SUPPLEMENTAL AIRPORT SITE WETLAND AND STREAM ANALYSIS

Prepared for

PORT OF SEATTLE

Prepared by

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TABLE OF CONTENTS

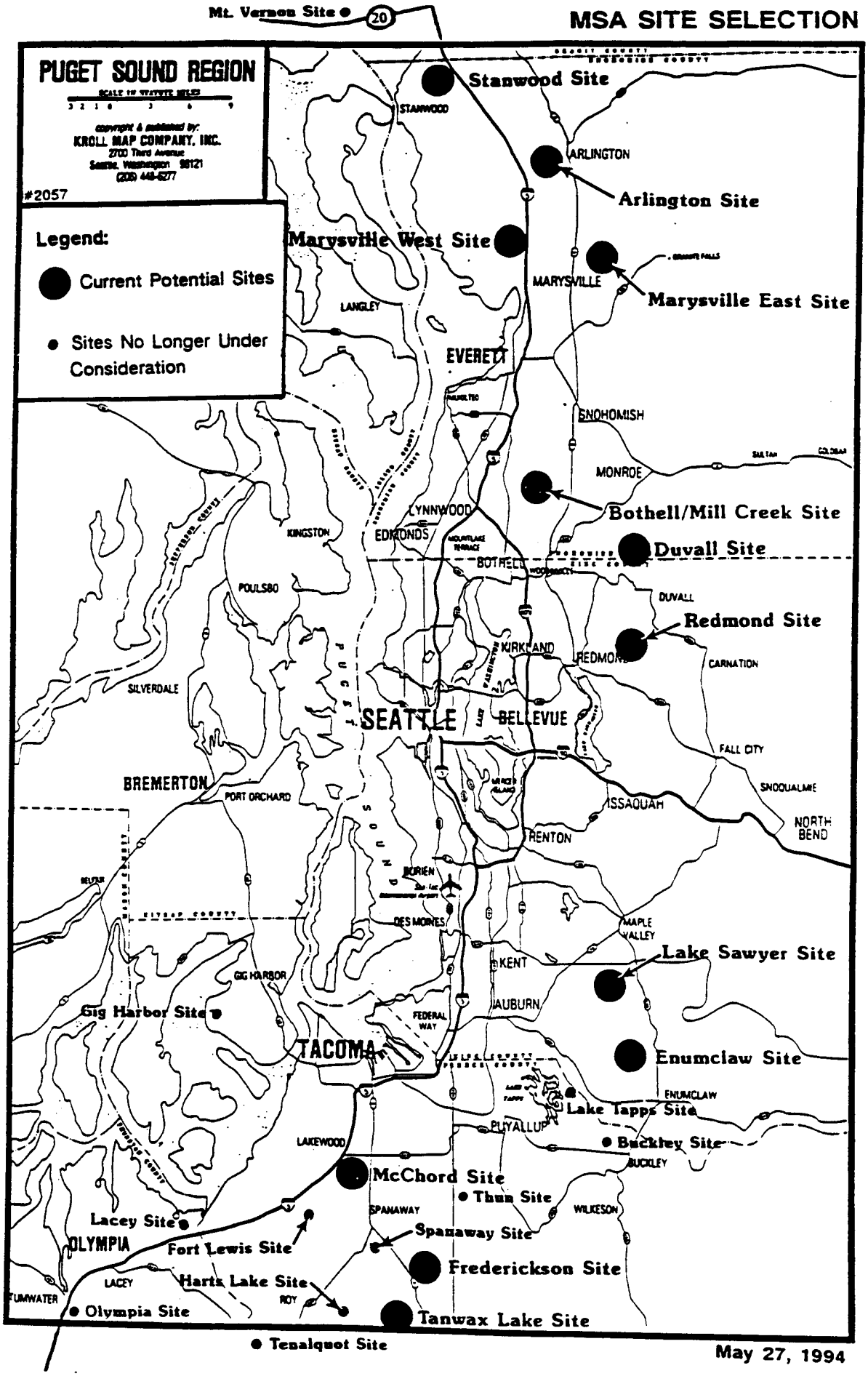
LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

