-half (40,000 operations/year) by the year 2020. Despite this reduction, the PSATC concluded that STIA would still face a capacity shortfall of 104,000 operations per year.
- The PSATC concluded growth would not occur at a remote airport site until the air capacity delay and its associated cost at STIA created an impetus for airlines to move their operations to the remote airfield, which would not occur in the foreseeable future. The PSATC rejected the Moses Lake remote field option because it would require some form of high-speed ground transportation link between STIA and the remote airport. The ground transportation requirement would also result in greatly increased travel times and reduce the convenient movement of goods and people. The PSATC rejected locating the remote field at Boeing Field because this option would provide only limited capacity enhancement to STIA due to significant airspace conflicts with STIA resulting from the proximity of the two airports and the alignments of their runways. Also, Boeing Field already relieves traffic at STIA by accepting general aviation aircraft.
- The PSATC rejected the closure of STIA and construction of a large airport capable of handling the region's air transportation needs. They concluded a replacement airport would come at a significant economic cost and would likely result in substantial environmental impacts, since no replacement sites exist close to urban centers. Locating the airport in a rural area would increase urban sprawl, would increase travel times and associated costs, and would negatively impact the region's air quality because of increased vehicle emissions.

The 1992 FPEIS examined many of the alternative airport sites that were later included in the MSA and analyzed the potential impacts on wetlands and wildlife habitat. The

FPEIS reached the following conclusions regarding the environmental impacts of construction of a supplemental airport:

- Arlington Airport. The FPEIS concluded the "long-term and cumulative impacts caused by the increased impervious surface area, potential contamination by pollutants and peripheral land development is likely to impact water quality and quantity." Construction would also impact salmon-bearing streams.
- Paine Field. The FPEIS concluded much of the land around Paine Field has been disturbed by urban development. Some shrub lands and wooded areas with second-growth coniferous and broadleaf trees still remain. There are also large wetland areas with open water, emergent, forested and scrub/shrub habitats immediately to the south and east of Paine Field.
- Central Pierce County. The FPEIS concluded development of this site would have resulted in the permanent loss of more than two square miles of relatively undisturbed habitat and some forested and scrub/shrub wetlands.
- McChord Air Force Base. The FPEIS concluded development at the McChord site would have impacted water quality and quantity in Clover Creek, a salmon-bearing stream.
- Fort Lewis. The FPEIS concluded development of a two-runway airport at the eastern-edge of Fort Lewis would have resulted in the permanent loss of two to three square miles of forested habitat with interspersed natural prairies and isolated wetlands. Development at this site would be expected to impact water quality in Muck and South creeks and their associated wetlands. These streams are salmon bearing. Additionally, the site contains threatened or endangered species, including bald eagles *(Haliaeetus leucocephalus*) and most of Fort Lewis has been designated as critical habitat for the Northern Spotted Owl.
- Loveland. The FPEIS concluded the Loveland site is very close to the Fort Lewis site and would have had similar impacts on environmentally sensitive areas and threatened or endangered species.
- Olympia/Black Lake. The FPEIS concluded "development of the Olympia/Black Lake option would significantly disrupt this migration route as well as result in a large incidence of bird strikes or collisions of bird flocks and aircraft.

The MSA included an initial list of 40 potential sites and was developed from numerous sources, including the Flight Plan Project, existing commercial, general aviation and military airports in the Puget Sound region, and review of USGS maps for level areas large enough to accommodate an airport.

The MSA identified a potential site as having enough space to accommodate two parallel, independent runways, with a minimum separation of 2,400 feet. Sites were classified as unacceptable if significant physical obstructions (major hills, cliffs, and bodies of water) existed within the footprint that would prohibit development. Approximately 25 sites satisfied the initial size and lack of obstructions criteria. Six of these sites were then eliminated due to their location outside of Pierce, Kitsap, King, or Snohomish Counties. The 19 remaining sites were then rated for accessibility, instrument approach capability, local airspace, site construction, site expansion

potential, noise impacts, and environmental impacts.[14] This secondary screening resulted in a reduction to twelve potential sites.

On 27 October 1994, the PSRC adopted Resolution EB 94-01, which concluded a major supplemental airport was not feasible. The rationale for the decision included the increased cost of a new airport over the cost of constructing a third runway at STIA, opposition from air carriers to the concept of a supplemental airport, questions regarding the long-term need for a supplemental airport in light of emerging transportation technologies, and support from a variety of labor, business and community groups for the concept of construction of a third runway at STIA.

Also in response to the PSATC Flight Plan Study, the Port undertook a comprehensive update to the STIA Master Plan to evaluate the long-term facility needs at the airport and to develop an array of possible improvements for meeting forecast regional air travel demand to the year 2020. The Master Plan Update evaluated the ability of the existing facility at STIA to maintain an efficient level of service for the growing passenger and operational demands.

To evaluate the potential environmental impacts and mitigation measures for proposed airport improvements – including a new runway – the FAA and the Port entered into a memorandum of understanding (MOU) to serve as joint-lead agencies for preparing an EIS on the Airport Master Plan Update. The Corps served as a cooperating agency for this EIS.

The Master Plan Update/EIS reconsidered the broad system alternatives to constructing a new runway at STIA, including use of other modes of transportation, use of other existing airports, construction of a new airport, activity/demand management, use of technology, and delayed or blended alternatives. With regard to a new runway at STIA, the Master Plan Update included a detailed analysis of the range of potential lengths and separations for a new runway. On 3 July 1997, the FAA issued its Record of Decision (ROD) for the Master Plan Update Development Actions at STIA. On pp. 8 - 11 of the ROD, the FAA discussed its analysis of alternatives to the third runway. The ROD noted the FAA has participated for many years in regional attempts to find a solution to the STIA delay problem through a wide variety of alternatives. The studied alternatives included: development of a replacement or supplemental airport, the expanded use of existing airports, development of other modes of transportation, demand and system management alternatives, and use of additional air traffic and flight technology. The FAA emphasized it has in recent years made a number of procedural and technological improvements at STIA, which have increased the efficiency of air traffic flow. However, the FAA stated: "[W]e have now exhausted all known available and reasonable improvements of this nature. Additional technological and procedural alternatives which have been suggested are not reasonable solutions to the defined need...."

The following is a summary of the Port's analysis of alternatives submitted to the Corps in support of the proposed project:

[14] *Major Supplemental Airport Feasibility Study,* Working Paper Three, 3-9 (1 August 1994).

4(a) Criteria for Evaluation. The Port provided several criteria, which they applied to each alternative hierarchically. That is, if an alternative did not meet the first criterion, it was excluded from further consideration. The Port's criteria are as follows:

(1) Purpose and Need. The alternative had to effectively meet the project's purpose and need, namely, improving poor weather airfield operating capability to accommodate aircraft activity with an acceptable level of aircraft delay.
(2) Size. Any replacement or supplemental airport site had to have a minimum size of 2,140 acres, sufficient for two runways (one 10,000 feet and one 8,000 feet, with a 4,300 foot separation) and a terminal, as well as runway protection zones, parking, aircraft storage and ancillary services.
(3) Local Airspace Evaluation. Any replacement or supplemental airport site could not have physical obstructions (hills, bodies of water) within the footprint of the site or present conflicts with existing commercial, general aviation, military airports or military operational areas.
(4) Instrument Approach Capability. Any replacement or supplemental airport site had to meet FAA conditions for precision instrument approach slope and 150-foot horizontal surface.[15]
(5) Site Constructability. Any replacement or supplemental airport site was evaluated for constructability using eight different components, applied on a site-specific basis: earthwork; rockwork; paving; drainage; urban construction; demolition; major facility reconstruction; and access.
(6) Accessibility. The alternative could not be so remote from the central Puget Sound population that it failed to provide sufficient delay reduction to meet the project's purpose and need (i.e., the reduction in delay when compared to STIA was offset by the increased delay of accessing these sites). Sites were evaluated based on proximity to total population, residences, total employment, office/service employment and manufacturing employment.
(7) Natural Environment. Each replacement or supplemental site was evaluated for potential adverse environmental impacts. Areas of impact considered were: wetlands, fish bearing streams, water quality, air quality, impacts on other listed species, and noise.

The Corps reviewed these criteria and considered them generally acceptable for the purposes of this evaluation after the modifications included below. The Corps' modifications reflect an evaluation applying criteria equally to each alternative and clearly reflecting the project purpose. The Corps also rejected the Port's notion of a hierarchical approach because it would result in prematurely rejecting alternatives based on a potentially inappropriate interpretation of a given criterion.

[15] Federal Aviation Regulation (FAR) Part 77 requires for precision instrument approach slopes, a slope of no greater than 50:1 must be maintained for 10,000 feet from the end of the runway and a slope of 40:1 must be maintained for 40,000 feet from the end of the runway. A site presenting an obstruction that intruded into these slopes was rejected. The 150-foot horizontal surface criteria requires that, at an elevation of 150-feet above the runway elevation, there must be no obstacle extending into the horizontal plane within 10,000 feet in all directions of the edge of the runway, because such an obstacle would increase the minimum allowable space between aircraft approaching on instruments, thus lowering airport capacity. Sites not meeting this standard were rejected. (14 CFR Chapter 1 – Part 77, Section 25).

The Corps' criteria for determining if an alternative meets the project purpose are as follows:

(1) Meet Acceptable Standards for Average Aircraft Delay. An alternative must provide an acceptable level of aircraft delay as defined by the FAA.
(2) Size. An alternative must be of sufficient size for two runways (one 10,000 feet and one 8,000 feet, with a 4,300 foot separation) and a terminal, as well as runway protection zones, parking, aircraft storage and ancillary services.
(3) Local Airspace Evaluation. An alternative must not have physical obstructions (hills, bodies of water) within the footprint of the site or present conflicts with existing commercial, general aviation, military airports or military operational areas.
(4) Instrument Approach Capability. An alternative must meet FAA conditions for precision instrument approach slope and 150-foot horizontal surface.
(5) Site Constructability. An alternative must be constructible using eight different components applied on a site-specific basis: earthwork; rockwork; paving; drainage; urban construction; demolition; major facility reconstruction; and access.
(6) Accessibility. An alternative must serve the central Puget Sound population.
(7) Natural Environment. An alternative must not be more environmentally damaging than the proposed project.

4(b) Range of Alternatives. The Port proposed to evaluate alternatives based on those alternatives evaluated within the Flight Plan Project Report, the Master Plan Update, the Master Plan Update EIS and Supplemental EIS. The Corps accepts these alternatives as representative of a reasonable range. The alternatives are as follows:

(1) No Action. No major facility improvements at any Puget Sound airport except those already underway.
(2) Short-term capital projects at STIA. Build short-term capital projects and employ only options that may be implemented at STIA in the near future. The projects examined included a 5,000 foot runway for propeller airplanes, angled runway exits, installation of a Microwave Landing System (MLS), additional gates at the terminal, a new maintenance facility, and the South access road.
(3) Demand Management. Pricing and/or regulatory techniques encouraging the use of larger aircraft, flights during non-peak hours and diversion of passengers to other modes of travel.
(4) New Technologies. New aircraft, new traffic control procedures and other technologies enhancing airport capacity.
(5) High-Speed Ground Transportation. High-speed ground transport linking major urban areas to each other and STIA, replacing a number of current air and/or automobile trips.
(6) STIA in Combination With Other Alternatives. Existing configuration of STIA in conjunction with the maximum feasible package of: (a) demand management; (b) new technologies; and (c) alternate modes of transportation.
(7) Distant Remote Airport. A second airport located at some distance from STIA, operated in tandem with STIA, with ground transportation links, for example, Napavine Prairie or Moses Lake.

(8) Replacement/Supplemental Airport Sites. A number of alternative sites were evaluated as either potential replacement or supplemental airport sites.

