King County

PRELIMINARY DRAFT

NEPA Environmental Assessment/
SEPA Environmental Impact Statement

For

Proposed Master Plan Improvements at

King County International Airport
(Boeing Field)

February 23, 2004

This Environmental Assessment becomes a Federal document when evaluated and signed by the responsible Federal Officials

Responsible Federal Aviation Administration Official ____________ Date ____________

PAGE INTENTIONALLY LEFT BLANK

FACT SHEET

GENERAL INFORMATION ABOUT THIS DOCUMENT

What's In This Document? This document contains a Draft Environmental Impact Statement (DEIS) prepared subject to the Washington State Environmental Policy Act (SEPA) and a Draft Environmental Assessment (EA) prepared subject to the National Environmental Policy Act (NEPA). King County voluntarily prepared this SEPA EIS to enable a thorough evaluation of the probable environmental impact of the proposed Master Plan. Under the NEPA, the environmental review process typically begins with the airport operator's preparation of an EA. If the Federal Aviation Administration (FAA) deems the project impacts to be significant under the NEPA, a separate NEPA Environmental Impact Statement would be prepared by the FAA.

Please note that Chapter 6 contains an index of key words, a list of abbreviations, and a glossary.

What Should You Do? Read this document and attend the public hearing on these proposed projects. If you have important pertinent information that has not been considered in this document or comments about the data or conclusions, please send your comments to King County at the address below. Copies of this Draft SEPA EIS/NEPA EA are available for review at various libraries in King County, the FAA's office in Renton, and County offices at King County International Airport and the County Courthouse. Addresses of these locations are further identified in the Fact Sheet.

Please send written comments to:

Mr. Gary Molyneaux
Airport Planning Manager
King County International Airport
P.O. Box 80245
Seattle, Washington 98108
E-Mail: Gary.Molyneaux@metrokc.gov

A public hearing will be conducted at King County International Airport on April 5, 2004 from 4:30 pm until 7:30 pm. All comments must be received by 5 p.m. on April 9, 2004. Comments can be sent through the U.S. mail to the address above, or e-mail to the address above.

What Happens After This? After comments are received from the public and other Federal, State, and local governmental reviewing agencies, King County would issue a Final SEPA EIS and in coordination with the Federal Aviation Administration, issue a Final NEPA Environmental Assessment (EA). Then King County is expected to approve the Master Plan and associated environmental documentation. King County would then also submit the NEPA Final EA to the Federal Aviation Administration. Based on the Final EA, the FAA may do one of the following: 1) issue a Finding of No Significant Impact (FONSI) or 2) require the preparation of a NEPA Environmental Impact Statement.

FACT SHEET (Continued)

Project Title: Proposed master plan improvements for King County International Airport (KCIA).

Description of Project: Two specific problems are being addressed by the SEPA EIS/NEPA EA: 1) compliance with FAA Runway Safety Area dimensions while maintaining the Airport's existing operational capability; and 2) providing sufficient facilities at KCIA to accommodate future air travel demand.

Project specific analysis is being conducted on the proposed 880 shift in Runway 13R/31L to achieve compliance with the Runway Safety Area (RSA) dimensions and land uses:

- Shift Runway 13R/31L about 880 feet to the north;
- Extend the parallel taxiway 880 feet north, about 325 feet west of the runway;
- Implement Special Area Use Procedures for Taxiway Z;
- Establish an 880 ft. displaced threshold on the south end of Runway 31R (80 feet north of its existing location) and associated blast pad; and
- Establish a jet blast wall adjacent to the southern portion of the Georgetown Steam Plant west of Taxiway Z.

Programmatic or non-project level analysis is being conducted on facilities needed to accommodate forecast growth in demand at KCIA. Such facilities are believed to include:

- Consolidate cargo use on parcels immediately to the south of the Terminal and Arrivals Buildings (east side);
- Develop a helipad of the northeast side of the runway system;
- Consolidate small general aviation (GA) uses to the far ends of the east side development area and adjacent to the Museum of Flight;
- Construct an engine testing enclosure ("hush house"); and
- On the east side, use the area between the small GA and cargo for corporate GA.

Project Sponsor: King County

Lead Agencies: King County contact is: Mr. Gary Molyneaux, Airport Planning Manager, King County International Airport, P.O. Box 80245, Seattle, Washington 98108. King County is the lead agency for the purpose of the National Environmental Policy Act (NEPA) Environmental Assessment (EA) and State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS).

Licenses, Permits and Other Approvals Potentially Required: *Federal*: FAA: either Finding of No Significant Impact or determination that a NEPA EIS is required; Air Quality Conformity evaluation; and approval of Runway Safety Area project.

Local: King County Council project decisions, including adoption of the Master Plan, special use procedures, and Final EIS; King County grading and building permits, King County and others adoption of a draft Memorandum of Agreement concerning the window mitigation for the Georgetown Steam Plant, and other permits and approvals.

Principal Authors and Contributors to the Draft EIS and Draft EA: This joint NEPA EA and SEPA EIS was prepared under the direction of King County. Technical analysis was provided by:

Barnard Dunkelberg & Co
Synergy Consultants, Inc.
Anchor Environmental, LLC
Greenbusch Group
The Sheridan Group

FACT SHEET (Continued)

Date of Issue of Draft EIS/EA: February 23, 2004

Public Meetings: Two *scoping meetings* were held. The public scoping meeting was held on November 10, 1998. A scoping meeting with Federal, State, and local agencies was held at KCIA on November 10, 1998.

A *public hearing* on this Draft EIS is scheduled for 4:30 pm until 7:30 pm on April 5, 2004 in the Terminal at King County International Airport. Comments may be submitted in writing no later than 5 p.m. on April 9,2004 to: Mr. Gary Molyneaux, Airport Planning Manager, King County International Airport, P.O. Box 80245, Seattle, Washington 98108
or by E-Mail: Gary.Molyneaux@metrokc.gov

Approximate Date of Final Action by Lead Agencies: In accordance with regulation, a Final NEPA EA and a Final SEPA EIS will be issued upon review and response to public and agency comment. After compliance with applicable requirements, the FAA will determine if the project would result in no significant impact or if a NEPA EIS would be required. If a Finding of No Significant Impact (FONSI) is appropriate, the FAA will make that determination for the runway safety area project. Similarly, King County Council's action approving the Master Plan would occur after issuance of the Final EIS.

Approximate Date of Implementation: The runway shift to achieve RSA compliance would occur beginning in summer 2004. Other airport facility development would occur in response to demand and may be subject to later project specific analysis in accordance with SEPA.

Availability of Copies: Copies of the Draft SEPA EIS and Draft NEPA EA are available for inspection at:

Federal Aviation Administration, Airports District Office, 1601 Lind Avenue SW, Renton
King County International Airport, 7277 Perimeter Road, Seattle
Puget Sound Regional Council, Information Center, 1011 Western Ave , Seattle
Beacon Hill Library, 2519 - 1st Avenue South, Seattle
Boulevard Park Library, 12015 Roseberg Avenue South, Seattle
Seattle Public Library, 1000 - 4th Avenue, Seattle
Magnolia Library, 2801 - 34th Ave W, Seattle
Rainier Beach Library, 9125 Rainier Avenue S., Seattle
Burien Library, 14700-6th SW, Burien
Foster Library, 4060 South 144th Street, Tukwila
Kent Regional Library, 212 - 2nd Ave N, Kent
University of Washington, Suzzallo Library, Government Publications, Seattle
Valley View Library, 17850 Military Road South, SeaTac
Bellevue Regional Library, 1111 - 110th Ave NE, Bellevue

To Purchase A Copy: This document is available for public reproduction at Officemax located at 2401 Utah Ave South (at Sodo next to Sears), Seattle, Washington at a cost of about $50.

Locations of Other Documents: Technical reports, background data, adopted documents and material incorporated by reference in this document are, unless otherwise stated, located at: King County International Airport, 7277 Perimeter Road, Seattle.

PAGE INTENTIONALLY LEFT BLANK

King County International Airport

SEPA EIS/NEPA EA
Master Plan Improvements

TABLE OF CONTENTS

King County International Airport

SEPA EIS/NEPA EA
Master Plan Improvements

LIST OF TABLES

King County International Airport

SEPA EIS/NEPA EA
Master Plan Improvements

LIST OF EXHIBITS

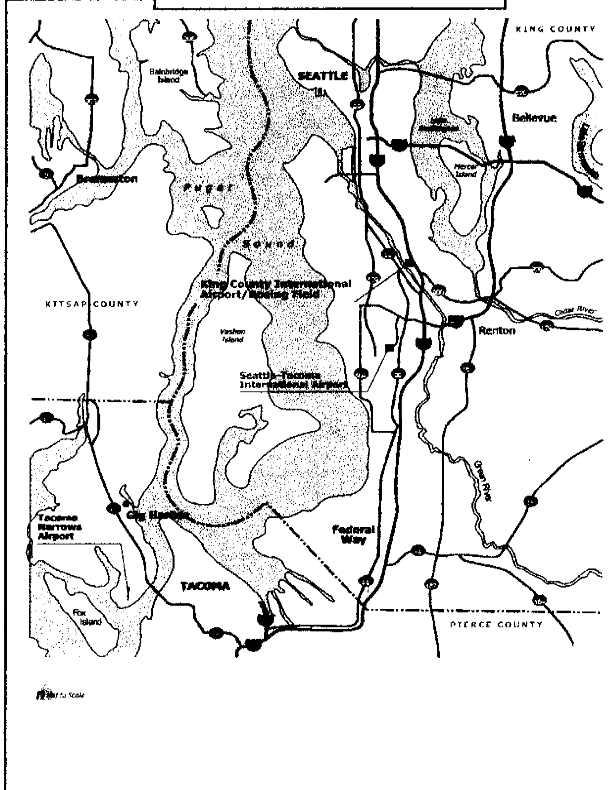
PAGE INTENTIONALLY LEFT BLANK

Chapter 1
INTRODUCTION AND PURPOSE AND NEED

1.1 INTRODUCTION

King County International Airport (KCIA – also known locally as Boeing Field), located about five (5) miles south of downtown Seattle, is owned and operated by King County. The Airport serves as a reliever airport to Seattle-Tacoma International Airport (Sea-Tac Airport). While Sea-Tac Airport is the region's primary air carrier airport, KCIA is the region's busiest general aviation airport and from time to time has accommodated more aircraft operations than neighboring Sea-Tac Airport. KCIA Airport property consists of about 594 acres of land and includes two parallel runways, a parallel taxiway system, aircraft parking aprons, a passenger terminal building, vehicle parking, and roadway system. The Boeing Company occupies about 20% of Airport land (120 acres) under a long-term lease. **Exhibit 1-1** shows the location of the Airport relative to the Puget Sound Region.