In 1994, the Puget Sound Regional Council (PSRC) undertook a study to select and evaluate potential sites for a major airport to supplement SeaTac International Airport, pursuant to PSRC Resolution A-93-03. The present study revisits the 1994 Major Supplemental Airport Site Evaluation (MSA) to more thoroughly investigate wetlands and streams on the three sites previously shown to have the least amount of wetland impacts. The three sites are Arlington, Lake Sawyer, and Frederickson (Figure 1). This study presents an inventory of wetlands and streams on these sites based on aerial photograph interpretation and partial field verification. The main goal of this study is to compare the results of the 1994 MSA Study, which was based solely on published information, with the more detailed evaluation undertaken here. Results of this investigation are to be used to more critically evaluate impacts to wetlands and streams that would be precipitated by construction of the potential airport facility.

MSA SITE SELECTION



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SUMMARY OF 1994 MSA STUDY

The MSA study area was limited to Snohomish, King, Pierce, and Kitsap counties, although some sites near Skagit and Thurston counties were initially identified. Sites were evaluated based on a generic footprint for a major airport. This included two parallel independent runways with a minimum separation of at least 4,300 ft, one runway of at least 10,000 ft, a second runway of at least 8,000 ft, runway protection zones, and space for parking, aircraft storage, and ancillary activities. The total area required for such a facility is 2,140 ac.

An initial list of more than 40 potential sites was developed from a variety of published and unpublished sources and a review of U.S. Geological Survey (USGS) maps. The generic footprint was overlaid on these sites to determine if space for an airport exists, absent a maximum slope of 2 percent and significant physical obstructions such as major hills, cliffs, or bodies of water. This preliminary evaluation identified 25 sites, six of which were excluded for being outside the four-county study area.

The remaining 19 sites were evaluated based on the following criteria:

- Market analysis
- Instrument approach capability
- Local airspace evaluation
- Construction cost increase
- Expansion potential
- Noise impact
- Predominant land cover
- Wetland impacts
- Stream impacts
- Priority habitat impacts

Seven sites were removed from consideration due to unacceptable instrument approach capability (3 sites), local airspace interference (3 sites), or high site construction costs (1 site). Based on the results of this evaluation and public comment on the study, PSRC determined none of the sites was feasible and no further analysis was conducted.

The environmental analysis for the 1994 study considered wetlands, water bodies used by anadromous and priority resident fish, and areas with priority species and habitat, including state and federally listed threatened, endangered, sensitive, or candidate animal and plant species. For each site, the generic footprint for the airport facility was overlaid onto maps of each environmental feature using a Geographic Information System (GIS). The total area, length, or number of points of each environmental feature within the airport footprint was then calculated. Direct impacts were based on the perimeter of the generic airport footprint applied to each site. Indirect impacts (i.e., those that could occur outside the footprint from new roads or other development) were not included.

Information on wetlands was obtained from the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS). The inventory is based on

interpretation of small-scale aerial photographs, but in most cases, without field verification. The NWI is a useful tool for preliminary wetlands analysis, but is less accurate than an analysis based on more-detailed, large color photographs and field investigation. The inventory describes wetlands by type of system and subsystem.

Impacts to fish-bearing water bodies were assessed using data on anadromous and resident fish available from the Washington Department of Fish and Wildlife (WDFW) through the Washington Rivers Information System (WRIS). The system includes anadromous fish species and resident fish species listed as priority species or threatened, endangered, sensitive, or candidate by state or federal agencies. For each site, this study updates inventory level information on streams, based on air photo review and site visits.

DATA GATHERING

Prior to conducting the initial data review and any field investigations for the present study, Parametrix obtained recent low-elevation aerial photographs for each of the three sites. These color photographs were permanently mounted on foamboard and covered with clear acetate overlays. The photos were used as bases for mapping wetland and stream resources for each of the sites. The same electronic file of the generic site footprint used in the 1994 analysis was used in the present study. The footprint was registered on the new digitized overlays using key landmarks.