SUMMARY OF SITES REVIEWED
(Ordered North to South)

SITE	LOCATION
Bellingham International	Existing Airport Site
Samish Bay	Northwest of Mount Vernon
Skagit Regional Bay View Airport	Existing Airport, Northwest of Mount Vernon
Stanwood/Conway	Two sites in area. West of I-5 near Snohomish/Skagit county line
Arlington Airport	Existing Airport Site
Marysville West	West of Marysville & I-5
Marysville East	Two sites in area. East of Marysville, N. of Lake Stevens
First Air Airport	Existing Airport, West of Monroe
Campbell Airfield	Existing Airport, East of Fall City
Harvey Field	Existing Airport, S. of Snohomish
Paine Field	Existing Airport Site, Snohomish County Airport
Bothell	North of Bothell (Mill Creek Area)
Martha Lake Airport	Existing Airport, Northwest of Mill Creek
Duvall	Northwest of Duvall
Redmond	East of Redmond
Boeing Field	Existing Airport
Renton (Boeing) Airport	Existing Airport
Port Orchard Airport	Existing Airport, West of Port Orchard
Port Angeles Airport	Existing Airport Site, Fairchild International
Lake Sawyer	West of Lake Sawyer & Black Diamond
Enumclaw	West of Enumclaw
Auburn Municipal Airport	Existing Airport, North of Auburn
Lake Tapps	East of Lake Tapps
Buckley	West of Buckley
Thun Field	Existing Airport, two sites in area
Shady Acres Airport	Existing Airport, East of Spanaway
Fredrickson	Southeast of Spanaway
Spanaway	South of Spanaway
Bremerton National Airport	Existing Airport, West of STIA
Gig Harbor	Gig Harbor Area
Tacoma Narrows Airport	Existing Airport
Central Pierce	Few miles East of Fort Lewis Military Reserve
Fort Lewis Military Reserve	South of the community of Elk Plain
Fort Lewis Gray Field	Existing Airport
Harts Lake	South of Fort Lewis Military Reserve
Tanwax Lake	South of Fort Lewis Military Reserve & West of Lake Tanwax

SITE	LOCATION
Kapowsin Airport	Existing Airport, North of Kapowsin Lake
Vashon Island	Vashon Island Area
McChord AFB	Existing Airport
Lacey	Northeast of Olympia
Olympia Airport	Existing Airport
Tenalquot	East of Olympia
Sunnydale	South of Olympia
Olympia/Black Lake	South of Tumwater

(9) Full Development at SeaTac Airport. Full development of STIA's existing site, roughly within the current boundaries, including construction of a third runway. A variation of this alternative is to develop a shorter runway (6,000' to 6,700') rather than the proposed 8,500' runway.

4(c) Evaluation of Alternatives. The Guidelines state '…no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact to the aquatic ecosystem. Further, "[A]n alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." Practicable alternatives not involving a discharge into a special aquatic site area are presumed to be available unless clearly demonstrated otherwise (see 40 CFR 230.10(a)).

The evaluation of each alternative pursuant to the criteria is as follows:

(1) No Action. The Port rejected this because it 'failed to provide sufficient reduction in delay.' As stated in Section 3(b), the Corps concurs with FAA and the Port's finding there is a defined need for the project and concurs the no-action alternative fails to meet the project purpose.

(2) Short-Term Capital Projects at STIA. Overall, the Port rejected this alternative because it failed to provide sufficient reduction in delay and therefore did not meet the project's purpose. However, the Port did build the new runway exits and new gates at the terminal. The FAA also tested the MLS and found it did not perform as expected so they did not implement the system. The Corps concurs this alternative does not meet the project purpose because it fails to address the issue of acceptable delay.

(3) Distant Remote Airport. The Port rejected this alternative because it 'failed to meet the project's purpose and need, as well as based on the failure to meet the accessibility criterion.' The Port stated all remote sites considered were so distant from the population center delay would be increased compared to STIA. They also stated airlines might be reluctant to use a remote airport because it may not be cost-effective for them to transfer operations. The Corps does not fully concur with the Port's rationale that airlines might not move. The Corps believes if sufficient conditions were present, a remote airport might reduce demand on STIA and would thereby reduce poor weather delay to more acceptable levels. However, the Corps

rejected this alternative because it would be located outside the major metropolitan area, which would necessitate the infrastructure be in place to transport people efficiently and effectively to the remote location (for example, high speed trains). This may occur at some time in the future, but it is not likely within the 2020 planning period projected by FAA. As such, a remote airport would not be able to reduce (and decrease) delay in the immediate or foreseeable future. This alternative, therefore, fails to meet criteria 1 and 6.

(4) Demand Management. The Master Plan Update FEIS considered demand management techniques such as discouraging air travel, diverting airline passengers to other modes of transportation, shifting a class of aircraft, such as commuters, all cargo or general aviation to other regional airports, encouraging use of larger aircraft with larger average seating capacity or higher load factors and shifting aircraft operations to non-peak periods of the day. The Port rejected demand management because of findings within the Flight Plan Study, which concluded, "demand management measures will at best delay for a few years the need for capacity improvements…. For purposes of this analysis, therefore, it was assumed the maximum demand management set of measures would delay capacity improvements for five years." The Port stated the PSRC Expert Panel on Noise and Demand/System Management supported the same conclusion in its 8 December 1994 final order on system/demand management. Lastly, the Port rejected this alternative because demand management techniques will not alleviate the bad weather operating conditions causing most of the delay at STIA. The Corps' review of the information indicated some aspects of demand management were already in operation and would likely continue to play a role in the future operation of the airport (larger aircraft, shifting operation to non-peak periods, etc). However, demand management itself would only result in incremental adjustments in delay (and were usually in conjunction with new technologies – see below) and would still not allow the use of both runways during poor weather. That is, demand management would not alleviate the need to shut one runway down during poor weather, although it does somewhat mitigate the severity of the delay. From this review, the Corps concurs demand management alone does not appear to reduce delay to the acceptable level, and therefore fails to meet Criterion 1.

(5) New Technologies. The Port reviewed the following new technologies for controlling air traffic, increasing arrival and monitoring and controlling traffic at the airport and in and around the terminal:

- Airport Surface Capacity Technology
- Terminal Airspace Capacity Technology
- Terminal Air Traffic Control Automation
- Precision Runway Monitor (PRM)
- Microwave Landing System
- Traffic Alert and Collision Avoidance System (TCAS)
- Localizer Directional Aid (LDA) Approaches
- Global Positioning System (GPS)
- Flight Management Systems (FMS)

The Port rejected all the new technology from further consideration because they believed there was insufficient evidence they would result in sufficient delay reduction to satisfy the project's purpose and need.[16] The Corps reviewed the new technology information and requested additional clarification from FAA in a letter dated 31 May 2001. FAA responded in a letter dated 19 June 2001, in which they provided additional explanation of the new technologies. They concluded:

> "…existing and upcoming new technology will only provide incremental benefits to address poor weather delay…. Our review of technologies currently available, under study, or in demonstration, has not found a technological solution that would allow the simultaneous dependent use of the existing runways in all weather conditions…."

The Corps concurs with the Port's conclusion after further review of FAA's assessment and applicability of the new technology. New technologies would not improve the ability to use both runways during poor weather and would not reduce demand during those times. This alternative fails to meet criterion 1 and was therefore rejected by the Corps from further consideration.

(6) High-Speed Ground Transportation. The Port rejected high-speed ground transport linking major urban areas to each other and to STIA because this alternative did not reduce delays to an acceptable level. They stated delay would actually be increased because of increased travel time to the airport. In addition, the Port stated less than 5% of the passengers using STIA were traveling to destinations where ground transportation was an efficient substitute for air travel.[17] The Corps does not concur with the Port's rationale because high-speed ground transportation may reduce the demand for air travel, which in turn would reduce delay. The argument this would increase delay because of travel time does not track with the concept of operational delay at the airport because of poor weather. However, the Corps rejects this alternative because high-speed ground transportation currently does not exist and is not likely to be implemented on a broad scale in the near future. The Corps concurs with the Port's statement that most of the public using the airport is not traveling to areas close enough to benefit from more efficient ground transportation. As such, this alternative would fail to significantly reduce demand, which would not assist in reducing delays and therefore fails to meet criterion 1.

(7) STIA in Combination With Other Alternatives. This alternative consists of a combination of the existing configuration of STIA, in conjunction with the demand management, new technologies, and alternate modes of transportation. The Port rejected this alternative because it failed to provide sufficient delay reduction to meet the project's purpose. The Corps requested FAA provide additional information on the ability of STIA to meet delay concerns without major construction at STIA. FAA replied in a letter dated 19 June 2001 with the following:

> "…existing and upcoming new technology will only provide incremental benefits to address the poor weather delay; all of which are significantly less than the

[16] Master Plan Update FEIS, pp. II-14 – II-18.
[17] Master Plan Update FEIS, p. II-2B – II3.

benefits of constructing a third parallel runway. As referenced in the 2001 Airport Capacity Benchmark Report, new technology and new procedures are expected to provide an approximate 5-percent increase in hourly operating capability benefit, while the new runway provides almost a 50-percent benefit, as it solves the poor arrival constraint. Our review of technologies currently available, under study, or in demonstration, has not found a technological solution that would allow the simultaneous dependent use of the existing runways in all weather conditions. This is largely because of wake turbulence and human factor limitations, for which solutions have not yet been identified.

Considering the FAA's finding, the Corps concurs with the Port's assessment of this alternative.

(8) Replacement Airport. The Port evaluated three potential replacement sites for a new regional airport: Central Pierce County, Olympia/Black Lake and Fort Lewis. The Port rejected all three sites because they would not reduce delay because of the length of time needed to construct a new airport and for the severe environmental impacts associated with the construction of a new facility. The Corps does not concur with the Port's delay reduction concern because construction of a new facility fits within the FAA's 2020 planning window. In theory, a new facility could provide sufficient operational capacity to meet future demands and thereby would reduce delay to acceptable levels within a reasonable time period. However, the Corps concurs with the Port's assessment that a new facility would have significant environmental impacts if it were located anywhere within the western Washington metropolitan regions. No sufficiently large tracts of land have been identified in the western Washington metropolitan area that does not have numerous wetlands and streams, especially in the three areas identified. The Corps therefore rejects this alternative because it would not be less environmentally damaging than the proposed project.

(9) Supplemental Airport. This alternative consists of building or modifying a second airport, which would be used as a supplement to STIA. The Port provided the following summary of their process for reviewing alternatives for supplemental airports.

- **Size.** The Port evaluated 40 potential sites evaluated and determined that 25 of those sites satisfied the size criterion (Criterion 2). The Port rejected the remaining 15 sites as too small. The Corps concurs with this finding.
- **Accessibility.** The Port rejected the following sites because they were not accessible to the central Puget Sound population center: Bremerton, Lacey, Olympia, Tenalquot, Sunnydale and Olympia/Black Lake. The Port also stated these sites were rejected because they would not provide sufficient delay reduction of the increased delay of accessing these sites. The Corps concurs these sites are outside the central Puget Sound population centers of Seattle and Tacoma. However, the Corps does not concur with the Port's findings on delay. The Corps is unaware that any of the operational delay statistics included the delay of getting to the airport facilities. This feature is not a factor in either reducing demand or reducing delay during poor weather conditions. However,

the Corps also rejected these alternatives from further consideration because they failed to meet Criterion 6 (Accessibility).

- **Instrument Approach Capability.** The Port evaluated sites based on minimal acceptable runway approach slopes for various instrument conditions and a 150-foot horizontal surface for 10,000 feet in any direction from the edge of the runway. The Port rejected the Lake Tapps, Buckley, and Thun Field sites because they failed to meet this criterion. The Corps concurs with the Port's findings; Lake Tapps, Buckley and Thun Field sites fail to meet Criterion 4 (Instrument Approach Capability).
- **Local Airspace Evaluation.** The Port evaluated sites for local airspace conflicts with the general aviation, commercial and military airfields in the Puget Sound area to determine if a site presented interference problems. Based on this analysis, the Port eliminated the Fort Lewis, Harts Lake, and Spanaway sites from further consideration. The Corps concurs with the Port's findings; Fort Lewis, Harts Lake, and Spanaway sites fail to meet Criterion 3 (Local Airspace Evaluation).
- **Site Constructability.** The Port evaluated the remaining sites for obvious constructability issues. Based on this evaluation, the Port rejected the Gig Harbor site (all other remaining sites were retained). This site would require extensive earthwork to flatten contours ranging from 60' to 400'. It would also require rockwork cuts of over 100' and rebuilding the road to Horseshoe Bay. The Corps concurs with the Port's finding; the Gig Harbor site fails to meet Criterion 5 (Site Constructability).
- **Natural Environment.** The Port reviewed the remaining supplemental sites for impacts to the natural environment (including wetlands; fish bearing streams; water quality; air quality; noise; and impacts on other listed species).

  The Port provided the following table.

Location	Wetlands Impacts (acres)	Stream Impacts (miles)	Wildlife Habitat Impacts (acres)
Stanwood	182	4.5	233
Arlington	45	2.3	124
Marysville West	75	6.2	232
Marysville East	185	0.0	0.0
Bothell/Mill Creek	92	0.0	170
Duvall	104	0.2	121
Redmond	187	1.0	335
Lake Sawyer	39	4.2	179
Enumclaw	83	0.0	92
McChord	166	4.1	196
Fredrickson	29	0.0	33
Tanwax Lake	78	0.0	77

From Major Supplemental Airport Feasibility Study, Working Paper Three, Preliminary Site Screening (Phase I) Evaluation, p. 9 (August 1994).