EXHIBIT 1-1
AIRPORT LOCATION



(A) Background

King County International Airport and the Puget Sound Region have played a significant role in the history of commercial aircraft. The Airport has been owned and operated by King County since it was originally developed in 1928. Concerned that Bill Boeing would move his 18-year old airplane company to California or Kansas in 1928, the King County Council proposed to build the region's first public airport, including ramp and runway space that could be leased to Boeing. At the time, Boeing was using a cinder runway near his Duwamish River production plant as an airstrip.

In November 1928, King County voters, by a landslide vote of 86%, approved construction of "Boeing Field". The King County Commissioners expressed a hope The Boeing Company "will continue to increase and employ a large number of men and be a monument to the manufacturing industries of Seattle and the Northwest."
The original runway was 4,800 feet long. During World War II, the Airport was taken over by the U.S. military and was dedicated to the production of nearly 7,000 Boeing-built B-17 "Flying Fortress" bombers. After the war, the Airport was reopened to the public and remained the region's major passenger airport until the development of Sea-Tac Airport in the late 1940s. During the 1930s, 40s, and 50s numerous improvements were made to the Airport, including adding the parallel runway and extending the primary runway to its current length of 10,000 feet.

Today, the airfield at KCIA consists of two parallel runways, as shown in **Exhibit I-2**. The primary runway (13R/31L) is approximately 10,000 feet in length and is the westerly of the two parallel runways. Runway 13L/31R is 3,710 feet in length and primarily services the light propeller aircraft. The primary cargo and general aviation facilities for the Airport are located on the eastside of the airfield along Airport Way.

In 1995, King County initiated a Master Plan for the Airport to consider several scenarios to reflect changes in aviation demand since the last plan was written in 1985. The initial purpose of the Master Plan was to examine several future role scenarios for the Airport. However, based on public feedback and a review of facility constraints, many of the role scenarios were found infeasible. Chapter 2 of this document briefly describes the various roles considered during the Master Plan alternatives evaluation phase. Based on a proportional growth in demand for airport facilities by all existing airport users, the Master Plan alternatives phase focused on addressing existing and anticipated constraints. The purpose of this State Environmental Policy Act (SEPA) EIS and this National Environmental Policy Act (NEPA) EA is to evaluate the probable environmental impact of the proposed recommendations as well as other alternatives, which would address these constraints.

Table 1-1 shows the allocation of existing airport land to the various types of users.

TABLE 1-1
EXISTING DISTRIBUTION OF AIRPORT LAND

Land Use	Area (Acres)
Airfield	330
General Aviation	82
Air Cargo	22
Aerospace (includes military)	124
Other Non-Aviation	25
Other (public ramp, passenger)	11
Total	594

Source: Barnard Dunkelberg & Company, 1999

(B) Aviation Forecasts

One step in the planning process is the preparation of a forecast of aviation activity (passengers, operations and cargo). The following sections summarize existing activity, the forecast prepared for the Master Plan, and the FAA's Terminal Area Forecast (TAF). As is noted in the forecast section, King County updated its Master Plan forecasts in late 2003 in response to changes in the aviation industry and the FAA's issuance of the 2002 TAF. While the 2002 TAF differs more than 10% from the updated forecast, the 2003 TAF to be issued by FAA in early 2004, will more closely resemble the KCIA updated forecast. Therefore, the County's 2003 updated forecast serves as the basis for evaluating the Master Plan in this document.

1. Existing and Historic Activity

As **Table 1-2** shows, over the last two (2) decades, the number of based aircraft have decreased from a high of 642 in 1980 to the year 2000 level of about 483. While based aircraft have decreased, annual aircraft operations have fluctuated between a high of about 425,548 annual operations in 1990 to a low of 291,472 operations in 2001 (due to the impacts of the terrorist activities on September 11, 2001 and national economic conditions).

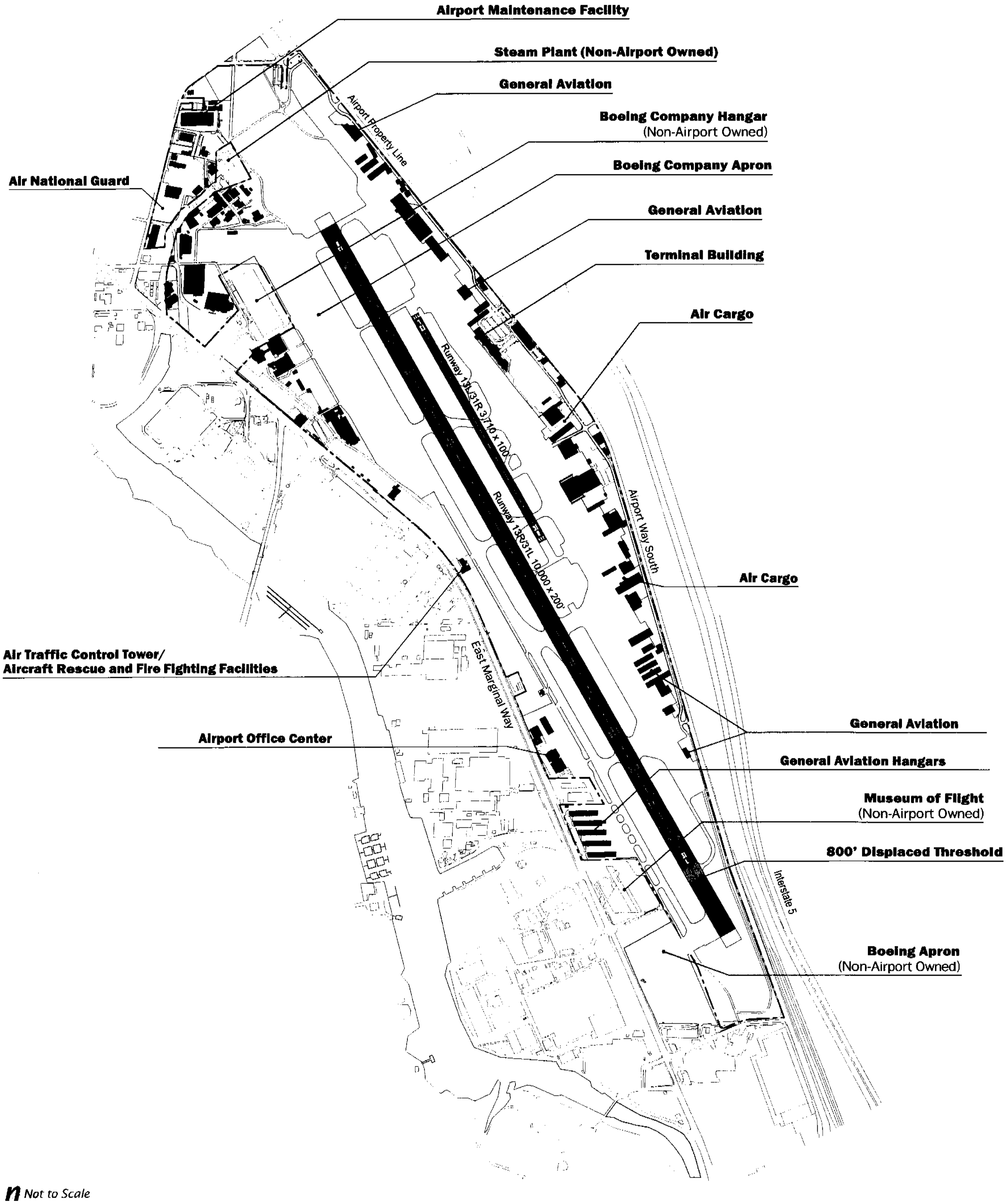


Figure I-2 Existing Airport Layout

TABLE 1-2
HISTORICAL ACTIVITY

Year	Based Aircraft	Annual Operations	Annual Enplaned Passengers
1980	642	408,207	25,000
1985	559	383,478	10,716
1990	533	425,548	8,837
1991	548	369,282	7,932
1992	537	414,341	2,166
1993	537	358,835	1,708
1994	482	422,804	2,474
1995	466	357,266	3,668
1996	455	339,321	5,072
1997	466	371,068	6,535
1998	466	345,120	9,795
1999	435	325,747	6,686
2000	478	363,838	6,580
2001	427	291,472	11,101
2002	486	283,734	10,069
2003 est	443	298,390	Not Available

Distribution of Activity (Operations)

Year	Air Carrier	Air Taxi	GA	Military
1980	3,570	12,577	389,479	2,581
1985	2,151	15,462	363,365	2,500
1990	5,691	18,726	396,778	4,353
1991	6,176	21,373	338,047	3,686
1992	5,918	28,017	376,324	4,082
1993	4,701	30,873	320,322	2,939
1994	5,452	35,564	375,826	3,273
1995	8,198	38,399	260,774	1,122
1996	9,139	41,034	285,076	2,131
1997	10,709	46,803	311,313	2,243
1998	11,659	44,279	286,933	2,249
1999	11,289	46,318	265,726	2,414
2000	11,498	46,013	304,301	2,026
2001	9,800	46,733	233,053	1,892
2002	9,268	47,452	222,483	2,563
2003 est	8,900	50,460	236,260	2,766

Source: Federal Aviation Administration TAF. 2003 est: reflects 7-1-02 through 6-30-03.