INITIAL REVIEW

For each of the three study sites, the following data sources were reviewed for information on vegetation patterns, topography, drainage, and potential or known wetlands in the vicinity:

- NWI maps;
- US Geologic Survey (USGS) 7.5 minute topographic maps; and,
- Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) soil survey maps and county hydric soils lists; and,
- Color aerial photographs (Walker and Associates, Seattle, Washington):

  —Arlington: Negative Nos. KISK-97 20-8, 9, and 10; 9-19-97; 1"=400'

  —Lake Sawyer: Neither negative numbers nor date was identified; 1"=400'

  —Frederickson: Negative Nos. SPS-96, 21-13, 14, and 15; 6-20-96; 1"=400'

The color aerial photos from 1996 and 1997 were used to provide a more accurate identification of wetlands and streams than was possible from NWI photographs used in the 1994 MSA analysis. Probable wetland areas were identified using standard aerial photo-interpretation techniques and outlined on the overlay for each site. Areas of hydric soil were also transferred to the overlays from soil surveys for each site.

FIELD RECONNAISSANCE AND ANALYSIS

The wetland, stream, and soil features identified during photo-interpretation for all three sites was field-verified (to the extent possible) on November 1 - 4, 6, and 7, 1998. Field reconnaissance was conducted from roads and other areas open to public access to visually confirm the presence and type of wetlands, the location of approximate wetland boundaries, as well as observe other important natural features. Wetlands were generally identified using the presence of reliable wetland indicator plants such as soft rush (*Juncus effusus*), slough sedge (*Carex obnupta*), redtwig dogwood (*Cornus sericea*), and others; the presence of ponded water; and/or topography. Wetland habitats were classified as emergent, shrub, and forested. Other wetland habitat classes were not used because these were either infrequent or were difficult to identify using photo-interpretation or field verification. Each wetland or wetland complex was assigned a unique number for identification and reporting purposes. No soil pits, vegetation samples, or other physical information, or photos, were gathered. Some wetland boundaries were not field-verified because access to all portions of the site or the wetland was not available.

Wetlands and streams that were identified on the overlays during the Initial Review phase were revised based on results of the field verification effort. The revised boundaries were then digitized to create electronic files using AutoCAD. The resulting files were subsequently transferred to GIS (ArcInfo), which was used to calculate the following variables within the airport footprint for each site[1]:

1) Total length of wetland boundaries, in feet (broken down as "field-verified" and "non-field-verified").
2) Area of wetland habitat type, in acres (forested, shrub, and/or emergent habitats) for each wetland.
3) Total wetland area for each site, in acres. In general, wetland area estimates are conservative in that they probably represent the minimal wetland size. (One wetland complex on the Lake Sawyer site was difficult to delineate based on aerial photography alone. Thus, two delineations were made, one being a "liberal" [i.e., larger] delineation and the other being a "conservative" [i.e., smaller] delineation.)
4) Lengths of streams, in feet.

To comply with Washington's Growth Management Act, most cities and counties have developed critical areas ordinances to protect wetlands and other sensitive areas. In many jurisdictions, the level of protection is tied to a wetland rating system. Rating systems used locally may be the same as the state's system (Ecology 1993) or one specific to the local government.

For descriptive purposes in this project, a few wetlands were preliminarily rated using the Ecology rating system and field observations.

[1] GIS files consist of digitized raw data which has not been manipulated into a map product.

FINDINGS

WETLANDS

While the NWI and USGS Topographic Survey are valid tools for preliminary wetland analysis, they are generally acknowledged to underestimate the presence and extent of wetland and stream resources. This has held true for each of the project sites, where substantially more wetland acreage and stream channel distance were identified using the higher resolution color photographs and field investigation used in this study. Wetland resources on each site (Table 1) are described here.

Table 1. Wetland habitats present at the Arlington, Lake Sawyer, and Frederickson sites.

Project Site	Forested Wetland Area (Acres)	Shrub Wetland Area (Acres)	Emergent Wetland Area (Acres)[a]	Total Wetland Area (Acres)
Arlington	34	6	289	329
Lake Sawyer[b]	90-99	14	1	105-114
Frederickson	83	2	16	101

[a] The emergent wetland class includes small areas of farmed wetland and open water habitats.
[b] Due to difficulties in interpreting the location of wetland boundaries in Wetland 8 for this site, a size range is presented based on two photo-delineations.

Table 2 presents estimates of the wetland boundary verification obtained during the field work for this analysis. The percentage of wetland boundaries that have been field-verified provides an estimate of the accuracy of this wetland analysis because field-verified boundaries will more accurately depict the existence and size of identified wetlands compared to non-verified boundaries.

Table 2. Comparison of field-verified wetland boundaries with non-field-verified boundaries at the Arlington, Lake Sawyer, and Frederickson sites.