In addition to the analysis of the supplemental airport sites undertaken in connection with the MSA, in November 1999, the Port prepared a Supplemental Airport Site Wetland and Stream Analysis for the Arlington, Lake Sawyer and Fredrickson sites. The applicant obtained the following information:

Location	Wetlands Impacts (acres)	Stream Impacts (miles)
Arlington	329	3.0
Lake Sawyer	105-114	5.3
Fredrickson	101	0.3

Site Summary. The following is a summary for each of the 12 remaining sites, including the Corps' findings:

- **Stanwood.** The Port found this site failed to meet the accessibility criterion (Criterion 6) because it provided low access for the central Puget Sound population center. The Port also found this site also presented significant impacts to the natural environment (Criterion 7) and significant local airspace conflicts (Criterion 3), with mountains to the east and Whidbey Island Naval Air Station limiting instrument approach (Criterion 4) and present airspace conflicts. The Corps visited the Stanwood site on 27 March 2001 and found the site had a significant amount of open space, which included forested areas and wetlands. Church, Freedom, and Fisher creeks cross through the area. The Corps concurred with the Port's findings on Criterion 3 and 4; however, the Corps initial evaluation was inconclusive regarding environmental site characteristics. We requested additional information from FAA and the Port about site characteristics and, after further review, the Corps concurred the environmental impacts would likely be greater than the proposed project because of the extensive area of wetlands and streams throughout the site. The Corps rejected this site from further consideration because it fails to meet Criteria 3, 4, and 7.
- **Arlington.** The Port stated this site failed to meet the accessibility criterion (Criterion 6) because access to the central Puget Sound population center is low. The Port also stated this site presented significant impacts to the natural environment (Criterion 7) and the mountains to the east hindered instrument approach separation between aircraft (Criterion 4). The Corps visited this site on 27 March 2001 and concurred with the Port's findings on Criteria 4 and 6. However, the Corps initially concluded the Arlington site might be viable for development of a supplement airport because of the existing airport facilities and the apparent room for expansion. The Corps was also unable to clearly identify the extensive wetland areas indicated in the preliminary report. We requested additional information from FAA and the Port regarding the feasibility of this site. The information forwarded to the Corps showed the northern areas of the proposed site (immediately north of the existing airport) contained a significant area of wetlands and a tributary stream/riparian area to the Stillaguamish River. We also asked if the footprint of the expanded facility could be shifted to the south, which consisted mostly of open fields. However, the Port identified this area was already a part of the project footprint, so shifting would not result in the

avoidance of wetland impacts. As such, the Corps concurs this alternative is not less environmentally damaging (failure to meet Criterion 7) and also fails to meet Criteria 4 and 6.

- **Marysville West.** The Port stated this site failed under the accessibility criterion (Criterion 6), presented significant conflicts in local airspace (Criterion 3), and had the potential for large impacts on the natural environment (Criterion 7). The Port stated the site's access potential is the same as Stanwood and Arlington and that development of this site would resulted in impacts to 75 acres of wetlands, 232 acres of wildlife habitat and 6.2 miles of streams. This site is one with the most miles of fish habitat streams. Finally, the Port stated the site presented significant airspace conflict with Paine Field and Arlington Municipal Airport, requiring transfer of Arlington Municipal operations to this site. The Corps visited the site on 27 March 2001 and concurred with the Port's findings that the site is relatively remote from the central Puget Sound population (Criteria 6), in a poor approach location with hills immediately to the west (Criteria 3 and 4) and is in a relatively undisturbed natural environment containing both wetlands and streams (Criterion 7). Also, the majority of the site would be located on the Tulalip Indian Reservation and would require negotiations with the Tribal government as well as their approval. The Corps rejected this alternative from further consideration because it failed to meet Criteria 3, 4, 6, and 7.
- **Marysville East.** The Port rejected this site because of impacts to the natural environment (Criterion 7) and the presence of mountains to the north of this site caused it to fail under the instrument approach criterion (Criterion 4). The Port also stated the site failed to meet the accessibility criterion for the same reasons listed for Stanwood, Arlington, and Marysville West. The Corps visited the site on 27 March 2001 and, like the previous site, the Corps was able to clearly identified reasons why this site is unsuitable. The site is heavily forested, supports numerous bogs and is the headwaters for several important salmon-supporting creeks (i.e., Quilceda and Little Pilchuck) and therefore fails to meet Criterion 7. Power lines and the railroad also bisect the site and it is located within hilly terrain (Criterion 4). Lastly, it is relatively remote from the central Puget Sound population (Criterion 6). The Corps rejected this alternative from further consideration because it failed to meet Criteria 4, 6, and 7.
- **Bothell/Mill Creek.** The Port rejected this site because of significant impacts to the natural environment: development of this site would have resulted in impacts to 92 acres of wetlands and 172 acres of wildlife habitat, as well as containing a reported state "candidate" species. The Port stated the site also failed to meet the instrument approach criterion or the local airspace conflict criterion. The Corps visited the site on 27 March 2001 and concluded it was unsuitable for further consideration. The topography contains several steep ravines and would require extensive amounts of fill for construction (Criterion 5). The area also contains many bogs and headwater wetlands supporting the Bear Creek drainage, a critical drainage in King County (Criterion 7). The site was well away from major transportation corridors that would need to be upgraded to support airport traffic (Criterion 6). Airspace to the east also appears limited because of high hills (Criterion 4). The Corps also found power lines and a substation on the

site that would need to be relocated (Criterion 5). The Corps rejected this alternative from further consideration because it failed to meet Criteria 4, 5, 6, and 7.

- **Duvall.** The Port rejected this alternative because of impacts to the natural environment: development of this site would have resulted in impacts to 104 acres of wetlands, 121 acres of wildlife habitat and 0.2 miles of streams (Criterion 7). The Corps visited the site on 27 March 2001. Access to the site was difficult, so we were unable to view the site in its entirety. The site appears to be heavily forested with fairly steep ravines likely supporting wetlands (Criterion 7). The varied topography would require extensive cut and fill to level the area (Criterion 5). The aircraft approach appeared to be limited because of mountains to the east (Criterion 4). The site can only be accessed by minor arterials; so major highway improvements would also be necessary (Criterion 5). After further review of the Port's data and additional information found in the Major Supplemental Airport Feasibility Study (1994-1995), the Corps rejected this alternative from further consideration because it failed to meet Criteria 4, 5, and 7.
- **Redmond.** The Port rejected this site because it impacts 335 acres of wildlife habitat and so was the worst site in terms of the impacts to the natural environment (Criterion 7). The Port also stated this site presented problems under the instrument approach criterion, with mountains to the east and south of this site impacting approach slopes during inclement weather (Criterion 4). The Corps visited the site on 27 March 2001 and found the site much like the Duvall site in size and situation with approach problems (Criterion 4), heavily wooded with extensive wetlands, including extensive headwater wetlands for Bear Creek (Criterion 7), varied topography (Criterion 5), and no major transportation corridors close by (Criterion 5). The Corps rejected this site because it failed to meet Criteria 4, 5, and 7.
- **Lake Sawyer.** The Port rejected this site because it is the furthest away from the central Puget Sound population center and it would result in significant impacts to the natural environment. The Port stated development of this site would result in impacts to 114 acres of wetlands and well as 5.3 miles of habitat streams. The Corps visited the site on 28 March 2001 and concluded it was clearly unsuitable for further consideration. The site is relatively remote from central Puget Sound population centers (Criterion 6). The site would require a significant amount of cutting and filling and is not near any major transportation corridors (Criterion 5). The area is forested with Covington Creek bisecting the site (a Chinook bearing stream) and some small residential lakes would need to be filled (Criterion 7). This is a high wind area (near the Cascade foothills) resulting in significant approach problems (Criterion 4). The Corps rejected this alternative from further consideration because it failed to meet Criteria 4, 5, 6, and 7.
- **Enumclaw.** The Port rejected this site because of the similar accessibility issue identified for Lake Sawyer (Criteria 5 and 6) and would require upgrades to 17 miles of access roads (Criterion 5). The Port stated this site also failed in terms of impacts to the natural environment (83 acres of wetlands and 92 acres of wildlife habitat). The Corps visited this site on 28 March 2001 and found it was

remote (Criterion 6), located near the high wind areas of the Cascade foothills (Criterion 4), and contained numerous wetlands and streams (Criterion 7). The Corps rejected this alternative from further consideration because if failed to meet Criteria 4, 5, 6, and 7.

- **McChord AFB.** The Port rejected this because of significant problems in terms of local airspace conflicts, based on the proximity of this site to Fort Lewis and both Gray Field and the Fort Lewis Military Operational Area. The Port also stated impacts to the natural environment would also be high (166 acres of wetlands and 196 acres of wildlife habitat). The Corps visited this site on 28 March 2001. Our field assessment does not confirm the high concern for environmental impacts because of the existing airport on the site. However, this is an existing and operational Air Force facility used extensively for transport and is heavily used in support of current ongoing military activities (Criterion 3). The Corps rejected this site from further consideration because it failed to meet Criterion 3 and was therefore rejected from further consideration.
- **Fredrickson.** The Port rejected this alternative because local airspace conflicts for this site were significant, based on interference with both STIA and McChord (Criterion 3) and because of potential impacts to the natural environment (29 acres of wetlands and 33 acres of wildlife habitat) (Criterion 7). The Corps visited the site on 28 March 2001 and determined the site to be clearly unsuitable. The topography is rolling, which would require a great deal of cut and fill work to provide a suitable surface (Criterion 5). There appears to be extensive areas of wetlands and the site is located within the boundaries of the Clover Creek sole source aquifer (Criterion 7). The site would result in airspace conflicts, especially from McChord AFB (Criterion 3). The Corps rejected this site from further consideration because it fails to meet Criteria 3, 5, and 7.
- **Tanwax Lake.** The Port rejected this alternative because of significant impacts to the natural environment (Criterion 7) and local airspace conflicts were significant, due to interference with both STIA and McChord (Criterion 3). The Corps visited this site on 28 March 2001 and determined the site to be clearly unsuitable. The topography is rolling, which would require a great deal of cut and fill work to provide a suitable surface (Criterion 5). There appears to be extensive areas of wetlands (78 acres), streams, lakes, and wildlife habitat (77 acres) (Criterion 7). The site would result in airspace conflicts, especially from McChord AFB (Criterion 3). The Corps rejected this site from further consideration because it fails to meet Criteria 3, 5, and 7.
- **Additional Sites Considered by the Corps.** The Corps also reviewed the possibility of two additional supplemental airport sites: one at the existing Olympia Airport and one at Sanderson Field, near Shelton (site visits on 28 March 2001). Both sites were open, previously developed airfields that appeared to have minimal natural resources of concern. The only consideration is that both sites are a notable distance from the central Puget Sound population centers. The Corps ultimately rejected both sites because they fail Criterion 6 because they do not have sufficient population to support a major airport facility.

(10) Expand STIA. This alternative considers the full development of the existing airport site, including construction of a third runway. The Port stated construction

of the third runway meets the project's criteria and is less environmentally damaging than any other alternative.

4(d) The Corps' Summary of Alternatives. The Corps evaluated the extensive documentation provided by the Port, FAA, and the public on the ability to meet the project purpose. Because of the Corps' involvement with previous large-scale projects in the western Washington region, we are well aware of the difficulty of locating large tracts of undeveloped or underdeveloped land that would not result in significant impacts to wetlands and other aquatic resources as well as impacts to local communities and land uses. Quite literally, any available, environmentally benign project areas were developed long before the Port began consideration of this project. Considering this and the above analysis in 4(a) through 4(c), the Corps concurs with the Port's assessment that the proposed project represents the least environmentally damaging, practicable alternative available to meet the project purpose.

5. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C). The purpose of this section is to evaluate the various physical and chemical components, which characterize the non-living environment of the proposed site (in this case, at STIA), the substrate, and the water, including its dynamic characteristics [40 CFR §230.5(e)].

5(a) Substrate Impacts [40 CFR §230.20]. The substrate of the aquatic ecosystem underlies open waters of the United States and constitutes the surface of wetlands. It consists of organic and inorganic solid materials and includes water and other liquids or gases filling the spaces between solid particles. Excavation or filling activities can result in varying degrees of change in the complex physical, chemical, and biological characteristics of the substrate.

The substrates of 19.50 acres of wetlands will be permanently converted to uplands as a result of the grading and filling required to construct the projects. The substrate within the wetlands would be filled and modified to elevations suitable for the runway, runway safety area embankments, relocated S.154/156th Street, the SASA, and other project facilities.

Wetland mitigation in Auburn would permanently alter 0.12 of an acre of the wetlands to construct access roads to the site. Temporary impacts to wetland substrates would occur during construction of the mitigation project at Auburn. Temporary staging, grading, excavation, discing, and access fills will result in impacts to 23.27 acres of wetlands. Staging fill will be removed and the area restored to native substrates upon completion of construction. An additional 4.94 acres of wetlands for the third runway and 0.40 of an acre for the RSA will be temporarily impacted during construction. These areas will also be restored upon construction completion.