As shown above, operations in all user categories have fluctuated over the 20-year period. The growth in air carrier activity is a function of the increase in cargo operations at the Airport.

2. Master Plan Forecast of Activity

For airport master planning, forecasts represent an estimate of future activity upon which airport operators can prepare estimates of the types and quantities of new facilities that may be required. Forecasting aviation activity at general aviation and reliever airports is a difficult process. As a result, forecasting is more of an art rather than a science. While actual activity rarely matches precisely a forecast, in the short-term, actual activity typically more closely resembles the forecast than in the long-term.

In 1994, the Master Plan consultants identified a tentative forecast of aviation activity through the year 2015 for KCIA. In 1999, these forecasts were re-evaluated in light of the passage of time and a slightly revised forecast was produced. In 2003, the forecasts were again updated based on reductions in air travel as a result of a slowing national economy, war in Iraq, and the terrorist events that occurred on September 11, 2001. Earlier forecasts were prepared through 2015, whereas the updated forecasts evaluated conditions through 2023. **Table 1-3** lists the updated forecast. While conditions were forecast through 2023, this Draft EIS/EA evaluates Master Plan facilities required through 2018 to closely resemble the original Master Plan horizon of 2015.

TABLE 1-3
MASTER PLAN FORECAST OF ACTIVITY

	2008	2018
Air Carrier.	10,970	14,090
Air Taxi	57,230	70,050
Military	3,000	3,000
General Aviation	251,400	284,650
Total	322,600	371,790
Enplaned Passengers	13,220	22,800

Source: Barnard Dunkelberg & Co, December 2003. Forecast rounded to the nearest ten.

The forecasts were prepared based on the type of activity at the Airport. For instance, general aviation activity makes up about 78% of total operations at KCIA. General aviation (GA) traffic was predicted based on a forecast of aircraft based at KCIA, which assumes that the Airport would maintain its current market share of based aircraft. The number of general aviation operations was then estimated based on the current ratio of general aviation operations to current based aircraft. Air Taxi (aircraft for hire) represents about 18% of total operations. This activity was estimated to grow at a compound growth rate of about 5.6%.

Over the last decade, passenger activity at the Airport has fluctuated widely. Scheduled commercial service operations are conducted at KCIA by San Juan Airlines (who use Cessna Caravan aircraft) and Helijet International (using Beech 1900 and Sikorsky S76A aircraft). Several additional commercial passenger operators have expressed interest in initiating service from KCIA. Therefore, the forecasts anticipate that passenger traffic would either remain (growing slightly) at its current range of activity, or increase rapidly if a carrier decides to initiate service. The passenger forecast reflects KCIA retaining its current approximate 20% market share of unscheduled regional passenger traffic, which is expected to continue to grow in response to the Airport's proximity to Seattle Central Business District or with initiation of commercial air carrier service.

In comparison to 2003 activity levels, total airport operations are expected to increase 8.1% by 2008, and between 2003 and 2018, an increase of 24.6% is expected. This growth represents nearly a 1.5% annual growth rate over the forecast period.

The greatest percentage growth in aircraft operations is anticipated to be in the air carrier category, with as much as a 58.3% increase between 2003 and 2018. This substantial growth is anticipated due to the very low level of passenger operations that currently occur, which is expected to increase from an average of less than 24 operations per average day in 2003 to as many as 39 operations in 2018. The increase in the passenger operations is expected due to the increase activity by the Boeing Company (classified in the updated forecast as air carrier), the air cargo carriers, as well as passenger service charter activity increasing from about 8,900 operations today to about 14,000 operations in 2018.

Military operations are anticipated to remain somewhat constant in the future. General aviation operations, which comprised the substantial majority of all operations at KCIA, are anticipated to increase 20.5% between 2003 and 2018, consistent with national trends in general aviation activity. Air Taxi is anticipated to increase 38.8% between 2003 and 2018, or an annual growth rate of about 2%.

3. Comparison to the FAA's Terminal Area Forecast (TAF)

A comparison of the FAA's 2002 Terminal Area Forecast (TAF)[1/] to the Master Plan forecasts indicates that the updated Master Plan forecast prepared in 2003 for year 2008 is about 13% higher than the FAA's 2002 TAF of operations for year 2008 and 22% higher in 2018. The primary differences are associated with the Master Plan forecast assuming a growth rate for general aviation in the future whereas the TAF assumes that General Aviation traffic would decrease and then remain constant in the future over actual existing levels.

TABLE 1-4
2002 FAA TERMINAL AREA FORECAST – BOEING FIELD

User Category	2001	2008	2018
General Aviation	259,106	216,139	216,139
Air Taxi	46,057	57,225	70,052
Military	2,030	2,458	2,458
Air Carrier	10,148	10,968	14,094
Total	359,408	286,790	302,743
Enplaned Passengers	6,371	6,371	6,371

Source: Federal Aviation Administration, December 2003 (http://www.apo.data.faa.gov/faatafall.HTM)
Note that in early 2004, the FAA will be releasing an updated forecast that, in draft form in early December 2003, indicates 331,314 operations in 2008, and 385,599 operations in 2018 for KCIA.

Based on these differences, King County and the FAA met in late 2003 to review the differences between the forecast update and the 2002 TAF. That review led to discussions with the Washington DC FAA office that prepares the TAF. Based on actual activity levels at KCIA through September 2003, the FAA Office of Policy and Plans (the office responsible for preparation of the TAF) has indicated that the 2003 TAF that will be released in March 2004 will contain higher estimates of future general aviation activity for KCIA, bringing the TAF to levels closely approximating the Master Plan forecast update. Based on preliminary/draft 2003 TAF, the 2008 operations forecast would increase to 331,314 operations and by 2018 operations would increase to 385,097. Thus, in 2008 the KCIA forecast update is 2.7% lower than the draft 2003 TAF, and by 2018 the forecast update would be 3.7% lower than the TAF. These differences are within the 10% range accepted by the FAA, and because the KCIA Master Plan updated forecasts are prepared at a level of detail necessary to use in evaluating environmental

1/ In early 2004, the FAA is expected to release its annual update of the TAF. The 2003 TAF is expected to be similar to the 2002 TAF noted in this report, with improved data concerning general aviation traffic, which was held constant in the 2002 forecast.

impacts, they serve as the basis for evaluating impacts associated with the proposed Master Plan.

1.2 PURPOSES AND NEEDS

The initial focus of the Master Plan study was the examination of the impact of various concepts for accommodating demand for air service at KCIA. During that review, however, some facilities at the Airport were found to not comply with FAA standards. As a result, two specific needs were identified:

- Achieve Runway Safety Area (RSA) Compliance While Maintaining the Airport's Existing Operational Capability
- Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner

The following sections summarize the purpose and needs.

(A) Achieve Runway Safety Area Requirement Compliance While Maintaining the Airport's Existing Operational Capability

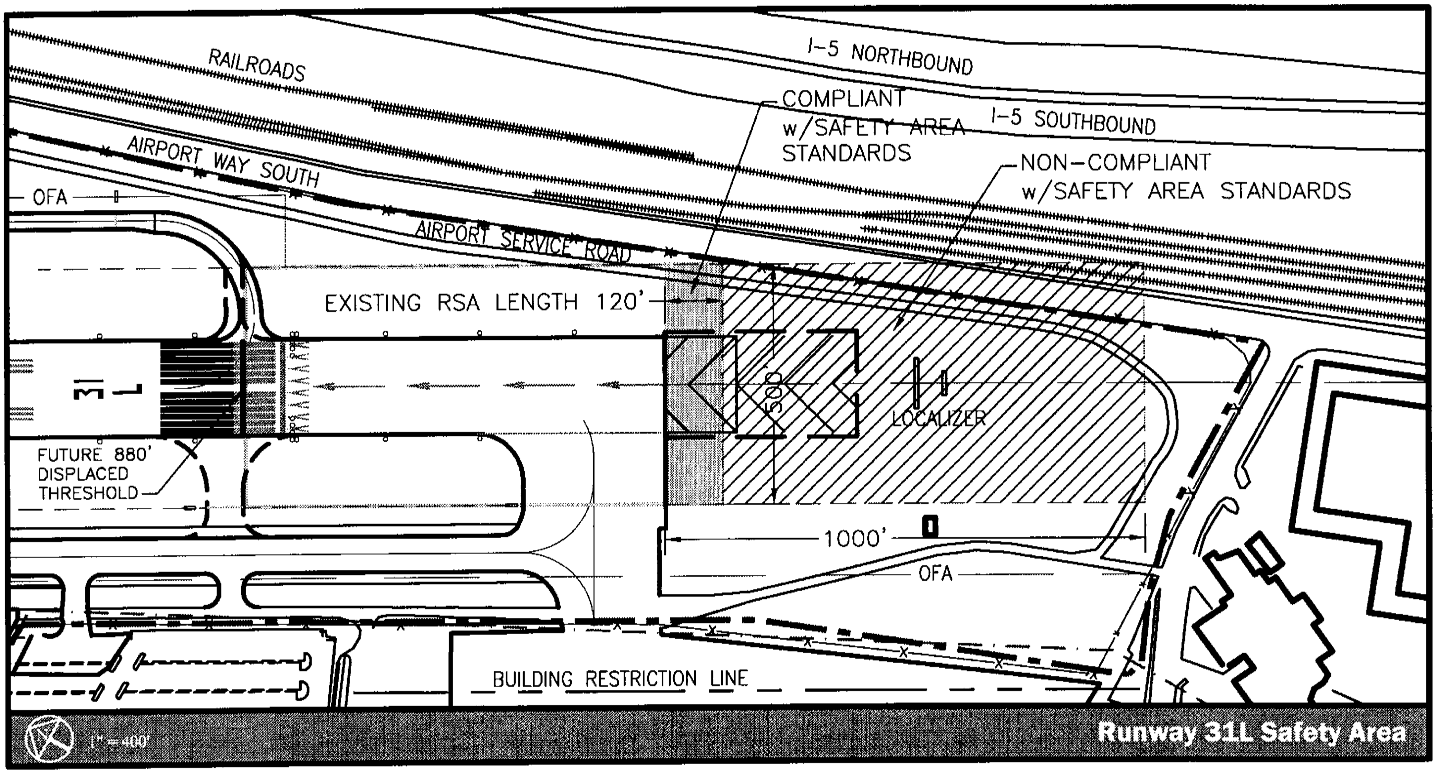
A review of all airfield facilities was conducted for the Master Plan for the purpose of ensuring that these facilities complied with all current FAA design standards. At that time, King County found that the Runway Safety Areas (RSAs) for the Airport's primary runway (13R/31L) do not meet current dimension/ use standards. An RSA is "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway".[2] When the runways at KCIA were originally built, they met then-current FAA design standards. However, as a result of aircraft overruns and incidents at airports in the U.S., the FAA modified the standards. In 1987, the FAA modified Federal Aviation Regulation 139.309(a)(2) that requires:

> "To the extent practicable, each certificate holder shall provide and maintain for each runway and taxiway which is available for air carrier use - (2) If construction, reconstruction, or significant expansion of the runway or taxiway began on or after January 1, 1988, a safety area which conforms to the dimensions acceptable to the Administrator at the time construction, reconstruction, or expansion began ...".

The RSA design standard dimension for Runway 13R/31L is defined as a rectangular area centered about the runway that is 500 feet wide the length of the runway and extends 1,000 feet beyond each runway end. In addition to the two-dimensional standards, FAA has longitudinal and transverse gradient standards for RSAs. The RSA should be cleared, drained and graded, and is usually turfed. Under dry conditions, this area should be capable of supporting occasional aircraft that could overrun the runway without causing structural damage, as well as support fire fighting equipment.

Exhibit 1-3 shows the dimensions of the existing RSAs at the Airport. At 10,001 feet, Runway 13R/31L is the longest runway at KCIA. The current RSA for the south end of the runway (31L) meets the dimensional standards for only 120 feet beyond the

[2] FAA Advisory Circular 150/5300-13, Airport Design Chapter 3, Runway Design.



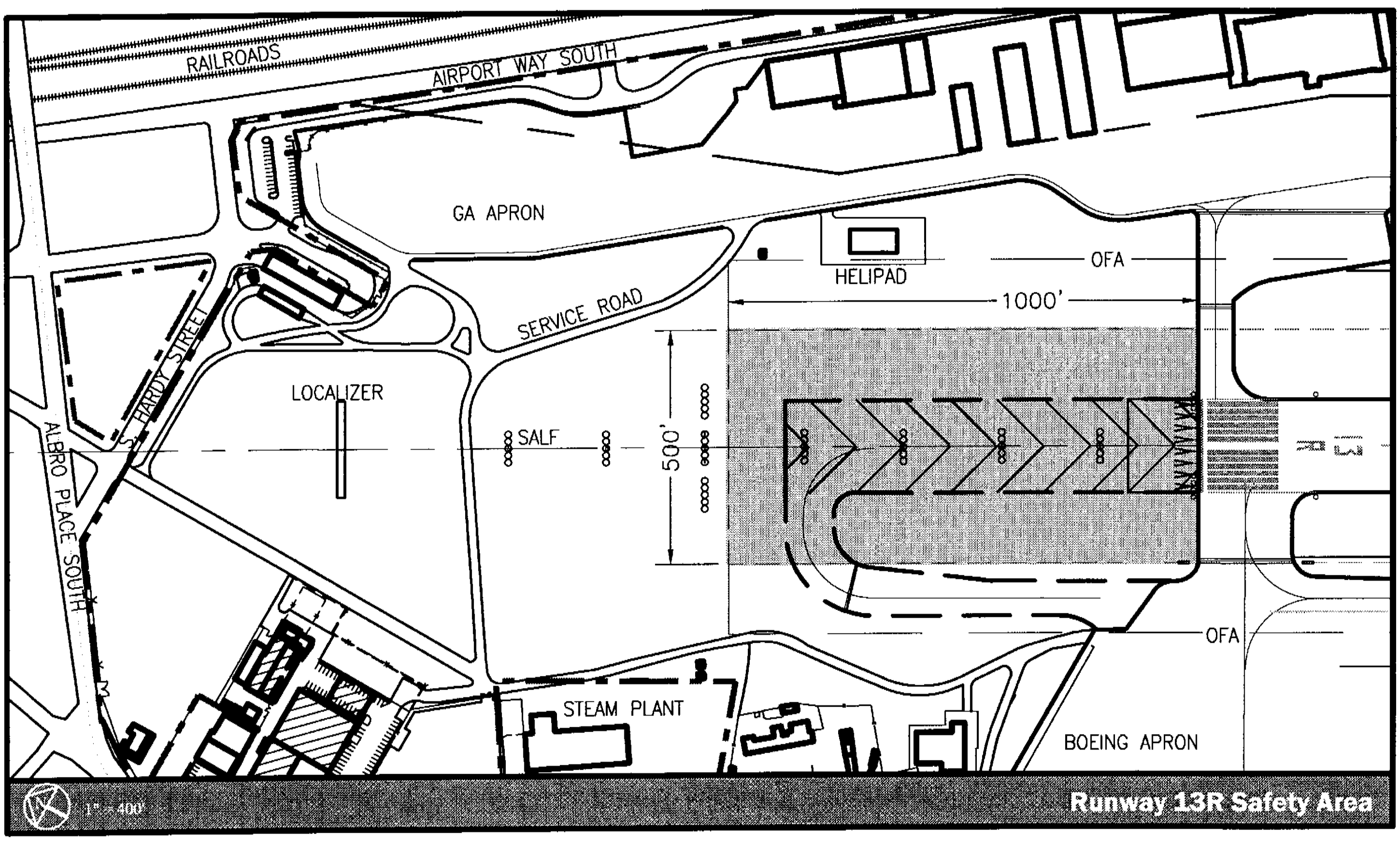


Figure I-3 **Existing Runway Safety Areas** threshold of the runway, in contrast to the required 1,000 feet. The current RSA for the north end of that runway (13R) meets the standard for 1,000 feet.[3] Because of the grant assurance as well as compliance with FAR Part 139 and airport design requirements, King County must bring the runway safety areas into compliance.

(B) Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner

Based on the existing facilities and aviation activity conducted at the Airport, a review of future facilities that would be required to accommodate forecast demand was conducted. **Table 1-5** lists the total quantity of facilities that would be required to meet all of the projected demand.

As is shown below, if growth in general aviation activity occurs as forecast, an increase in space for based and transient aircraft of about 11% and 56% respectively would be required. Passenger terminal space requirements would require an increase by about 91%. The primary needs for passenger terminal space are related to baggage and circulation needs as well as public parking. The anticipated growth in demand for cargo traffic would require an increase in cargo building space of about 155% and an associated 48% increase in cargo aircraft apron space.

TABLE 1-5
FACILITIES NEEDED TO ACCOMMODATE DEMAND

Facility/Use	Existing 1994/95	Forecast Total Need 2008	Forecast Total Need 2018
General Aviation:			
Based Aircraft (positions)	479	503	532
Transient Aircraft	36	53	56
Additional GA Area (SF)	--	107,100	126,000
Passenger Terminal			
Lobby waiting area (SF)	2,962	1,825	2,075
Ticket Counter Queue (SF)	560	550	620
Baggage Claim Area (SF)	1,050	925	1,075
Departure lounge (SF)	2,841	2,460	2,880
Total Area Required (SF)	9,154	15,410	17,552
Other Terminal Space (SF)	1,741	9,650	10,902
Aircraft positions – large	2	1	2
Aircraft positions – small	2	1	2
Public parking stalls	283	383	398
Cargo Building Area (SF)	58,305	104,727	148,945
Cargo Aircraft Parking Positions	29	41	43
Total Area Cargo (Acres)	22	33	43

Source: "King County International Airport, Demand/Capacity and Facility Requirements", TRA-BV, January 1997; Other Terminal Space includes: mechanical systems, building structure, circulation space, public restrooms, departure lounges, coffee shop/restaurant, security screening, etc. Note: the Master Plan was originally prepared to note facility requirements in 2005 and 2015. Based on the 2003 updated forecasts, the facility requirements were assumed equal to the 2008 and 2018 timeframe.

3/ In 1999, the FAA installed an Instrument Landing System for landings from the south on Runway end 31L. As a result of installing this ILS, King County was required to displace the landing threshold for aircraft landing on this end of the runway by 800 feet. Aircraft landing on this runway in north flow now have 9,200 feet of landing length. The installation of the ILS did not affect the runway length available for departure in a south or north flow direction, nor did it affect arrival operations in a south flow which would continue to have 10,000 feet of runway.

Table 1-5 above shows the space available when the Master Plan was undertaken (shown as available in 1994/1995), as well as the space that would be required in 2008 or 2018 if activity grows as anticipated by the forecasts shown in **Table 1-3**. For instance, a decrease in passenger terminal area is noted for 2008 relative to that which was available in 1994, as more space exists for these users than is needed by the 2008 forecast level of activity. For cargo users, the Airport had 29 parking positions for cargo aircraft within about 22 acres of land in 1994. By 2008, demand for cargo use is expected to require 31 parking positions on 33 acres and by 2018, require 43 parking positions on 43 acres of land.