Project Site	Total Length of Wetland Boundaries (Feet)	Length Not Verified (Feet)	Percentage Not Verified[a]
Arlington	41,355 (7.8 mi)	11,373 (2.2 mi)	28
Lake Sawyer[b]	57,182 (10.8 mi)	34,659 (6.6 mi)	61
Frederickson	51,836 (9.8 mi)	17,147 (3.2 mi)	33

[a] "Verification" refers to actual visual observation of a wetland boundary in the field, as contrasted with a boundary that was obtained solely from interpretation of aerial photographs.
[b] Due to difficulties in interpreting the location of wetland boundaries in Wetland 8 for this site, two photo-delineations were made, one being more wetland-generous, the other being less wetland-generous. The more wetland-generous of these delineations is considered here.

Arlington

Most of the wetland habitats at this site are associated with Portage and Quilceda creeks, at the north and south ends of the site, respectively. Both of these wetland systems have been intensely impacted by past agricultural development. Many areas in the Portage Creek basin appear to be recently abandoned farmland and are now in various states of natural restoration. Emergent wetland habitats are most abundant, being dominated by reed canarygrass (*Phalaris arundinacea*), soft rush, and other disturbance-response species.

Most of the wetlands in the Quilceda basin have been ditched and are actively farmed or pastured, recently abandoned from agricultural use, or being developed for commercial and residential uses. Some of these farmed areas may be considered by the U.S. Army Corps of Engineers as "Prior Converted Croplands," and thus, not regulated wetlands under the Clean Water Act. Generally, vegetated emergent wetland habitats are most common, being dominated by reed canarygrass, bentgrass (*Agrostis* spp.), and soft rush.

Notable wetlands at this site include Portage Creek wetland (Wetland 3 in this study), a probable Category II wetland system. Despite past agricultural development, this is an expansive (110 ac, inside the project area) wetland system associated with Portage Creek. The wetland contains emergent, shrub, and deciduous forested wetland habitats that are saturated or ponded for most of the year. Some of this wetland acreage is actively farmed. A portion of the wetland is included in the Portage Wildlife Sanctuary (Snohomish County Parks).

Lake Sawyer

Most of the wetland habitats at this site are associated with existing stream systems (Cranmar, Covington, and Crisp creeks). Few (if any) of the wetlands have been disturbed by agricultural practices, but most have been affected by timber harvest and/or residential development. Deciduous forested wetlands are most common, and are dominated by black cottonwood (*Populus balsamifera*) and red alder (*Alnus rubra*).

Notable wetlands at this site include Covington Creek wetland system (Wetland 8). This is a large (46 ac to 37 ac, inside the project area) predominantly forested complex along Covington Creek and a few of its minor tributaries. In addition, Wetland 13 is notable because it is a large (47 ac) muck-based shrub/forested wetland and riparian wetland complex that forms the headwaters of Crisp Creek. Wetland 8 is probably a Category II wetland, whereas Wetland 13 is likely a Category I wetland.

Frederickson

Most of the wetland habitats in the southeast quadrant of this site are associated with minor headwater tributaries of Muck Creek. A relatively large but highly disturbed and fragmented wetland complex also exists in the northwest corner of the site. This wetland appears to not be associated with a stream system. Numerous other isolated wetlands are

scattered throughout the site. Most of the wetland habitats are forested with conifers, deciduous trees, or a mixture of these tree species.

Portions of the wetlands in the Muck Creek system appear to be abandoned farmland and are now in various states of natural restoration. Emergent areas are dominated by reed canarygrass, soft rush, and other disturbance-response species. Other wetland areas here have been ditched and are still actively farmed or pastured, or only recently abandoned from agricultural use. Conifer-forested areas are dominated by western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and Sitka spruce (*Picea sitchensis*). Deciduous forested wetlands are dominated by black cottonwood and red alder.

The wetland complex in the northwest corner of the site has been fragmented and disturbed by residential development. Generally, emergent wetlands here are dominated by reed canarygrass, bentgrass and soft rush. Deciduous forested areas are dominated by black cottonwood and red alder, and in some cases, quaking aspen (*Populus tremuloides*).