Up to 980 linear feet of Miller Creek will be filled and a new channel constructed. The aquatic substrate at the existing channel bed will be permanently lost and the new channel will result from converting upland substrates to aquatic substrates. Drainage

channels in the Miller Creek basin (1,290 linear feet) and in the Des Moines Creek basin (100 linear feet) will also be permanently lost. A breakdown of the impacts for each project component are shown in Table 5(a)-1.

Table 5(a)-1. Impacts to Wetlands and Other Waters of the United States

	Wetlands (acres)		Stream (LF)	Drainage Channels (LF)
	Permanent	Temporary		
Third Runway[a]	15.48	0.80	980	1,390
RSA	0.14	0.40		
SASA	2.78	0.17		
Borrow area and haul road	1.10	0		
Auburn mitigation	0.12	14.14		
Total	19.62	28.78	980	1,390

[a] Includes relocation of S 154th/156th Way and temporary mitigation impacts

Mitigation efforts both on-site and at Auburn will disrupt the existing substrates through restoration and enhancement actions, which will include excavation and planting. The new substrates are expected to be modified but will not loose substrate functions associated with wetlands (nutrient cycling, carbon cycling, invertebrate support).

5(b) Suspended Particulates/Turbidity Impacts (40 CFR §230.21). Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles, usually smaller than silt, and organic particles. Suspended particulates may enter water bodies as a result of land runoff, flooding, vegetation and planktonic breakdown, resuspension of bottom sediments, and human activities including excavation and filling activities. Filling activities can result in greatly elevated levels of suspended particulates in the water column for varying lengths of time. These new levels may reduce light penetration and lower the rate of photosynthesis and the primary productivity of an aquatic area if they last long enough. Sight-dependent species may suffer reduced feeding ability leading to limited growth and lowered resistance to disease if high levels of suspended particulates persist. The biological and the chemical content of the suspended material may react with the dissolved oxygen in the water, which can result in oxygen depletion.

Toxic metals and organics, pathogens, and viruses absorbed or adsorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or on the substrate. Significant increases in suspended particulate levels create highly visible and aesthetically displeasing turbid plumes. The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate, and duration of the discharge, particulate deposition, and the seasonal timing of the discharge.

Filling, excavating, and grading occurring during construction could cause increased sediment runoff from the area and result in potential sediment releases to ditch systems that connect to surface streams. These discharges could result in a temporary increase in the amount of suspended particulates and turbidity in water reaching the streams and waterways. If substantial, increases in suspended particulates and turbidity could negatively affect aquatic habitat for fish or other aquatic life and aesthetic values.

These impacts will be minimized by the use of best management practices to control runoff from the project area during construction and operation. General and specific requirements for stormwater management during construction and operations at STIA are discussed in the NPDES permit for the facility, the *Seattle-Tacoma International Airport Stormwater Pollution Prevention Plan*, and the *Preliminary Comprehensive Stormwater Management Plan for Sea-Tac International Airport Master Plan Improvements*, which are hereby incorporated in the evaluation. The NPDES permit requires the development of a Stormwater Pollution Prevention Plan (conditions S12 and S13 of Permit No. WA-002465-1), which demonstrates how the Port will control stormwater during operation and construction activities.[18] These requirements assure planning and implementation of adequate BMPs to control construction stormwater quality, including suspended particulates and turbidity. Washington State Water Quality Standards (WAC 173-201a) for Class AA waters limit increases in turbidity in Miller and Des Moines creeks to 5 Nephelometric turbidity units (NTU) above background conditions. If this standard is violated, regulatory action can be taken by Ecology to ensure the standard is met.

Construction water quality BMPs will also be required at the Auburn site pursuant to the 21 September 2001 WQC conditions for this project.

5(c) Water [40 CFR §230.22 (a-b)]. Water is part of the aquatic ecosystem in which organic and inorganic constituents are dissolved and suspended. It constitutes part of the liquid phase and is contained by the substrate. Water forms part of a dynamic aquatic life-supporting system. Water clarity, nutrients and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to its life-sustaining capabilities. The discharge of fill material can change the chemistry and the physical characteristics of the receiving water at a site through the introduction of chemical constituents in suspended or dissolved form. Changes in the clarity, color, odor, and taste of water and the addition of contaminants can reduce or eliminate the suitability of water bodies for populations of aquatic organisms, and for human consumption, recreation, and aesthetics.

Water quality in Miller, Walker, and Des Moines creeks could potentially be affected by the proposed project; this includes construction activities and increases in impervious surface that could lead to additional sediment and contaminants in stormwater runoff during the operating life of the projects. These potential water quality impacts and

[18] The PCHB also added several conditions regarding water quality concerns. Some of the conditions were added as special conditions to this permit. See Paragraph 9(C) of the ROD for additional discussion.

associated conservation and enhancement measures are discussed in the *Biological Assessment* (BA) (Port of Seattle, 2000b and c), the *Essential Fish Habitat Assessment* (EFH) (Port of Seattle, 2000a) and the *Natural Resource Mitigation Plan (*NRMP*) for Seattle-Tacoma International Airport Master Plan Update Improvements* (Port of Seattle 2001b).[19] No long-term adverse effects are anticipated on freshwater, estuarine, or marine aquatic habitat from construction or operation. The Green River could also be affected by the mitigation construction.

The 21 September 2001 WQC conditions for this project contains extensive requirements for the Port to maintain existing water quality for all receiving water bodies associated with this project. The PCHB also added 13 conditions regarding water quality. As discussed in Paragraph 9(C) of the ROD, 6 of the PCHB conditions have been added as special conditions to this permit. These conditions apply during both construction and project operation. Conditions contained in the WQC and the special conditions will provide rigorous protection measures to assure avoidance of degradation of existing to water quality. Better control of stormwater from the STIA may also improve some conditions in Miller and Des Moines Creek.

5(d) Current Patterns and Water Circulation [40 CFR §230.23(a-b)]. Current patterns and water circulation are the physical movements of water in the aquatic ecosystem. Currents and circulation respond to natural forces as modified by basin shape and cover, physical and chemical characteristics of water strata and masses, and energy dissipating factors.

The discharge of dredged or fill material can modify current patterns and water circulation by obstructing flow, changing the direction or velocity of water flow and circulation, or otherwise changing the dimensions of a water body. As a result, adverse changes can occur in location, structure, and dynamics of aquatic communities; substrate erosion and deposition rates; and the deposition of suspended particulates.

The fill would eliminate water circulation on 480 acres of the project footprint, including the 19.62 acres of wetlands. This reduces the ability of the site and its wetlands to retain sediments moving through the site under normal water circulation patterns. This fill would also eliminate the ability of the site and its wetlands to store surface and storm waters. Under storm conditions, flows may be diverted to other areas or other nearby aquatic ecosystems.

Water management from the project site and the proposed mitigation areas is of specific concern to the Corps and Ecology. The Corps has worked extensively with the Port and Ecology to develop a mitigation plan that will offset any impacts associated with increased storm flows during rain events to decreased water retention capabilities (lack of stream flow augmentation during the drought months). The Corps believes the

[19] The NRMP referenced throughout the ROD and Appendix B is the November 2001 version with corrections dated January 2002. Appendix C includes a review of both the December 2000 and November 2001, as amended, versions.

mitigation measures will offset any adverse impacts to existing flow and storage conditions. In addition, the 21 September 2001 WQC requires specific monitoring and mitigation measures to assure the beneficial uses of existing waters are preserved and/or enhanced. The PCHB also added 3 conditions regarding the wetland mitigation. As discussed in Paragraph 9(A) of the ROD, the Corps has not added these conditions to the permit. However, the Corps has added other special conditions to the permit regarding completion of the proposed mitigation and monitoring requirements (see Paragraphs 9(A) and 10(A)(5) and (10)(h) of the ROD).

Current patterns and water circulation at the Auburn mitigation site are not expected to be adversely impacted.

5(e) Normal Water Fluctuations [40 CFR §230.24(a-b)]. Normal water fluctuations in a natural freshwater aquatic system consist of daily, seasonal, and annual flood fluctuations in water level. Biological and physical components of such a system are either attuned to or characterized by these periodic water fluctuations.

The discharge of fill material can alter the normal water-level fluctuation pattern of an area, resulting in prolonged periods of inundation, exaggerated extremes of high and low water, or a static, nonfluctuating water level. Such water level modifications may alter erosion or sedimentation rates, aggravate water temperature extremes, and upset the nutrient and dissolved oxygen balance of the aquatic ecosystem. In addition, these modifications can alter or destroy communities and populations of aquatic animals and vegetation, induce populations of nuisance organisms, modify habitat, reduce food supplies, restrict movement of aquatic fauna, destroy spawning areas, and change adjacent, upstream and downstream areas.

Hydrologic modeling indicates the potential low stream flow impacts to Miller Creek would be a 0.01 cubic feet per second (CFS) increase. For Des Moines Creek, potential reductions in low stream flow would be less than 0.08 CFS. This baseflow reduction could reduce water depths in Des Moines Creek by up to 0.36 inches. For Walker Creek, potential reductions in low stream flow would be less than 0.11 CFS. These baseflow reductions could reduce water depths in Walker Creek by up to 0.12 inches. The Port has proposed low flow mitigation through the storage of stormwater in vaults to be released during low flow periods. A special condition has been added to the permit requiring the mitigation be performed. The PCHB also added conditions regarding low flow that were not added as conditions to this permit. See Paragraph 9(C) and 10(A)(6)(b) of the ROD for additional discussion regarding low flow and the proposed PCHB condition.

The proposed project will not adversely affect floodplain storage. Wetlands impacted in the area of Vacca Farm are within the 100-year floodplain of Miller Creek and perform flood-storage functions. These functions will be replaced by excavation of flood-storage on undeveloped portions of the Vacca Farm.

The proposed project will permanently change the pathways for water movement within the project area. Other potential long-term impacts include an increased magnitude, frequency, and duration in peak flow, increased erosion and sedimentation, and base and low flow impacts. Temporal impact will occur until the vegetation communities mature and stabilize so they can perform storm and floodwater resynchronization functions. Potential indirect impacts include changes to the vegetation community and wildlife use of the wetlands or habitat damage to streams either through erosion or reducing wetted areas if the hydroperiods are substantially changed.

The proposed on-site compensatory mitigation would be reconstructed with adequate capacity to convey flood flows. Miller Creek will be reconstructed with adequate capacity to convey and store peak plows without increasing downstream flows or flooding.

Normal water fluctuations at the Auburn mitigation site are not expected to be adversely impacted. The modification of the existing upland and wetland area is expected to provide beneficial aquatic habitat functions.

5(f) Salinity Gradients (40 CFR §230.25). Not applicable.

6. Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D). The purpose of this section is to identify and evaluate any special or critical characteristics of the project site, and surrounding areas which might be affected by use of the site, related to their living communities or human uses [40 CFR §230.5(f)].

6(a) Threatened/Endangered Species or Their Habitat [40 CFR §230.30 (a-c)]. An endangered species is a plant or animal in danger of extinction throughout all or a significant portion of its range. A threatened species is one in danger of becoming an endangered species in the foreseeable future throughout all or a significant portion of its range. The major potential impacts on threatened or endangered species from the discharge of dredged or fill material include:

1. Covering or otherwise directly killing the species.
2. The impairment or destruction of habitat to which these species are limited. Elements of the aquatic habitat which are particularly crucial to the continued survival of some threatened or endangered species include adequate good quality water, spawning and maturation areas, nesting areas, protective cover, adequate and reliable food supply, and resting areas for migratory species. Each of these elements can be adversely affected by changes in either the normal water conditions for clarity, chemical content, nutrient balance, dissolved oxygen, pH, temperature, salinity, current patterns, circulation and fluctuation, or the physical removal of habitat.
3. Facilitating incompatible activities

The U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion (BO) to FAA on 22 May 2001 regarding the proposed project.[20] Included in the BO were seven leachate impact reduction measures developed in negotiations between USFWS and the Port, who agreed to implement these measures. The BO concluded the proposed project is not likely to jeopardize the continued existence of the bull trout, bald eagle, or marbled murrelet. This is based on the finding that the proposed action is not likely to adversely affect these species. The USFWS recommended several conservation recommendations. As discussed in Paragraph 9(I)(1) of the ROD, I have determined these conservation recommendations do not need to be added as special conditions to the permit.

The National Marine Fisheries Service (NMFS) issued a letter to FAA on 31 May 2001, which concurred with FAA assessment of not likely to adversely affect Chinook salmon. The NMFS included several conservation recommendations. As discussed in Paragraph 9(I)(1) of the ROD, I have determined these conservation recommendations do not need to be added as special conditions to the permit.