1.3 DESCRIPTION OF THE PROPOSED PROJECT

Based on the evaluation conducted as part of the Master Plan process, the staff at King County International Airport has identified a preferred concept for addressing the needs at KCIA. Chapter 2 discusses in detail the alternatives that would meet the need.

(A) Achieve Runway Safety Area Requirement Compliance While Maintaining the Airport's Existing Operational Capability

Project specific analysis is being conducted on the proposed project, which consists of a proposed 880-foot shift in Runway 13L/31R to achieve compliance with the Runway Safety Area (RSA) dimensions. Elements of this project, reflected in **Exhibit I-4a and I-4b** include:

- *Shift Runway 13R/31L 880 feet to the north* – The landing threshold on the south end of the runway would be moved 80 feet north of its present location (880 feet north of its location in 1999). To complete the project, the surface material from the site would be removed to enable construction of 880 feet of additional pavement, about 200 feet wide. In addition, utilities and other infrastructure may require relocation;
- *The landing threshold on the north end* would remain at its present location;
- *Extending the West Parallel Taxiway* – the west parallel taxiway would be extended about 880 feet north at lateral distance of about 325 feet west of the runway. This taxiway would be known as Taxiway Z, would be 75 feet wide, and would include associated taxiway lights and in-pavement lighting and marking;
- Construction of additional *crossover taxiways* west of the terminal and at the south end of the runway;
- Installation of jet blast or jet exhaust walls within FAA guidelines, including Part 77 requirements on the north west side of the airfield to prevent jet exhaust effects on facilities adjacent to the shifted runway end and Taxiway Z;
- *Establish 880 ft. displaced threshold on the south end of Runway 31R* – this element would involve the re-painting of the runway markings to show the new location of the threshold. The 880 feet displacement would provide the required 1,000 feet long Runway Safety Area for the south end of the runway, as well as RSA compliance when combined with the additional pavement for the north end of the runway;
- *FAA implementation of declared distances* to enable 13R/31L to be lighted and marked to designate the thresholds;
- *Implement Prior Permission Required Procedures* for use of Special Use Area 13R.

King County proposes to shift the runway to the north, removing from service 880 feet of pavement for departure and replacing that lost pavement on the north end of the runway. When the Airport operates in a north flow (landings from the south, departures to the north), aircraft would land at the displaced threshold (about 80 feet further down the runway than occurs today), while departures would occur from their current position. In south flow, arrivals would touch down at their current locations. Aircraft not requiring 10,000 feet of departure length would begin their departure roll from the current location. Aircraft requiring 10,000 feet of departure length, where prior permission had been granted, would use the shifted runway and would begin their departure roll about 880 feet north of the current location.

To minimize the effects of the shift on the Airport environs, King County (in concert with the FAA) has developed procedures to ensure that users requiring the existing 10,000 feet of departure length in a south flow would be able to operate and have 10,000 feet of departure length available. King County would enter into a draft Memorandum of Agreement (a voluntary agreement) with all tenants at the Airport concerning the use of the 880 feet Special Use Area pavement on the north. The signators of the agreement would agree to use the additional pavement only when the operational performance and weather conditions require 10,000 feet of departure length in a south flow. All other times, the existing departure point would be used. A copy of the draft agreement is shown in **Appendix E**. When operators require the 10,000 feet of departure length in a south flow, they would contact FAA air traffic control with the requisite prior permission requested authorization. Air Traffic would then authorize those specific users to taxi through Special Use Area 13R. All other users would begin their departure in a south flow from the existing departure point.

To shield the adjoining areas from jet blast and associated noise activities related to the Special Use Area, King County proposes to develop a blast fence within FAA guidelines along the northwest perimeter of the Airport near the Georgetown Steam Plant to ensure that jet blast does not affect uses on the Steam Plant property. In addition, King County proposes to install a screening wall and landscaping along the north end of the Airport perimeter.

(B) Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner

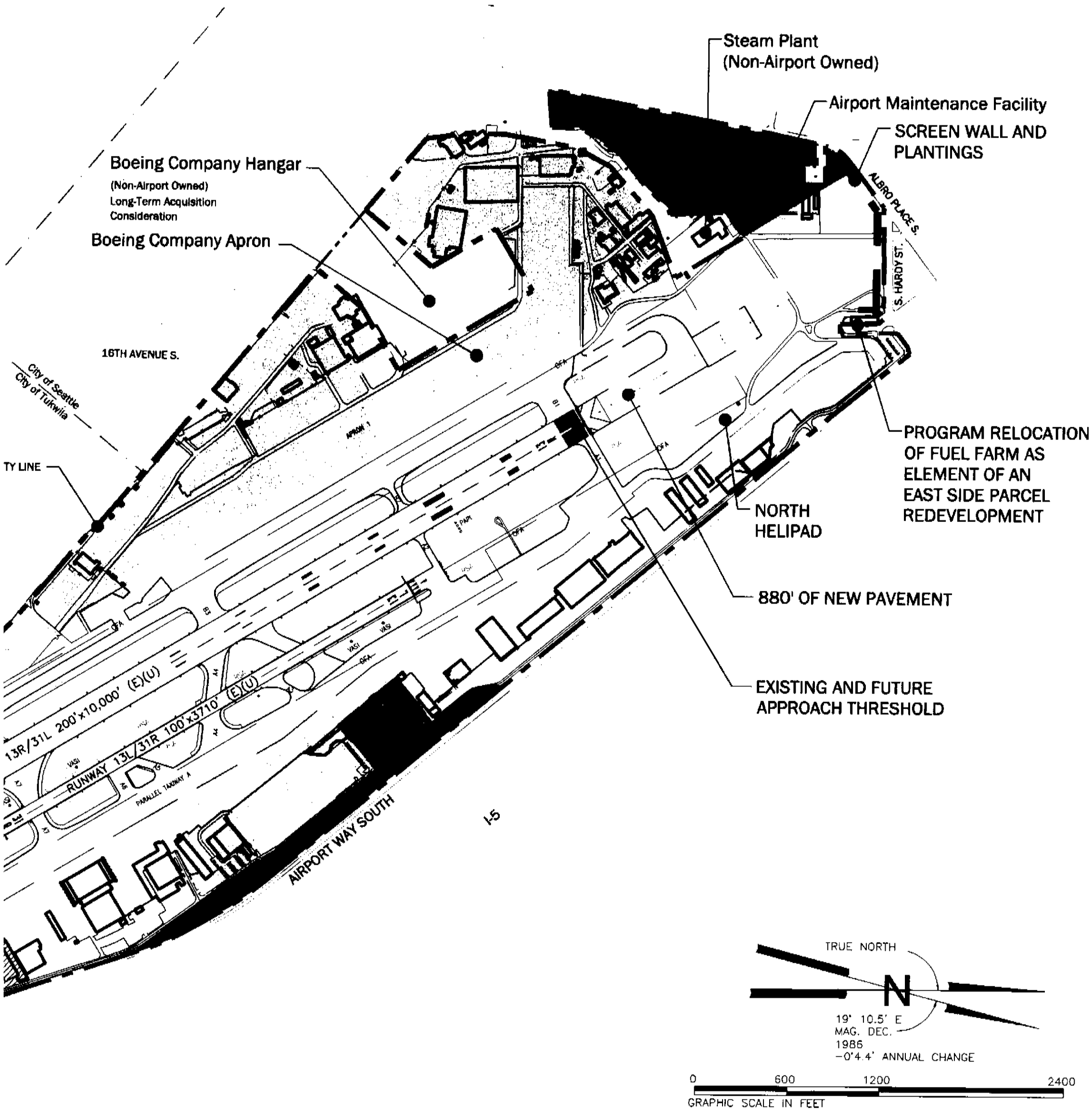
Programmatic (non-project) level analysis is being conducted on all facilities needed to accommodate forecast growth in demand.[4/] **Table 1-5** lists the quantity of facilities that would be required to satisfy the anticipated demand. The Master Plan is documented in *King County International Airport Master Plan* dated August 2001, which is incorporated herein by reference. Based on the existing location of facilities and the limited land available to satisfy the demand, this is expected to include:

- *East Side Development* – the east side currently serves GA, corporate aviation, FBO, air cargo, and others. Uses of the east side were identified based on the existing height limits associated with airport development standards close to an air carrier runway, and the needs of various users. The Master Plan recommends continued use for these types of services:
  - Small GA is recommended to be concentrated in the north and south ends of the east side because of height limits in this area which are conducive to this user;

[4/] It is noted that insufficient land exists to efficiently accommodate all future demand. Thus, the Master Plan recommends that the best/optimal use of various land parcels in consideration of potential future demand.

- Corporate GA is recommended to occur adjacent to the small GA on the inner portions of the north and south ends, in addition to retaining the middle area of the east side for corporate uses, because of the medium height requirements of the facilities and the height limits of this area;
- Consolidate cargo use on parcels immediately to the south of the Terminal and Arrivals Buildings (east side). These parcels are least affected by height limits, so the taller uses associated with cargo are recommended for this area;
- Continued use of the passenger terminal for future passenger use as well as anticipated renovation of the aging terminal structure. The building on the north side of the terminal facility, currently used for airport administrative offices, would also be reserved for future passenger terminal use;
- *Construction of a helipad* (a paved surface of about 100 feet by 50 feet) to support existing and future helicopter activity on the north east side of the runway system, north of Taxiway A1, west of Classic Helicopter. Helicopters would approach/takeoff using paths to the north, south, and west from this facility; and
- *Construction of a second helipad* – to be located on the southern portion of the east side development area, adjacent to Apron 12, south of Taxiway A10. Approach and takeoff paths would be to the north and south.