One wetland complex is notable for what appears to be numerous vernal pool-type wetlands. This area was not examined closely due to its occurrence on private property. Aerial photographs indicate a curious pattern of zonated vegetation in small depressions. This wetland area is currently used as an overgrazed pasture.

Accuracy

The inventory approach undertaken by this study necessarily excluded conclusive evaluation of wetland boundaries for most of each of the project areas. For example, the southern half of the Lake Sawyer site is devoid of public access and, therefore, could not be fully evaluated (more than 60 percent of the wetland boundaries were not field-verified in this site). Thus, generally, the number and acreage of wetland and stream habitats are probably underestimated for the Lake Sawyer project site.

STREAMS

As shown on the WDFW Habitats and Animals map for the respective USGS quadrangles, all project sites contain streams, most of which are known to provide habitat for resident, and anadromous fish species.

Arlington

The north half of the Arlington site includes 2,100 lineal ft of Portage Creek (tributary to the Stilliguamish River) and its tributaries. The south end of the site includes 13,530 lineal ft of tributaries to Quilceda Creek (which is tributary to Puget Sound), including agricultural ditches that provide potential habitat for resident fish, anadromous fish, and priority fish species. The total length of stream channel in the project area is estimated to be 15,630 lineal ft. All of these bodies are known to support resident fish, anadromous fish, and priority fish species.

Lake Sawyer

The north end of the Lake Sawyer site includes a 3,657 lineal ft segment of Cranmar Creek, a tributary to Jenkins Creek, which is tributary to Big Soos Creek. In addition, 15,872 lineal ft of upper Covington Creek (which is tributary to Big Soos Creek) are present in the Lake Sawyer site. The headwater stream segments (8,442 lineal ft) and headwater wetlands of Crisp Creek (which is tributary to the Green River) are present at the south end of the site. The total length of stream channel in the project area is estimated to be 27,971 ft.

Covington Creek and its tributaries are known to support resident fish, anadromous fish, and priority fish species. Cranmar Creek is not mapped as supporting any fish species, but Jenkins Creek is known to support resident fish, anadromous fish, and priority fish species. The Cranmar Creek watershed provides a city water supply for the City of Kent. Within the site boundary, Crisp Creek is mapped as having only resident fish and anadromous fish.

Frederickson

The Frederickson site adjoins the expansive headwater wetland system and upper tributaries of Muck Creek (tributary to Nisqually River). The total length of stream channel in the project area is estimated to be 1,421 lineal ft. Muck Creek and its upper basin tributaries are known to support anadromous fish.

COMPARATIVE ANALYSIS

A main goal of the present study is to provide a comparative analysis of wetland and stream resources present in each of the three sites. Table 3 shows the areas for each wetland class inventoried in each of the three sites in 1998 and compares these acreages with the areas included in the 1994 MSA study. As stated previously, the greater wetland acreage reported in the 1998 study is a function of the higher-resolution aerial photographs and field verification approach used in this study.

Similar to wetlands, field verification for the present study mapped and measured stream reaches within each site. These data, shown in Table 3, show greater stream length than reported in 1994.

Table 3. Comparison of wetland resources between 1994 and 1998 at the Arlington, Lake Sawyer, and Frederickson sites.

Airport Site	Feature	Palustrine Wetland Classes[a]												Stream Length	
		Aquatic Bed[b]		Emergent		Forested		Shrub		Unconsolidated Bottom[b]		Total		Miles[c]	
Name	Type	1994	1998	1994	1998	1994	1998	1994	1998	1994	1998	1994	1998	1994	1998
Arlington	area (ac)	0	N/A	30	289	12	34	2	6	1	N/A	45	329	2.7	3
Lake Sawyer	area (ac)	0	N/A	6	1	14	99	19	14	0	N/A	39	114	4	5.3
Frederickson	area (ac)	0.6	N/A	3	16	12	83	12	2	1	N/A	28.6	101	0	0.3

[a] 1994 data obtained from NWI. 1998 data obtained from photo-interpretation and limited field verification.

[b] This wetland class was not used in the 1998 analysis.

[c] 1994 data were obtained from Washington Rivers Information System.
1998 data were obtained from photo-interpretation and partial field verification

LITERATURE CITED

Washington Department of Ecology (Ecology). 1993. Washington state wetlands rating system (Western Washington). Publication 93-74. Olympia, Washington.