6(b) Fish and other Aquatic Organisms in the Food Web [40 CFR §230.31(a-b)]. Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. The discharge of fill material can variously affect populations of fish, crustaceans, mollusks and other food web organisms through the release of contaminants which adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species. Suspended particulates settling on attached or buried eggs can smother the eggs by limiting or sealing off their exposure to oxygenated water. Discharges may result in the debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent.

Discharges can also redirect, delay, or stop the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations. Reduction of detrital feeding species or other representatives of lower trophic levels can impair the flow of energy from primary consumers to higher trophic levels. The reduction or potential elimination of food chain organism populations decreases the overall productivity and nutrient export capability of the ecosystem.

The aquatic food web is largely confined to Miller, Des Moines, and Walker creeks, and certain associated wetlands where the soils are inundated or saturated for much of the year. In the creeks, the aquatic food web consists of several trophic levels including fungi and bacteria; periphytic alga; invertebrate detritivoires, consumers, and predators; and several species of predatory fish. Fish-use in the creeks located near the airport

[20] The FAA was the lead federal agency for consultation under Section 7 of the Endangered Species Act for this project.

includes coho salmon, cutthroat trout, pumpkinseed sunfish, and three-spine stickleback. Amphibians are also likely to use the creek and riparian wetlands for dispersal, forage, and breeding. At Vacca Farm, Lora Lake, and the Tyee Valley Golf Course, waterfowl (including mallard duck, Canada Geese, and American widgeon) forage in wetlands, ponds, and the creek channels.

The aquatic food web of the creek is dependent in part on riparian conditions. Well-vegetated riparian areas present in some locations provide organic matter (small detritus, large woody debris, and insects) to the creek, which can become important to the aquatic organisms present.

Some terrestrial animals are likely dependent to some degree on the aquatic habitat and animal production of the creeks. Insectivorous birds may forage on semi-aquatic insects hatched from the creek sediments or riparian wetlands, great blue heron may feed on small fish, larger invertebrates, and amphibians inhabiting the creek. Additionally, some small mammals (such as raccoon) may feed in the creek on invertebrates (such as crayfish).

In the non-riparian wetlands affected by MPU projects, the food web is somewhat simpler, as the standing water providing true aquatic habitat is generally lacking. In these wetlands, wetland plant production would support bacterial and detritivoire insect populations. Plant matter and insects would provide food resources for semi-aquatic amphibians, terrestrial birds, and terrestrial small mammals.

Potential impacts to the aquatic food web were of particular concern to the Corps and are reflected in our evaluation of the proposed compensatory mitigation. Our specific concerns regarding the ability of the mitigation project to offset the loss of organic export (for food chain support) resulted in the Port submitting additional mitigation. The Corps believes the NRMP will offset any potential adverse impacts to food chain support. The 21 September 2001 WQC conditions require strict protection of beneficial uses of State waters, which include food chain support. The PCHB also added 3 conditions regarding the wetland mitigation. As discussed in Paragraph 9(A) of the ROD, the Corps has not added these conditions to the permit. However, the Corps has added other special conditions to the permit regarding completion of the proposed mitigation and monitoring requirements (see Paragraphs 9(A) and 10(A)(5) and (10)(h) of the ROD).

The Auburn mitigation consists of abandoned agricultural land dominated by grasses and forbs. The wetlands would be expected to produce plant matter, semi-aquatic insects, and terrestrial insects supporting small mammals and terrestrial bird life. Small mammals use the area for feeding and breeding. The site may provide foraging habitat for raptors, such as Northern harriers and red-tailed hawks. Apart from the tall pasture grasses there is a general lack of cover from predators and a lack of habitat complexity (e.g., pits and mounds, large woody debris) that provides for breeding, resting, and/or thermal cover for small mammals. For most passerine bird species, the site lacks habitat structure for nesting, protection from predators, thermal cover, or perching. A narrow band of shrub vegetation along the southern boundary provides limited forage

and perching habitat. Tracks or scat of coyote, mink, deer, and raccoon were observed on or near the mitigation site during the site assessment. Species observed on the site include kingfisher, short-eared owl, barn owl, common snipe, red-tailed hawk, common yellowthroat, and mallard duck. Most of these species appeared to be most abundant in the eastern portion of the site next to the Green River. The project is expected to enhance existing food chain support features.

6(c) Wildlife [40 CFR §230.32(a-b)]. Wildlife associated with aquatic ecosystems includes resident and transient mammals, birds, reptiles, and amphibians. This discharge of dredged or fill material can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. Increased water turbidity can adversely affect wildlife species that rely upon sight to feed, and disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms. The availability of contaminants from the discharge of fill material may lead to the bioaccumulation of such contaminants in wildlife. Changes in such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species and communities. In some aquatic environments, lowering plant and animal species diversity may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity.

Wildlife habitat within the STIA vicinity has been highly modified through urbanization and residential development. Much of the area is protected from human and domestic animal intrusion through restricted access and fencing. Vegetation communities provide habitat for several species of terrestrial and aquatic wildlife. Wildlife diversity is generally related to the structure and plant species composition within these vegetative communities. Fragmentation of habitat and significant ongoing noise disturbance caused by airport operations limit wildlife use of the area.[21] Wetlands and forested areas with well-developed shrub layers are likely to support the greatest number of species and populations of wildlife.[22] Common and scientific names of wildlife species discussed in the following text are presented in FEIS Appendix M.

Construction activities associated with airport development would result in the displacement of wildlife species. Highly mobile animals such as large mammals and birds are able to move away from disturbances into nearby habitats. It is generally assumed, however, these habitats are at or near carrying capacity and these animals would be required to compete for already limited resources. Less mobile animals such as small mammals, amphibians, reptiles, young animals, and nesting birds, would most likely perish during construction.

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[21] *Disturbance to birds by gas compressor noise stimulators, aircraft, and human activity in the Mackenzie Valley and North Slope, 1972.* Arct. Gas Biol. Rep. Ser. 14. Gunn, W.W.H., and J.A. Livingston, eds., 1974.

[22] *Management of Wildlife Habitats in Forests of Western Oregon and Washington, Vols.1 and 2*. Brown, E.R. (ed).,U.S. Forest Service, 1985.

Disturbance caused by construction activities may have an adverse impact on wildlife by disrupting feeding and nesting activities. Clearing and grading activities in the South Borrow Area, adjacent to the large forested tract that encompasses Des Moines Creek Park could have an impact on breeding wildlife. Neotropical migrant and resident songbirds use this habitat extensively for breeding. Significant noise disturbance, especially in this relatively undisturbed area of the site, could cause birds to abandon their nests.

A variety of small mammals and amphibians would be directly impacted by the loss of wetlands because they rely on these areas for foraging, breeding, and over wintering habitat. Because of their limited mobility, these taxa would likely perish during construction activities. Many of the aquatic habitats have been previously degraded by activities such as construction, fuel spills, and refuse dumping. Exposing soil and removing vegetation could result in an increase in sediments and other non-point pollutants entering adjacent wetlands, contributing to further degradation of aquatic habitat. Many amphibian species are sensitive to pollutants, and water quality in aquatic habitats on the site may be a limiting factor for some of these species.

Populations of species utilizing urbanized habitats such as American robin, European starling, house sparrow, raccoon, opossum, and deer mouse would likely increase after construction of the MPU and species utilizing older, more complex successional stages (forests, wetlands) would experience population decreases due to habitat loss.[23] There will be a net loss of wetland wildlife habitat in the Des Moines and Miller creek basins. Replacement of wetland habitat primarily for passerine birds and waterfowl will occur in Auburn.

The Corps was concerned regarding the loss of wildlife and passerine bird habitat due to the MPU projects. After considerable review and discussion, the Corps concluded the Port's ability to offset these impacts at the MPU was extremely limited due to lack of available land and the FAA and Port concerns about creating habitat attracting large numbers of birds and increase the potential for bird strikes during takeoff and landing. The Auburn mitigation site was included in the mitigation plan by the Port to compensate for loss of wildlife and passerine bird habitat. The Corps eventually concurred this was a suitable option because it is within the larger Water Resource Inventory Area (WRIA) number 9, which includes the Green and Duwamish Watershed as well as the smaller coastal streams (such as Miller and Des Moines Creeks) draining to Puget Sound. The Corps concluded the Auburn site could provide regional benefits to the WRIA. The Corps also concluded the compensatory mitigation within the smaller watersheds of the MPU will provide some habitat for passerine birds and wildlife, although it will not be specifically designed to do so (see Appendix C).

The Corps expects a net increase of wildlife habitat at the Auburn site, although construction will result in the temporary displacement and disturbance of small mammals and birds. This part of the mitigation is specifically designed to increase

[23] *Conservation Biology: The Science and Scarcity of Diversity*. Soulé, Michael E. 1986.

wildlife and passerine bird habitat by creating diverse wetlands over a relatively large parcel of land.

7. Potential Impacts on Special Aquatic Sites (Subpart E).

7(a) Sanctuaries and Refuges [40 CFR §230.40(a-b)]. Not applicable. No sanctuaries or refuges will be affected by the proposed project.

7(b) Wetlands [40 CFR §230.41]. Wetlands consist of areas inundated or saturated by surface or ground water 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. The discharge of fill materials in wetlands could damage or destroy habitat and adversely affect the biological productivity of wetland ecosystems by smothering, by dewatering, by permanently flooding, or by altering substrate elevation or periodicity of water movement. The addition of fill material may destroy wetland vegetation or result in advancement of succession to dry land species.

The MPU projects would permanently impact 19.62 acres and temporarily impact 28.78 acres of wetlands for the entire project, including the proposed off-site mitigation at Auburn. Appendix C of the ROD describes the wetlands, provides a functional assessment of them, and also describes the impacts in detail. The following is a summary of information in Appendix C.

The wetlands being impacted by the proposed project include forested, scrub/shrub, emergent, and open water areas with several of the wetlands containing at least two different vegetation classes. In the forested areas, there are many individual trees over 60 – 80 years but the majority average 20 – 40 years of age. The emergent wetlands include some farmed wetlands and wetlands within the fairways of the golf course. Using Ecology's wetland rating system, the majority of the wetlands being permanently impacted are Category III wetlands (61%), with 23% being Category II, and 16% Category IV. None of these wetlands are unique in nature for the Puget Sound region.

The functions supported by the wetlands include water quality (sediment, nutrient, heavy metal, toxic, and organics removal), hydrology (reduction of peak flows, decreasing erosion, groundwater recharge and discharge), and general habitat suitability (fish and amphibian habitat, aquatic food web conditions, invertebrate habitat, terrestrial bird, waterfowl, and other wildlife habitat, and native species richness). For water quality, the Corps has determined the majority of the wetlands are high functioning given the existing land uses, the landscape position of the wetlands, and the limited number of water quality treatment ponds within the area. The Corps also determined there is a range of ratings for the hydrology functions; depressional wetlands are high functioning for reducing storm peak flows and preventing downstream erosion in the area streams. In contrast, the slope wetlands perform this suite of functions at a low level. The small wetlands perform them at an even lower level given the limited opportunity and capacity for storage. As for habitat functions, the Corps has determined the on-site wetlands in general, rate highest for carbon export and food

chain support and to a lesser extent invertebrate, passerine bird, small mammal, and amphibian habitat. The Auburn wetlands rate as low overall for habitat support.

Potential permanent impacts include decreased opportunity for nutrient and sediment trapping, decreased opportunity to detain, retain, and filter stormwater, and increased pollutant and sediment loads to streams. Temporary impacts could occur during construction as a result of soil movement and disturbance. Temporal impacts will occur until the vegetation communities become reestablished and are able to perform their water quality functions. Indirect impacts could include a shift in food chain support due to any changes in water quality.

There will be a permanent loss of habitat in the areas being filled by the proposed project. This loss could alter or eliminate populations in the lower trophic levels, reduce the volume of organic particulate matter, eliminate or reduce wildlife migration corridors, etc. Temporary impacts could include disruption to wildlife utilizing adjacent areas, trimming of vegetation in shrub and forested wetlands for silt fence installation. Temporal impacts occurring include the reduction of habitat and carbon export until the vegetation is reestablished in the newly planted areas. Indirect impacts include the potential shift in food chain support functions.

The Port has proposed mitigation to offset the potential physical, chemical, and biological impacts to wetlands and the species supported by the wetlands, as documented in the NRMP, *Comprehensive Stormwater Management Plan*, *Low Streamflow Analysis*, and the *Wildlife Hazard Management Plan* (WHMP). A more detailed discussion of the compensatory mitigation can be found in Appendix C of the ROD.