- *West Side Development* – the west side of the Airport is primarily occupied by Boeing Company facilities, some small general aviation users, Airport Traffic Control Tower Facilities, the Aircraft Rescue and Fire Fighting facility, and several parcels occupied by non-aviation uses. The Master Plan recommends maximizing the use of this area by corporate and GA uses.
  - Should the Boeing Company release land at KCIA, that land would be used to serve other aviation needs;
  - Aviation activities would continue to occupy existing space north of the Museum of Flight. Additional small GA facilities are proposed for a portion of the existing Boeing lease area north of the State Aeronautics hangar and office. The parcel of non-airport property north of the existing T-hangar site is proposed for acquisition and development for aviation facilities. The existing airport-owned structures in the vicinity of the State Aeronautics facility would be rehabilitated or removed and replaced to better meet current GA and other needs;
  - Continued uses to occur in the Northwest Development area on the northwest side of the airfield that do not require taxiway access. Included in this area are improved access to the Georgetown Steam Plant, and airport maintenance. Other uses in the future that are aviation/airport related would occur in this area. The visual screen wall or buildings could occur along the property line along the east side of Ellis Avenue;
  - FAA Airport Traffic Control Tower – this land would continue to be used for ATCT purposes, however, the tower is programmed by FAA for replacement;
  - Evaluate the development of an engine testing/run-up enclosure ("hush house"); and
  - Separate from the Master Plan recommendations, King County is working with Seattle Light concerning improved access to the Georgetown Steam Plant. Currently, City Light has an easement through the secure portions of the airfield - through the north RPZ. King County is proposing to acquire the easement interests and to coordinate a land exchange between the County, Boeing Company, and Seattle Light that would enable direct access to the Steam Plant property from Ellis Avenue.



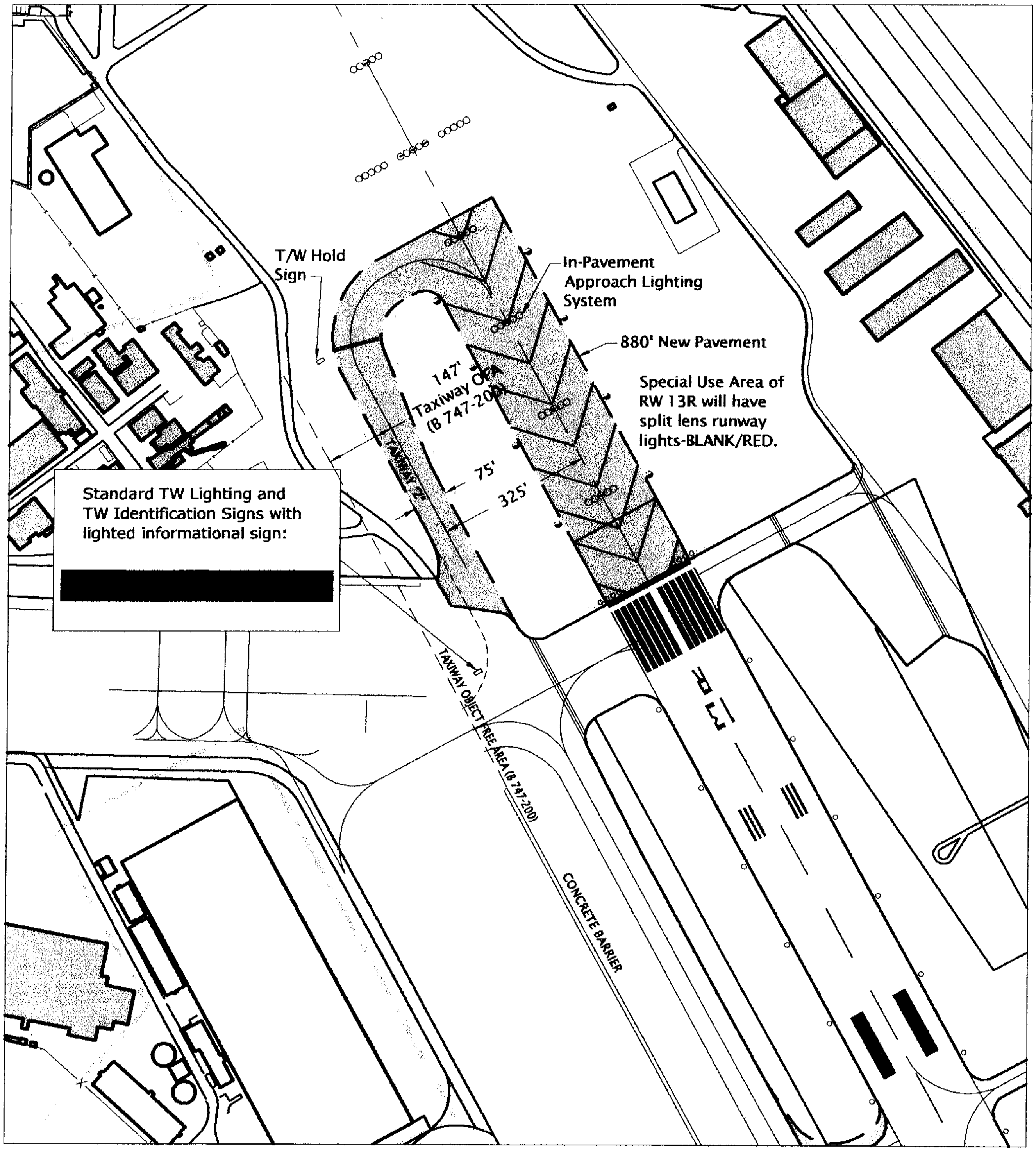
LINE LEGEND

SCREEN WALL & PLANTINGS
FUTURE PUBLIC ACCESS ROAD FOR STEAM PLANT
RUNWAY SAFETY AREA
AIRPORT PROPERTY LINE

ROPOSED USE LEGEND

SMALL GENERAL AVIATION (GA)
CORPORATE GENERAL AVIATION (GA)
AIR CARGO
CORPORATE OR CARGO
RECOMMENDED PROPERTY ACQUISITION
PUBLIC RAMP
PASSENGER TERMINAL FACILITIES
FEDERAL AVIATION ADMINISTRATION (FAA)
BOEING COMPANY LEASEHOLD
OTHER (NON-AVIATION)

Barnard Dunkelberg & Company
Tulsa, Oklahoma



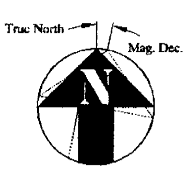
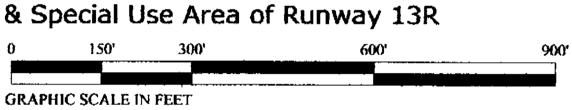


Figure I-4b
Future Taxiway 'Z'
& Special Use Area of Runway 13R



1.4 FEDERAL, STATE AND LOCAL ACTIONS

Regardless of the development alternative pursued, action will be required at the Federal, State, and local level. The next section summarizes the applicable Federal and State laws. The types and groups responsible for the action include the following:

(A) Federal Actions

Among the types of actions likely to be undertaken by the FAA in the normal course of implementing the proposed project include:

- A determination under 14 CFR Part 157 (49 USC 40113(a)) as to whether or not it objects to the Airport development proposal from an airspace perspective, based on aeronautical studies;
- A determination, through the aeronautical study process, under 14 CFR 77 (49 USC 40103(b), 40113) regarding obstructions to navigable airspace;
- Decisions regarding project eligibility for Federal grant-in aid funds (49 USC 47101, et seq.) for land acquisition, site preparation, runway and taxiway construction, and environmental mitigation;
- Execution of the Memorandum of Agreement concerning the window mitigation effort at the Georgetown Steam Plant. At the request of the National Park Service and the Washington State Historic Preservation Officer, the FAA initiated Section 106 consultation in accordance with 36 CFR 800 as part of the NEPA EA process to enable the agencies early participation in the conduct of the Master Plan;
- Decision under FAR Part 139 concerning RSA requirements and compliance.

(B) Airport Operator Actions

Among the actions expected by King County to occur in the normal course of implementing the proposed project include:

- Finalization of the Master Plan and associated documentation;
- Adoption of the Master Plan and SEPA Final EIS;
- Implementation of Special Use Procedures for Runway 13R;
- Adoption of the Memorandum of Agreement concerning the window mitigation for the Georgetown Steam Plant (See **Appendix H**);
- Application for federal financial assistance;
- Application for and approval of a building and grading permit; and
- Construction of the preferred alternative.

In addition, as projects are defined for the terminal and landside elements of the Master Plan, it is anticipated that further environmental analysis may be required.

(C) State and Local Actions

It is anticipated that King County would adopt the Master Plan and Final SEPA EIS/NEPA EA and then seek certain state and local permits and approvals to implement the Master

Plan Update improvements. The types of permits would be similar for all alternatives. The following organizations could be involved:

- Washington Department of Community Development - Office of Archaeology and Historic Preservation;
- King County grading and building permits;
- City of Seattle and other parties adoption of the Memorandum of Agreement concerning the window mitigation for the Georgetown Steam Plant (See **Appendix H**); and
- Other permits and approvals may be necessary as landside and tenant improvement elements of the Master Plan are refined.

1.5 FUNDING AND TIMING

As was noted earlier, airport facilities are typically provided in direct response to a specific user and/or need. As specific projects have not been identified to address future growth, a cost estimate has only been prepared for the runway shift, which is estimated to cost about $6.2 million.

The runway shift and landside improvements would be completed using a combination of King County, private, and Federal funding. Funding from the following sources may be sought: FAA grants from the Aviation Trust Fund, General Obligation Bonds (backed by airport revenue), and tenant capital expenditures. General Obligation Bonds would be issued by King County. Funding from the Aviation Trust Fund would be requested for airfield-related improvements. The Aviation Trust Fund is funded primarily by a nationwide airline passenger ticket tax.