The NRMP describes the compensatory mitigation voluntarily proposed by the Port to replace wetland and stream functions impacted by the proposal. The proposed mitigation includes wetland creation, restoration, and enhancement activities, stream enhancement in Miller Creek, riparian buffer enhancement in Miller and Des Moines creeks, replacement of drainage channels in the Miller Creek basin, and wetland restoration and enhancement at an off-site mitigation in Auburn. The Stormwater Plan addresses water quality and quantity impacts through the construction of detention ponds and vaults, implementation of treatment best management practices (BMPs) for new development, redevelopment, and retrofitted areas, and numerous actions to address water quality issues. The *Low Streamflow Analysis* addresses the potential low flow impacts through the construction of supplemental vaults so water can be released during the summer and early fall months to augment streamflow. The WHMP emphasizes the identification and abatement of wildlife hazards within the airfield environment, including the wetlands.

The Corps' evaluation of the Port's proposed mitigation concluded it would result in the creation, restoration, and enhancement of wetlands in a rough proportionality to the

project impact, considering both the nature and extent of the impacts.[24] See Appendix C for a detailed description of the proposed mitigation.

7(c) Mudflats [40 CFR §230.42]. Not applicable.

7(d) Vegetated Shallows [40 CFR §230.43]. Not applicable.

7(e) Coral Reefs [40 CFR §230.44]. Not applicable.

7(f) Riffle and Pool Complexes [40 CFR §230.45]. Riffle and pool complexes are important stream features because the riffles increase dissolved oxygen levels in the water and the pools provide refuge areas with slower stream velocities. Riffles typically are topographically high portions of the streambed with the substrate predominately gravel and cobbles and are constriction points. Pools generally form upstream of the riffles as the water backs up behind the constriction. Elimination of these complexes through the discharge of dredged or fill material could damage or destroy the habitat and adversely impact aeration and filtration capabilities, reduce habitat diversity, and/or change scouring and sedimentation rates and patterns.

All three of the creeks, Miller, Walker, and Des Moines, do have some riffle pool complexes. However, the loss of large woody debris and channel alterations has decreased the pool to riffle ratios. Miller Creek does support several deep pools and has some riffle-pool complexes in the enhancement area. However, most of the pools are not associated with riffles but are formed by modified channel features such as culverts and riprap. In Walker Creek the complexes are located west and downstream of Des Moines Memorial Parkway. Des Moines Creek does support some pools in the Tyee Valley Golf Course area with a higher frequency of occurrence below S 200th Street.

The proposed project will not directly impact any riffle-pool complexes through the discharge of dredged or fill material. However, in Miller Creek the proposed Miller Creek enhancement mitigation will be removing riprap, weirs, and debris from along the stream banks and in the streams and placing large woody debris, river boulders, and streambed gravels to restore more natural stream features and increase habitat complexity, including the riffle-pool ratio. In Des Moines Creek, buffer enhancement work in the Tyee Golf Course area will serve to protect the complexes and provide a source of large woody debris in the future to maintain the habitat complexity.

The Corps' evaluation of the Port's proposed in-stream mitigation concluded it would result in the creation, restoration, and enhancement of habitat complexity, including riffles and pools, in a rough proportionality to the project impact, considering both the nature and extent of the impacts. See Appendix C for a detailed description of the proposed mitigation.

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[24] See also Paragraphs 9(A) and 10(A)(5) of the ROD for a discussion regarding the PCHB's mitigation conditions.

8. Potential Effects on Human Use Characteristics (Subpart F). The purpose of this section is to identify and evaluate any special or critical characteristics of the project site, and surrounding areas which might be affected by use of the site, related to their living communities or human uses [40 CFR §230.5(f)].

8(a) Municipal and Private Water Supplies [40 CFR §230.50]. Municipal and private water supplies consist of surface water or ground water directed to the intake of a municipal or private water supply system. Possible losses of value includes discharges affecting the quality of water supplies with respect to color, taste, odor, chemical content and suspended particulate concentration, in such a way as to reduce the fitness of the water for consumption. Water can be rendered unpalatable or unhealthy by the addition of suspended particulates, viruses and pathogenic organisms, and dissolved materials. The expense of removing such substances before the water is delivered for consumption can be high. Discharges may also affect the quantity of water available for municipal and private water supplies. In addition, certain commonly used water treatment chemicals have the potential for combining with some suspended or dissolved substances from dredged or fill material to form other products having a toxic effect on consumers.

Chapter IV Section 18 of the FEIS presents the impact of the proposed project on "Public Services and Utilities". The Port serves as its own water district for the majority of the Airport property, with supplies obtained from the City of Seattle water system. No residential uses are connected to the STIA water system. Current water demand at the STIA is about 172 million gallons per year. By implementing planned conservation activities, annual water consumption was predicted to decline to about 166 million gallons per year by 2000. However, long-term water demand at the STIA is expected to increase with the forecast increase in passenger traffic. Based on air traffic projections presented in the FEIS and with implementation of recommended conservation activities, annual water consumption is forecast to increase to about 266 million gallons per year by 2010.

Five water utility agencies serve the STIA area. The five agencies are the Seattle Water Department, Water District No. 20, Water District No. 49, Water District No. 75 (Highline), and Water District No. 125. The Port maintains the water lines within the Airport use water provided by Seattle Water Department. Most of the water facilities in the immediate airport area consist of small lines serving residential and other local users. There is, however, a major 36-inch-diameter Seattle Water Department trunk line crossing the area and significant local fire protection trunk lines within Airport property. The new parallel runway will impact this trunk line crossing the airfield. The Port has developed plans to ensure minimal disruption to this trunk line as construction is undertaken.

The Port maintains 300,000 gallons of on-site storage in an elevated reservoir at the northeast corner of STIA property. Additional storage is available in the City of Seattle system; their 20-million-gallon Riverton Heights reservoir is located less than one mile north of the STIA.

Removal of residential uses due to the third runway embankment will result in a removal of residential water usage. The acquisition and relocation program calls for the relocation of over 380 residences, condominiums, and businesses, and their associated water demands.

In the Miller Creek basin, the Port will acquire residential, commercial, and agricultural properties, some of which have wells from which they pump groundwater for domestic, commercial, and/or agricultural purposes. After the Port acquires these properties, any wells will be abandoned.

The Port completed a groundwater study characterizing subsurface geology, aquifers, and aquitards, groundwater occurrence, movement, and recharge and discharge relationships in the vicinity of the STIA (Appendix Q-A of the FEIS). The results of the completed study, and the potential impacts of the Master Plan Update alternatives on the Highline Aquifer, are summarized in Chapter IV, Section 10 of the FEIS. At the request of the Seattle Public Utilities (formerly Seattle Water), additional study was performed of the wellhead protection area located north of SR518, where the North Employee lot has been completed. This analysis is documented in the FSEIS at page 5-7-5 and 5-7-6.

The airport lies on the Des Moines Drift Plain, which is the topographic area between Puget Sound and the Duwamish Valley. Three groundwater aquifers (shallow, intermediate, and deep) have been identified in the Des Moines Drift Plain. Low-permeability silt and clay layers within the drift plain separate the shallow, intermediate, and deep groundwater. In addition, in some locations, groundwater is perched in depressions located on top of relatively impervious glacial till material and beneath the thin mantel of Alderwood and Everett gravelly sandy loam soils common in this region. Perched groundwater is often found within 5 to 15 feet of the ground surface during the wetter months but generally recede during the drier months. The availability of perched groundwater is typically too limited for use as a drinking water supply. There is no known use of this groundwater as a source of drinking water in the airport vicinity.

Based on geotechnical investigations in potential borrow site areas to the north and south of the airport, an uppermost aquifer is located about 30-100 feet beneath the surface at an elevation of about 300 feet above sea level. This upper level aquifer (also called advance outwash or shallow aquifer), which has been contaminated in five locations from leaking jet fuel and rental car fuel distribution systems, is not used for domestic water supply. Available site data indicates impacts on the aquifer tend to be localized and contamination has not moved far or been identified at significant distances away from the sites. Contaminated soil and groundwater at these sites is in various stages of remediation by the responsible parties pursuant to applicable law.

The intermediate or Highline Aquifer (also called the Third Coarse Grained Deposit (Qc (3)) is located at an elevation between about 227 and 108 feet above mean sea level, which is over 100 feet beneath the surface of the STIA. The Seattle Public Utilities (SPU) has three operating wells in the Highline Aquifer. The Highline Water District

(HWD), formerly Water District 75, operates two wells in a deep aquifer (also called Fourth Course Grained Deposit (Qc (4)), which is located at about sea level. The two HWD wells are located about a mile southwest and south of the STIA, respectively. All three SPU wells are located north of SR 518 and the STIA.

According to well logs, the static surface water level of the Highline Aquifer is approximately 80 to 200 feet beneath the ground surface. Overlying aquitards of glacial till and clay, which have very low and low permeability, protect the integrity of the Highline Aquifer by restricting downward movement of contaminants through these layers. For these reasons, the EPA considers the Highline Aquifer to have a low susceptibility to contamination from contaminants originating from the ground surface.[25] There is no threat of contamination to SPU wells from existing contamination at the STIA because the wells are located up gradient and/or cross gradient of existing contamination and the direction of groundwater flow.

8(b) Recreational and Commercial Fisheries [40 CFR §230.51]. Recreational and commercial fisheries consist of harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man. The discharge of fill materials can affect the suitability of recreational and commercial fishing grounds as habitat for populations of consumable aquatic organisms. Discharges can result in the chemical contamination of recreational or commercial fisheries. They may also interfere with the reproductive success of recreational and commercially important aquatic species through disruption of migration and spawning areas. The introduction of pollutants at critical times in their life cycle may directly reduce populations of commercially important aquatic organisms or indirectly reduce them by reducing organisms upon which they depend for food. Any of these impacts can be of short duration or prolonged, depending upon the physical and chemical impacts of the discharge and the biological availability of contaminants to aquatic organisms.

The Miller Creek watershed drains approximately 8 mi^2 of predominantly urban area, mostly within the cities of Burien and SeaTac. STIA facilities located in this basin include the north end of runways 16L and 16R and north air cargo facilities, an area of about 162 acres representing about 3 percent of the watershed. Flows in Miller Creek originate at Arbor, Burien, Tub, and Lora lakes, Lake Reba, and from seeps located on the west side of STIA.

Commercial, sport, and tribal fisheries consist of fish, shellfish, and other aquatic organisms whose harvest is permitted and regulated by tribal, state, and federal agreements, laws, and treaties. The economic, sport, subsistence, and heritage values generated by these fisheries are important to the community, state, and nation. Disturbance or injury to commercially harvested fish species can negatively affect the individuals, communities, and businesses that depend on them. To understand, avoid, and mitigate potential impacts from the proposed project on fisheries, detailed impact assessments were conducted to evaluate project actions on fish species in the Miller

[25] *Final Report Highline Well Field Aquifer Storage and Recovery Project*, Seattle Water Department, 1994.

and Des Moines Creek basins and in the Green/Duwamish basin. These impact assessments are described in the following documents, which are part of the project record:

- *Biological Assessment Master Plan Improvements Seattle-Tacoma International Airport* (2000)
- B*iological Assessment—Supplement—for the Reinitiation and Initiation of Consultation for Certain Master Plan Update Improvements and Related Actions* (2000)
- *Essential Fish Habitat Consultation for Certain Master Plan Update Improvements and Related Actions* (2000)
- *Final Environmental Impact Statement for the Proposed Master Plan update Development Actions at Seattle-Tacoma International Airport* (FAA 1996) (see IV 10, 11, 16; Appendix F, Appendix P)
- *Final Supplemental Environmental Impact Statement for the Proposed Master Plan update Development Actions at Seattle-Tacoma International Airport* (FAA 1997) (see Chapter 5-5)
- *Low Streamflow Analysis. STIA Master Plan Update Improvements* (2001).
- *Comprehensive Stormwater Management Plan, Master Plan Update Improvements, Seattle-Tacoma International Airport* (2000).

Potential construction and operational impacts to fish were identified for all project activities in both the Miller and Des Moines creeks and Green/Duwamish River watersheds. Impacts were identified and categorized as potentially affecting water quality, water quantity, and physical habitat (such as substrate and refugia).

Potential water quality impacts to Miller and Des Moines creeks resulting from construction of project and mitigation actions include short-term increases in turbidity and sedimentation from project and habitat enhancement activities (from vegetation clearing, riparian regrading, and channel reconstruction), as well as sediment and erosion control practices that may result in potential impacts (e.g., changes in stream temperature and pH, release of flocculation agents, and changes in base and peak flows). Potential water quality operational impacts include changes in stormwater quality and quantity associated with increased impervious surfaces, airport anti-icing and de-icing operations, application of nutrients and pesticides to landscape management areas, and hydrology changes.

The water quality analyses indicated any changes to water quality in Miller and Des Moines creeks or the Green/Duwamish River would be minor, localized, and/or not measurable for salmonids or salmonid habitat. Erosion and sedimentation controls described in the BA and supporting documents will be applied. The greatest potential disturbances would arise from habitat improvements in the creek channels (e.g., placement of large woody debris) designed to create instream structures for coho salmon and cutthroat trout. Long-term benefits to coho in Miller and Des Moines creeks are expected as a result of in-basin mitigation. Riparian restoration and stormwater improvements associated with the proposed action will assist in restoring both spawning

and rearing habitats for coho salmon in Miller and Des Moines creeks. Chinook salmon and bull trout are not present in the creeks, so they would not be affected by construction.

The Port's *Comprehensive Stormwater Management Plan* and Ecology's stormwater analysis for the WQC and NPDES permits indicates construction management practices, post-construction improvements, and retrofitting improvements will improve the water quality of stormwater released into Puget Sound. The diversion of existing stormwater from creeks into detention and treatment facilities before release from the Industrial Wastewater System (IWS) will improve stormwater quality entering Miller and Des Moines creeks and the marine waters around the IWS outfall. Therefore, the proposed actions will not affect salmonid, West Coast groundfish, or coastal pelagic fisheries species using the marine and estuarine areas near the project site.

Water quantity will be improved by construction of stormwater detention and treatment facilities that will reduce peak flows and maintain summer low flows in Miller and Des Moines creeks downstream of project discharges. These actions will enhance hydrologic conditions in the creeks and their associated estuaries. To further compensate for increased impervious surface in the watersheds, water rights will be purchased and those uses will be terminated to preserve creek flow in the Miller Creek basin.

8(c) Water-Related Recreation [40 CFR §230.52]. Water-related recreation encompasses activities undertaken for amusement and relaxation. Activities encompass two broad categories of use: consumptive, e.g. harvesting resources by hunting and fishing; and non-consumptive, e.g. canoeing and sightseeing.

One of the more important direct impacts of the discharge of fill material is to impair or destroy the resources supporting recreation activities. The placement of fill material may adversely modify or destroy water use for recreation by changing turbidity, suspended particulates, temperature, dissolved oxygen, dissolved materials, toxic materials, pathogenic organisms, quality of habitat, and the aesthetic qualities of sight, taste, odor, and color.

The STIA area is not utilized for recreational activities because of limited access to the wetlands and waterways. Bird watchers and recreational fishers may utilize Miller and Des Moines Creek, but these activities occur downstream and would not be impacted by the project. The Auburn mitigation area will likely see an increase in recreational users, especially for bird watching.

8(d) Aesthetics [40 CFR §230.53]. Aesthetics associated with the aquatic ecosystem consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch, and smell. Aesthetics of aquatic ecosystems apply to the quality of life enjoyed by the general public and property owners.

The discharge of fill material can mar the beauty of natural aquatic ecosystems by degrading water quality, creating distracting disposal sites, inducing inappropriate development, encouraging unplanned and incompatible human access, and by destroying vital elements contributing to the compositional harmony or unity, visual distinctiveness, or diversity of an area. The discharge of fill material can adversely affect the particular features, traits, or characteristics of an aquatic area, which make it valuable to property owners. Activities which degrade water quality, disrupt natural substrate and vegetation characteristics, deny access to or visibility of the resource, or result in changes in odor, air quality, or noise levels may reduce the value of an aquatic area to private property owners.

The aesthetic quality of the existing STIA is limited; it is a large commercial airport in an industrial location. The overall character of the facility will not be changed. Noise continues to be a concern, but the Port will continue to work with the local public to find ways to mitigate or reduce potential noise impacts. Noise is fully discussed within FAA FEIS for the MPU (see also Paragraph 10(A)(10(b) of the ROD).

The aesthetics of the Auburn site will be improved by diversifying the habitat types and increasing bird and wildlife use.

8(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves [40 CFR §230.54]. These preserves consist of areas designated under Federal and State laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value. The discharge of fill material into such areas may modify the aesthetic, educational, historical, recreational and/or scientific qualities thereby reducing or eliminating the uses for which such sites are set aside and managed.

In preparing the EIS and the SEIS, the FAA and Port analyzed the potential aircraft noise impacts on uses adjacent to the airport, including noise-sensitive facilities such as schools and historic properties. The FSEIS noted the properties for which noise levels increased by 1.5 DNL or more. The Sunnydale School, located on Des Moines Memorial Way at South 154th, is one of these properties. Through coordination with the Washington State Historic Preservation Officer, the school is potentially eligible for listing on the National Register of Historic Sites. It was estimated the school would experience an increase in noise level of 2.8 DNL in approximately the year 2010. Although it was not anticipated these noise impacts would significantly affect the historic qualities of the school building, the FSEIS noted this building could be sound insulated. Such insulation could require custom treatment to avoid significant alteration of the architectural style. See FSEIS, Section 5-6, pp. 5-6-1 through 5-6-22.

In its ROD, the FAA acknowledged the potential noise impacts on Sunnydale School and noted the impacts would be mitigated by acoustical insulation allowing its use to be compatible with increased noise levels. The FAA also summarized its consultation under Section 106 of the National Historic Preservation Act (NHPA) concerning the potential noise impacts. See FAA ROD, pp. 31-36.

9. Evaluation and Testing (Subpart G). Subpart G prescribes a number of physical, chemical, and biological evaluations and testing procedures to be used in reaching the required factual determinations in [40 CFR 230.11].

9(a) General Evaluation of Fill Materials [40 CFR 230.60]. All material proposed by contractors as fill material must comply with the restrictions contained in the 21 September 2001 WQC. The PCHB also revised the fill criteria in one of their conditions. Both the Port and Ecology are appealing this condition.[26] The Corps has reviewed the PCHB condition, WQC, the USFWS BO, and the various other comments provided regarding the fill criteria and has determined the fill criteria provided in the WQC are protective of the aquatic environment. Therefore, the PCHB condition was not added as a special condition to the Corps permit (see Paragraphs 9(C) and 10(A)(7) of the ROD for additional discussion).

9(b) Chemical, Biological, and Physical Evaluation and Testing [40 CFR §230.61]. The principal concerns of discharge of fill material containing contaminants are the potential effects on the water column and on communities of aquatic organisms. Fill material may be excluded from the evaluation in 40 CFR §230.60 if the likelihood of contamination is acceptably low. As discussed in Paragraph 9(a) above, the Corps has determined the fill criteria provided in the WQC are protective of the aquatic environment and the Corps will require no further testing of the fill material.

10. Actions to Minimize Adverse Effects (Subpart H). In the Corps process to determine compliance with the Guidelines, compensatory mitigation (creation, restoration, enhancement) is considered only after all efforts have been exhausted to avoid or minimize project impacts; avoidance is usually the preferred mitigation option. Compensatory mitigation is then considered for unavoidable project impacts.

10(a) Actions to avoid or minimize impacts. The Corps has worked with the Port throughout the process to reduce wetland impacts to the maximum extent practicable. The Port has complied by minimizing the footprint of the third runway fill through the construction of retaining (MSE) walls. The Port also significantly reduced the proposed impacts identified in FAA's 1995 Draft EIS by eliminating several proposed borrow areas. The Corps continued to question the need for on-site borrow sources because of our concerns for both direct and indirect impacts to wetlands. The Port responded by modifying and reducing wetland impacts associated with the borrow sources until they came up with a final reduction to 1.03 acres in a single borrow source. The Corps requested the Port provide written justification why they could not avoid the last 1.03 acres. They submitted a Memorandum dated 1 November 2001, which included an argument that the use of Borrow Area 1, the largest borrow source, would significantly reduce project costs. The Port also provided other environmental justifications (protection of air quality and traffic concerns). The Corps agrees the use of Borrow Area 1 is environmentally beneficial because of reduced impact to air quality and traffic and concurs with the Port that avoidance of this area would result in significant project

[26] The appeals are still pending. If the appeals changes the PCHB decision, then the DE has the option of modifying, suspending, or revoking the DA permit to comply with the revised decision.

cost increases. The Corps also concurs the SASA impacts and runway impacts have been minimized to the maximum extent practicable.

The Corps concludes the Port has minimized project impacts to the maximum extent practicable.

10(b) Actions to compensate for unavoidable impacts to the aquatic resource. The Corps received numerous comments from the public regarding the adequacy of the Port's proposed mitigation. The Corps also had concerns regarding the Port's original proposal and did an independent assessment of adequacy (see Appendix C of the ROD for full discussion). The Corps' assessment led to further negotiation with the Port to provide additional on-site mitigation at the MPU to adequately offset impacts to organic export functions. The Port's final submittal for proposed mitigation adequately offsets the impacts identified by the Corps.

10(c) Rationale for off-site mitigation. The Corps received numerous comments from the public regarding the Port's proposal to replace wetland avian habitat in Auburn rather than in the Miller and Des Moines Creek basins. Prior to selecting the Auburn mitigation site, and in consultation with the Corps, the Port conducted a search of potential sites on which it could construct replacement wetlands. Because of runway safety issues, any proposed mitigation attracting birds needed to be at least 10,000 ft from proposed or existing runways in accordance with the FAA Advisory Circular. The search was fairly exhaustive and resulted in finding a suitable area in the Auburn-Kent valley, approximately 6 miles from the project site. No other suitable sites were closer to STIA.

The mitigation site is within the boundary of the Mill Creek Special Area Management Plan (SAMP) and within the boundaries of WRIA 9; the STIA is also within WRIA 9. The intent of the proposed compensatory mitigation is to enhance the aquatic resources and functional values of the Mill Creek basin, which provide regional benefits.

10(d) Determination of Adequacy of Compensatory Mitigation. The Corps finds the final NRMP submitted by the Port (November 2001, as amended in January 2002) adequately offsets adverse impacts associated with this project. Appendix C of the ROD provides a full discussion of this issue.

11. Compliance with Restrictions on Discharge [40 CFR §230.10 Subpart B Continued].

11(a) Compliance with Pertinent Legislation [40 CFR §230.10(b)]. No discharge shall be permitted if any of the following are not in compliance.

- Water quality standards. The State of Washington has issued a Water Quality Certification, dated 21 September 2001. The PCHB added additional conditions on 12 August 2002. The Port, Ecology, and the ACC are appealing various aspects of

the PCHB decision. See Paragraph 7(J) of the ROD regarding the status of the WQC and appeals.

- Toxic effluent standards. Potential discharges under Section 307 of the Clean Water Act are not expected. Discharges from the new parallel runway are the subject of a Construction NPDES Permit issued by Ecology to the Port on 20 February 1998 and modified on 29 May 2001. An NPDES General Stormwater Permit for Construction Activities was issued on 4 April 2001.
- Endangered Species Act. The USFWS issued a biological opinion to the FAA for this project dated 22 May 2001 concluding the project may affect but is not likely to adversely affect bull trout, bald eagle, and marbled murrelet. The biological opinion contained seven leachate impact reduction measures and several conservation recommendations. The NMFS issued a concurrence letter to the FAA on this project dated 31 May 2001, which agreed with FAA determination that the project may affect but is not likely to adversely affect Chinook salmon. The concurrence letter also contained conservation recommendations. As discussed in Paragraph 9(I)(1) of the ROD, I have determined these conservation recommendations do not need to be added as special conditions to the permit.
- Marine Protection, Research, and Sanctuaries Act. The discharge of dredged and fill material will not occur in or near a marine sanctuary, nor will any potential off-site effects of the discharges cause any impacts to a marine sanctuary.

11(b) Potential for Degradation of Waters of the United States [40 CFR §230.10(c)]. No discharge shall be permitted which will cause or contribute to significant degradation of waters of the United States. Under the Guidelines, effects contributing to significant degradation, considered individually or collectively, include those listed immediately below. The Guidelines define "significant" as being more than trivial [see Preamble 40 CFR §230].

- **Human Health Or Welfare**. This includes, but is not limited to, effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites. I find the discharge will not result in significant degradation of human health or welfare.
- **Life Stages In and Dependent On Aquatic Ecosystems**. This includes the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, chemical, and physical processes. Section 5 of this document describes the impacts to biological, chemical and physical processes. I find the discharge will not result in significant degradation to aquatic ecosystem life stages.
- **Aquatic Ecosystem Diversity**. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy. Paragraph 6 of this document describes the impacts to aquatic ecosystem diversity. I find that the discharge will not result in significant degradation to aquatic ecosystem diversity.
- **Recreational, Aesthetic and Economic Values**. This includes the effects of the discharge of pollutants on recreational, aesthetic and economic values. Paragraph 8 of this document describes the impacts to recreational, aesthetic and economic

resources from the project. I find the discharge will not result in significant degradation to recreational, aesthetic and economic values.