PAGE INTENTIONALLY LEFT BLANK

Chapter 2
ALTERNATIVES AND PROJECT DESCRIPTION

Federal and state guidelines concerning the environmental review process require that all reasonable alternatives that might accomplish the objectives of a proposed project be identified and evaluated. The examination of alternatives is of critical importance to the environmental review process and serves to establish the conclusion that an alternative that addresses the project purpose and might enhance environmental quality (or have a less detrimental effect) has not been prematurely dismissed from consideration. **Table 2-1** lists the alternatives that were identified as possibly satisfying the individual needs. Alternatives specific to each need are identified.

Alternatives considered in this environmental document address the two specific needs identified in Chapter 1.

2.1 ACHIEVE RUNWAY SAFETY AREA (RSA) REQUIREMENT COMPLIANCE WHILE MAINTAINING THE AIRPORT'S EXISTING OPERATIONAL CAPABILITY

As a result of the airport certification requirements of FAR Part 139, King County must evaluate the practicability of achieving RSA compliance and then upgrade the RSAs as practicable. The following alternatives were identified to address RSA compliance:

A-1 Develop the necessary dimensions from the existing threshold – As is shown in **Exhibit 1-3,** to provide the necessary 1,000 longitudinal RSA would require King County to relocate Airport Way, the Burlington Northern Rail line, and at least a half-mile segment of Interstate-5 (I-5). The relocation of this infrastructure was determined to be very costly and, unreasonable, thus, is not prudent. Therefore, this alternative is not prudent and was not considered further.

A-2 Shift the runway 80 feet to the north (Shifted Runway) With Full Operational Use [5] – As was noted earlier, and shown in **Exhibit 1-4a**, a distance of 880 feet could be developed on the north end of the runway to meet the current RSA standards. As a result, the runway could be shifted 80 feet to the north (880 feet north of its 1999 location), to achieve the required RSA dimensions and to retain the 10,000-foot departure length of the runway. In this scenario, aircraft would touch down on the runway in south flow at the present location, but when departing to the south, all aircraft would use the new departure threshold, that has been moved 880 feet north of its present location.

A-3 Shift the runway 80 feet to the north (Shifted Runway With Special User Area 13R Operational Procedures– Preferred Alternative) –This Alternative is similar to Alternative A-2, except not all aircraft would use the shifted runway. Procedures would be put in place so that only aircraft requiring 10,000 of departure pavement in south flow would use the new pavement. Aircraft operators that have demonstrated a need for 10,000 feet would be provided with "prior permission" to taxi on Taxiway Z and to use the 880 feet of new pavement (Special Use Area 13R). This alternative would not affect the landing point on either end of the runway, and would only affect the departure point for those operators that had prior permission. Because the existing departure runway length must be retained to maintain the Airport's existing operational capability, the runway shift is preferred.

---

[5] As is noted in Chapter 1, this runway was displaced 800 feet in 1999 to install an Instrument Landing System; thus, it would be displaced an additional 80 feet for a total of 880 feet.

A-4 Use of Declared Distances – This option would effectively shorten the runway in the areas that do not meet the standards – shorten by the required 80 feet (880 feet from the 1999 location) from the south. This could be done through the development of declared distances, which are procedures that would declare only 9,120 feet of runway available for departure and arrival. As a result, the landing length would be shortened for both Runway 13R and 31L to 9,120 feet and less runway length would be available for 13R departures (departures to the south). As is discussed later, this alternative was found to not be prudent.

A-5 No Action – The NEPA and SEPA require consideration of a No Action Alternatives. As is noted, FAA requires that King County bring the runway safety areas into compliance. Therefore, to evaluate a non-standard RSA, the status quo was evaluated, as it would not require construction. As a result, the existing runway thresholds would remain at their present location with an associated 10,000-foot runway length. The RSA for the south end of the runway (31L) would only be120 feet long by 500 feet wide (short of the standard by 880 feet). The RSA for the north end of that runway (13R) would be the requisite 1,000 feet long and 500 ft wide.

TABLE 2-1
ALTERNATIVES CONSIDERED

Achieve Runway Safety Area (RSA) Requirement Compliance While Maintaining the Airport's Existing Operational Capability

A-1 Develop the necessary dimensions from the existing threshold (relocate I-5/Airport Way)

A-2 Shift the runway 880 feet to the north (Shifted Runway) With Full Operation

A-3 Shift the runway 880 feet to the north (Shifted Runway) With Special Use Area 13R Procedures

A-4 Declared Distances: this alternative would effectively shorten the runway to achieve RSA compliance

A-5 No Action (status quo, with the RSA for 31L not meeting current standards)

Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner

D-1 Use of Other Modes of Transportation

D-2 Use of Other Area Airports

D-3 Activity or Demand Management

D-4 Alternatives at King County International Airport, including the Community Alternative discussed in Appendix B

D-5 Without Master Plan (No Action)

Appendix B discussed the Community Alternative, as defined by the Airport Roundtable.

Evaluation of Alternatives A-2, A-3, A-4, and A-5 - For airports that cannot meet RSA design standards, the FAA has established guidelines for the use of declared distance procedures. With the declared distance procedures, the FAA requires that an airport operator declare which portions of the runway are available for takeoff and landing calculations so that the 1,000-foot RSA is available. Declared distances were established by the FAA for space-constrained airports where the conventional RSA configuration cannot be provided at the ends of the runways. FAA defines declared distances for:

- Landing Distance Available (LDA) - is the runway length available for landing.
- Takeoff Related Distances:
  - Takeoff Run Available (TORA) - the length of runway declared available and suitable for satisfying takeoff run requirements.
  - Takeoff Distance Available (TODA) - is the TORA plus the length of any remaining runway or clearway beyond the end of the TORA available for satisfying takeoff distance requirements. The TODA length is determined by aircraft operations, based on the controlled obstacles in the departure area. At KCIA, where no clearways are present, TODA is the same as TORA.
  - Accelerate-Stop Distance Available (ASDA) - is the runway length available to accelerate to V1 (takeoff speed) and then decelerate to a safe stop. This length affects the available length on departure.

If the RSA requirements are met, the length of each of the above distances equals the length of the runway for a given operation; thus, generally, the shortest of the takeoff-related distances determines the amount of available departure runway. Shortening these lengths has ramifications on the numbers and types of aircraft operations occurring at an individual airport. The following declared distances would be associated with the alternatives:

TABLE 2-2
LANDING AND TAKEOFF DISTANCES OF ALTERNATIVES

Distance	RSA Alt A-2 (Shifted – Full Use)	RSA Alt A-3 (Shifted – Special Use Area)	RSA Alt A-4 Declared Dist. (Shortened)	Existing & RSA-5
North Flow (31L)				
Landing Distance Available (LDA)	9,120	9,120	9,120	9,200
Takeoff Run Available (TORA)	10,000	10,000	10,000	10,000
Takeoff Distance Available (TODA)	10,000	10,000	10,000	10,000
Accelerate Stop Distance Available (ASDA)	10,000	10,000	10,000	10,000
South Flow (13R)				
Landing Distance Available (LDA)	**9,120**	**9,120**	**9,120**	**10,000**
Takeoff Run Available (TORA)	10,880	10,880	10,000	10,000
Takeoff Distance Available (TODA)	10,880	10,880	10,000	10,000
Accelerate Stop Distance Available (ASDA)	**10,000**	**9,120+**	**9,120**	**10,000**

Source: Barnard Dunkelberg & Company. **Shaded areas** note changes over the existing conditions
+ The designation of the Special Use Area and Prior Permission Required authorization would enable approved aircraft, requiring 10,000 feet of departure length in south flow, to operate safely.

As the table above shows, all alternatives are nearly equal in a north flow. In south flow, differences would result. Alternative A-2 (full use of the shifted runway) would result in a reduction in the current landing distance (LDA). No impact would occur to departures as the runway would be shifted north and 10,000 feet of departure length would be provided. With all of the shifted runways, the TORA and TODA would increase to 10,880 feet. However, with Alternative A-3 (Shifted runway with special use area procedures) would result in a reduced landing distance, and would provide 9,120 feet of departure length for most aircraft; however, special procedures would enable aircraft requiring 10,000 feet of departure length in south flow. Alternative A-4 would reduce the south flow arrival and departure length. Alternative A-5 would retain the existing runway length, but would provide a non-standard RSA for the south end of the runway. The following subsections discuss the effect of the options on the operational capability of the Airport:

Alternative A-2 (Full Use of Shifted Runway): As the **Table 2-2** shows, the net result of the difference between Alternative A-2 and the existing runway is that landings to the south would have 880 feet less of landing length. Departures to the south would not be altered in available departure length (10,000 feet is available today and would remain available for all aircraft), but the departure roll would occur 880 feet north of the present location for all aircraft. Departures to the north would not be affected over existing conditions with Alternative A-2.

Alternative A-3 (Shifted Runway- Special Use Area Procedures): This alternative would be like Alternative A-2, except that only aircraft that have a demonstrated need for 10,000 feet of departure runway length in south flow would be provided with the requisite permission to use the special use area. To implement the proposed action, King County is proposing to implement a series of procedures to ensure that only those operations, which require an ASDA of 10,000 feet, use the new pavement. **Appendix E** identifies the proposed procedures and a draft Memorandum of Agreement between King County and the FAA that would implement the desired special use area procedures. Approximately 438 annual operations would be expected to require the 10,000 feet of departure length (ASDA) in year 2018. These operations would consist of the AWACs and heavy aircraft, such as the B767, B777, and B757 Boeing Aerospace and cargo aircraft; reflecting an average of one (1) to two (2) operations during an average day.