Further, I find that collectively the discharge will not result in significant degradation of waters of the United States.

11(c) Measures to Minimize Potential Adverse Impacts on the Aquatic Ecosystems [40 CFR §230.10(d)]. The Guidelines provide that no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem. The mitigation for this project is discussed in Paragraph 10 of this document and Appendix C of the ROD. I find that all measures have been taken to minimize potential impacts to the aquatic ecosystem.

12. Factual Determinations (40 CFR §230.11). The following determinations are based on information contained in Paragraph 2 through 11 of this document.

12(a) Physical Substrate Determinations [40 CFR §230.11(a)]. The placement of fill would result in the permanent loss of 19.50 acres of wetlands to be filled for the proposed work at STIA. An additional 5.51 acres of wetlands will be temporarily impacted at STIA during construction. Approximately 0.12 acres of wetlands will be filled at the Auburn mitigation site, with approximately 23.27 acres of temporary wetlands impacts due to construction. For all temporary impacts, wetlands will be restored to functioning conditions after construction. For the permanent impacts, the new substrate would no longer support a wetland community (see Paragraph 7(g) of this document). The compensatory mitigation proposed for this project and the conditions of the 21 September 2001 WQC would offset the adverse impacts associated with the wetland losses.[27] Compliance with the WQC is a standard condition of the permit. Special conditions regarding implementation and monitoring of the compensatory mitigation will also be part of this permit (see Paragraph 12(M) of the ROD). I find the individual and cumulative losses of the wetland will not result in significant impacts to the physical substrate.

12(b) Water Circulation, Fluctuation, and Salinity Determinations [40 CFR §230.11(b)]. The placement of fill would result in the permanent loss of 19.50 acres of wetlands to be filled for the proposed work at STIA. An additional 5.51 acres of wetlands will be temporarily impacted at STIA during construction. Approximately 0.12 acres of wetlands will be filled at the Auburn mitigation site, with approximately 23.27 acres of temporary wetlands impacts due to construction. For all temporary impacts, wetlands will be restored to functioning conditions after construction. For the permanent impacts, the fill would eliminate water circulation on 19.50 acres of wetlands at STIA and 0.12 acre of wetland at the Auburn mitigation site. This reduces the ability of the wetland to retain sediments and toxics moving through the wetland under normal water circulation patterns. The fill would also eliminate the ability of the wetlands to store

[27] The 3 PCHB conditions dealing with the wetland mitigation were not added as conditions to the permit (see Paragraph 9(A) of the ROD).

surface and storm waters. The compensatory mitigation proposed for this project and the conditions of the 21 September 2001 WQC would offset adverse impacts associated with the wetland loss.[28] Special conditions regarding implementation and monitoring of the compensatory mitigation will also be part of this permit (see Paragraph 12(M) of the ROD). I find that the individual and cumulative losses of the wetland will not result in significant impacts to water circulation, fluctuation and salinity.

12(c) Suspended Particulates/Turbidity Determinations [40 CFR §230.11(d)]. General and specific requirements for stormwater management during construction and operations at STIA are discussed in the NPDES permit for the facility, the *Sea-Tac International Airport Stormwater Pollution Prevention Plan*, and the *Preliminary Comprehensive Stormwater Management Plan for Sea-Tac International Airport Master Plan Improvements*), which are hereby incorporated as a condition of this permit. The NPDES permit requires the development of a Stormwater Pollution Prevention Plan (conditions S12 and S13 of Permit No. WA-002465-1), which demonstrates how the Port will control stormwater during operation and construction activities. These requirements assure planning and implementation of adequate BMPs to control construction stormwater quality, including suspended particulates and turbidity. Washington State Water Quality Standards (WAC 173-201a) for Class AA waters limit increases in turbidity in Miller and Des Moines Creeks to 5 Nephelometric turbidity units (NTU) above background conditions. If this standard is violated, regulatory action can be taken by Ecology to ensure the standard is met.

Construction water quality BMPs will also be required at the Auburn site pursuant to the 21 September 2001 WQC conditions for this project, which is also a condition of this permit. Six of the sixteen PCHB conditions have also been added as special conditions to the permit (see footnote 27 of this document).

I find that the individual and cumulative losses of the wetland will not result in significant impacts to the water quality concerns of suspended particulates and turbidity.

12(d) Contaminant Determinations [40 CFR 230.11(d)]. The 21 September 2001 WQC contains requirements to determine suitability of fill materials used in conjunction with this project. As discussed in Paragraph 2(d) above, I have determined the PCHB condition modifying the fill criteria will not be added as a special condition to the permit. I find the proposed project will not result in contamination of the aquatic environment.

12(e) Aquatic Ecosystem and Organism Determinations [40 CFR 230.11(e)]. Filling of wetlands will result in the conversion of 19.62 acres of wetlands to uplands. This would result in the loss of a wetland ecosystem providing functions valued by society. Functions lost include, but are not limited to: flood storage, migratory and resident wildlife habitat (including avifauna), food chain support, and sediment retention and detention. The compensatory mitigation proposed for this project, the special conditions of the permit, and the conditions of the 21 September 2001 WQC will offset

[28] See Paragraphs 9(A) and (C) of the ROD for a discussion regarding the PCHB conditions.

adverse impacts associated with the wetland loss. I find the individual and cumulative losses (see 12(g) below) of the wetland will not result in significant impacts to the aquatic ecosystem.

12(f) Proposed Disposal Site Mixing Zone Determinations [40 CFR §230.11(f). Not applicable.

12(g) Determination of Cumulative Effects on the Aquatic Ecosystem [40 CFR §230.11(g)]. Paragraph 9(S) of the ROD provides a full discussion on cumulative impacts. Those findings are summarized here. The watersheds of Miller, Walker, and Des Moines creeks have been impacted by urban development, including major transportation projects. These impacts are fairly typical for urban watersheds. Mitigation for many of the past impacts was not required at the time because of the lack of environmental and land use laws. However, for the proposed project, the Port is required to provide mitigation to offset both the specific and cumulative impacts and is proposing:

- Restoring, creating, and enhancing both wetland and upland habitats on-site. This mitigation is concentrated along Miller and Des Moines creeks to maintain habitat connectivity, in part.
- Providing additional habitat mitigation off-site for birds, a more mobile species. This site is adjacent to the Green River and provides also connectivity between various habitats.
- Realigning and/or enhancing various portions of Miller Creek, thus reversing some of the past channelization impacts.
- Recreating floodplains at Vacca Farms hydrologically connected to Miller Creek.
- Increasing opportunity for organic input by locating other portions of the mitigation, the Des Moines Nursery site and Wetland A17 in particular, adjacent to and connected with Miller Creek.
- Providing mitigation for the increased amount of impervious surface through the Comprehensive Stormwater Management Plan.

Therefore, while the proposed project and mitigation does not reverse the past adverse impacts having occurred in these watersheds, I find the proposed project does not further contribute to cumulative adverse degradation of the aquatic environment, except for passerine bird and waterfowl habitat. Mitigation for these impacts are provided at the off-site mitigation in Auburn.

12(h) Determination of Secondary Effects on the Aquatic Ecosystem [40 CFR §230.11(h)]. Secondary and/or indirect impacts associated with this project are addressed in Section 9(S) of the ROD and Appendix C of the ROD. The proposed mitigation in addition to the requirements for the WQC and the special conditions of this permit adequately offsets foreseeable secondary impacts (including water quality and habitat quality). I find the project will not result in adverse degradation to aquatic resources through secondary effects.

13. Findings of Compliance with the Restrictions on Discharge [40 CFR 230.12]. Based on the information provided in Section 1 through 12 above, the proposed discharge complies with all requirements of the Section 404(b)(1) Guidelines.

13 Dec 02
DATE

RALPH H.GRAVES
Colonel, Corps of Engineers
District Engineer

REFERENCES

Gunn, W.W.H., and J.A. Livingston, eds. 1974. *Disturbance to birds by gas compressor noise stimulators, aircraft, and human activity in the Mackenzie Valley and North Slope, 1972*. Arct. Gas Biol. Rep. Ser. 14.

National Marine Fisheries Service. 31 May 2001. *Letter of Concurrence Regarding Biological Assessment for Master Plan Update Improvements at Seattle-Tacoma International Airport and Essential Fish Habitat consultation.* Seattle, Washington.

Pollution Control Hearings Board. 2002. *Final Findings of Fact and Conclusions of Law, PCHB 01-160.* Olympia, Washington.

Port of Seattle. 1998. *Seattle-Tacoma International Airport Stormwater Pollution Prevention Plan.* Seattle, Washington.

Port of Seattle. 1999. *Supplemental Airport Site Wetlands and Stream Analysis*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2000a. *Essential Fish Habitat Consultation for Certain Master Plan Update Improvements and Related Actions. Pacific Coast Salmon Essential Fish Habitat Assessment Master Plan Improvements, Seattle-Tacoma International Airport*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2000b. *Biological Assessment for Seattle-Tacoma International Airport Master Plan Update improvements*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2000c. *Supplement. Biological Assessment for Seattle-Tacoma International Airport Master Plan Update improvements*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2000d. *Comprehensive Stormwater Management Plan, Master Plan Update Improvements, Seattle-Tacoma International Airport*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2000e. *Wildlife Hazard Management Plan, Seattle-Tacoma International Airport*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle, 2000f. *Wetland Delineation Report – Master Plan Update Improvements, Seattle-Tacoma International Airport*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2001a. *Low Streamflow Analysis. STIA Master Plan Update Improvements.* Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 2001b. *Natural Resource Mitigation Plan. Master Plan Update Improvements, Seattle-Tacoma International Airport*. Prepared by Parametrix. Kirkland, Washington.

Port of Seattle. 26 October 2001. *Letter explaining the Purpose and Need for Runway after Events of September 11, 2001*. SeaTac, Washington.

Port of Seattle. 1 November 2001. *Memorandum: Army Corps 404 Review of On-Site Borrow Areas.* SeaTac, Washington.

Puget Sound Regional Council. October 1992. *The Flight Plan Project. Final Environmental Impact Statement.* Seattle, Washington.

Puget Sound Regional Council. March 1994. *Major Supplemental Airport Feasibility Study. Summary Report.* Seattle, Washington.

Puget Sound Regional Council. 1 August 1994. *Major Supplemental Airport Feasibility Study, Working Paper Three. Preliminary Airport Site Evaluation Summary.* Prepared by TAMS Consultants, Inc. Seattle, Washington.

Puget Sound Regional Council. 27 October 1994. *PSRC Executive Board Resolution EB 94-01.* Seattle, Washington.

Puget Sound Regional Council. 25 April 1995. *Minutes of PSRC Executive Board.* Seattle, Washington.

Soulé, Michael E. 1986. *Conservation Biology: The Science and Scarcity of Diversity.* Sinauer Associates, Inc., Sunderland, MA.

U.S. Army Corps of Engineers. 18 October 1996. *Memorandum For Record: Wetland Delineation Confirmation*. CENWS-OD-RG. Seattle, Washington.

U.S. Army Corps of Engineers. February 2001. *Memorandum For Record: Field Review and Jurisdictional Summary, Final Edits February 2001*. CENWS-OD-RG. Seattle, Washington.

U.S. Department of Transportation – Federal Aviation Administration. June 1991. *Seattle-Tacoma International Airport Capacity Enhancement Plan*. Northwest Mountain Regional, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. July 1995. *Seattle-Tacoma International Airport – Capacity Enhancement Plan Update*. Northwest Mountain Regional, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 1996. *Final Environmental Impact Statement for the Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport*. Northwest Mountain Regional, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 1997. *Final Supplemental Environmental Impact Statement for the Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport*. Northwest Mountain Regional, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 1997. *Record of Decision for the Master Plan Update Development Actions, Sea-Tac International Airport*. Northwest Mountain Region, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 8 August 2001. *Record of Decision. Environmental Reevaluation for the Master Plan Update Development Actions, Sea-Tac International Airport*. Northwest Mountain Region, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 19 September 2001. *Delay at Seattle-Tacoma International Airport (SEA)*. Northwest Mountain Region, Renton, Washington.

U.S. Department of Transportation – Federal Aviation Administration. 7 August 2002. *Letter responding the Dr. Hockaday's letters.* Northwest Mountain Region, Renton, Washington.

U.S. Fish and Wildlife Service. 22 May 2001. *Biological Opinion for Biological Assessment for Master Plan Update Improvements at Seattle-Tacoma International Airport.* Lacey, Washington.

U.S. Forest Service. 1985. *Management of Wildlife Habitats in Forests of Western Oregon and Washington, Vols.1 and 2*. Brown, E.R. (ed).