Alternative A-4 (Declared Distances - Runway Shortened): Alternative A-4, relative to existing conditions, would result in 880 feet less of landing length available in a south flow, but not alter the existing condition in a north flow. For departures, Alternative A-4 would result in a TORA or TODA at 10,000 feet and an ASDA at 9,120 feet. Because the shortest of these lengths determines the departure runway length, only 9,120 feet would be available in a south flow. Therefore, this alternative would result in 880 feet less departure length (9,120 feet) to the south in comparison to existing or Alternatives A-2 and A-3. In arrivals, the north flow would be the same as today, but in south flow, arrivals would have 880 feet less than today.

Alternative A-5 (No Action or Non-standard RSA): This alternative would retain the airfield in its present configuration; the landing thresholds for both the south and north runway ends would remain in their present location. Therefore, all aircraft would begin their departure roll and landing touchdown at the same location used today.

Issues associated with shortened departure length: King County International Airport is located adjacent to the major offices of The Boeing Company (and until recently, the world corporate headquarters). The Boeing Company is organized into three primary operating divisions: The Commercial Airplane (headquartered in the Seattle area), the Military (St. Louis), and Space (Long Beach). Although the division headquarters of two of these divisions are located outside the State of Washington, many of the corporate functions are located in the vicinity of Boeing Field due to the efficiencies that are gained by their co-location and shared resources.

The Boeing Corporation site at KCIA completes the following activities for the Boeing Commercial Aircraft and Military divisions:

- AWACs Installation and Electronics Test program;
- Conduct of FAA certification tests and test flights of any new Boeing aircraft models; and
- Preparation for delivery of the B-737/B-757 aircraft line, which are assembled in Renton and flown to KCIA for delivery.

Because the Research and Development Flight Test and Delivery Center for the 737/757 are co-located, the company realizes efficiencies from the test pilot and ground support integration between programs. [6]

Among the functions of the Flight Test Division located at Boeing's KCIA facilities are the research and test functions associated with the AWACs aircraft (the B-707/E-3 aircraft and B-767 aircraft). These particular aircraft, due to their size, are particularly sensitive to runway lengths less than 10,000 feet. All AWACs testing for United States military, the fleet of North Atlantic Treaty Organization (NATO), and other nations occurs at KCIA due to the unique facilities available through the Boeing Company. No other location within the United States currently exists (or is planned) to provide this type of testing, and no other U.S. company is capable of providing this testing capability.

The testing of AWACs aircraft includes the aircraft integrity, as well as all of the advanced electronic operating capability of the aircraft. When sorties are flown to test new software/ hardware as well as to maintain/correct existing systems, the AWACs flown from Boeing Field intercept military aircraft deployed from other locations. Thus, due to complex resource scheduling, the testing of the AWACs aircraft cannot be delayed to other periods when KCIA could be operated in north flow. The Boeing Company estimates that the cost to launch an AWACs test is about $100,000. Thus, cancellations due to weight penalties caused by a shorter departure runway length at KCIA would increase to cost of the testing and maintenance of AWACs aircraft. Boeing estimates that about 100 AWACs tests requiring a 10,000-foot departure length occur each year. To operate on a shorter runway would require reducing the weight of the aircraft, primarily through offloading fuel. As a consequence, the length of the testing, normally 8.8 hours, would be shortened, potentially requiring increased numbers of AWACs launches or inadequate testing. Boeing estimates that shortening the runway to 9,200 feet could result in reduced fuel capability, reducing the flight duration by 2.3 hours to 6.5 hours. As a consequence, shortening the runway length available for takeoff at Boeing Field would increase cost by requiring more frequent refueling of these operations, as well as time lost for associated military operations. This would result in an added cost of about $100,000 per takeoff.

---

[6] In the midst of preparing this environmental evaluation, the Boeing Company announced employee layoffs associated with reduced aircraft orders and options. These layoffs do not affect the need for 10,000 feet of departure length in south flow.

The test capability provided at Boeing Field for a NATO country AWACs aircraft is an essential military function. No other NATO country has such facilities. Thus, a loss in operating capability at KCIA would adversely affect these operations and thus, the critical defense capability provided by the AWACs aircraft, as this loss could represent a severe impact to the maintenance and testing of these aircraft.[7]

As noted earlier, another function the Boeing Company performs at KCIA is associated with the conduct of FAA certification tests of new aircraft. During these tests, aircraft are required to operate within 5% of their maximum weight. These tests include: cruise performance, stall speed, drag, check climbs, etc. At 10,000 feet, aircraft undergoing such tests are often required to depart KCIA, fly to another airport (often nearby Sea-Tac with an 11,900-foot long runway) whereby additional weight is added. These interim flights are estimated to add $30,000 per occurrence. If the runway was shortened at KCIA, such that only 9,120 feet was available during south flow, the need to add weight at another nearby airport would occur during warm weather conditions (increasing the cost to conduct such tests) or the entire program would require relocation. Boeing also estimates that reduced weight conditions could result in the conduct of additional flights or more frequent use of nearby airports with the requisite length (Sea-Tac or Moses Lake). If such conditions occurred frequently the cost of continual delivery would escalate, requiring the company to consider relocating the test activities to a location that would enable all test flights to occur at one site. Boeing estimates that such relocation, likely to southern California, would cost about $240 million (in 1998 dollars) and result in the relocation of 900 to 1,100 jobs to that location.

The amount of runway required for departures is primarily driven by the weight of the aircraft and operating time temperature/humidity. As a result, one consideration might be having aircraft operations that require greater weight loads (departure length) to occur during cooler periods of the day or year. However, to ensure national defense capability and readiness, the military and NATO nations must have certainty as to the operating environment to test these aircraft. As a result deferring these tests to north flow conditions or cooler periods is not a viable option.

To ensure that a significant adverse noise impact does not result from the proposed runway shift, as could occur with the proposed runway shift, King County proposes to implement operating procedures for Special Use Area 13R and the additional pavement as part of Alternative A-3. By 2018, it is anticipated that as many as 438 annual operations might require 10,000 ft of departure runway length in south flow. As was noted in Chapter 1, King County (in working with the FAA) has developed a prior permission required program that would affect the use of the shifted runway. King County would enter into a voluntary agreement with the users at the Airport concerning this area. Aircraft operators that have a demonstrated need to use 10,000 feet of departure runway length in a south flow, would be provided with permission to use the Special Use Area 13R (the only access to the shifted runway). Users would be required to supply FAA with their prior permission before being provided clearance to taxi to Taxiway Z. Those receiving prior permission would be able to begin their departure roll from the new end of the runway. All other users would departure from the current departure location. **Appendix E** shows the draft agreement.

---

[7] Mr. Frank Figg, The Boeing Company, June 1999 and re-confirmed by Richard Lentz, Flight Test Operations, August 2002.

While declared distances are not desirable, they do represent a feasible alternative. However, as the preceding analysis shows, the loss of departure length would have serious impacts on the operational capability of the Airport and its users. Based on this analysis, it was determined that Alternative A-4 (Declared Distances alternative) would not be prudent. Two other alternatives were also considered prudent. Alternative A-2 would enable all aircraft to use the runway when shifted 880 feet north of its location in 1999. The 880-foot shift in the runway with special use area procedures (Alternative A-3) represents the staff recommended alternative. The environmental consequences of Alternatives A-2, A-3, and A-5 are addressed in Chapter 4 of this document.

2.2 SATISFY EXISTING AND FUTURE AVIATION DEMAND IN A SAFE AND EFFICIENT MANNER

A number of alternatives were initially considered for the purpose of addressing existing and future demand for air service at KCIA. These include:

- Use of Other Modes of Transportation
- Use of Other Area Airports
- Activity or Demand Management
- Alternatives at King County International Airport

(A) Use of Other Modes of Transportation

Alternative modes of transportation were evaluated in terms of their capability to divert aircraft operations, passengers, and cargo from KCIA by offering alternative modes of meeting their needs. Alternative modes considered include: automobile, rail, and bus service. In evaluating the ability of these other modes of transportation to serve the development needs at the Airport, it is important to consider the purpose of the air travel. As a result, the evaluation of alternative means of transportation focused on the types of users at KCIA. While this alternative is not prudent, and may not be feasible, its effect relative to KCIA might theoretically lead to not needing the Master Plan recommendations (No Action condition), which is considered throughout this environmental document.

General aviation (GA) traffic currently accounts for about 79% of aircraft operations at KCIA. By 2018, as a percentage of total traffic, general aviation activity, relative to overall activity, is forecast to decrease to about 76.5% of total traffic (while the number of GA operations are expected to increase from about 236,258 annual operations to 284,650 in 2018). General aviation traffic refers to the smaller aircraft, and aircraft used for personal/corporate purposes. Based on national surveys, the primary purpose of general aviation is 62% personal; 15% business; 8% instructional; 6% corporate; and 9% other miscellaneous (including air surveillance, external loads, etc). General aviation activity at KCIA is a function of the number of based aircraft and the proximity of the Airport to the central business district. Because King County cannot prevent a user from operating at the Airport, the only control that could be exerted on these users would be limiting the availability of additional facilities, such as hangars, tie-downs and other resources. However, such controls would not limit activity to current use and activity levels. Instead, activity could continue to increase with a lower level of service (inefficiently) to the users and potentially inadequate and unsafe aircraft parking conditions would result. Aircraft owners and operators typically select the location in which they base their aircraft on proximity to home/office/destination, ease of operation, and cost. Because of KCIA's location relative to the tall structures in downtown, and large aircraft operating at Sea-Tac Airport, it is not the easiest of airports at which to operate, nor are costs the lowest in the region. As a result, it is likely that location is the primary reason that operators choose KCIA. No other airport is available to serve these aircraft, and thus, no alternatives exist to serve this demand.

Air taxi demand represented almost 17% of aircraft operations at KCIA in 2003. Alternative modes of transportation would not serve these operations; these aircraft are "for hire" to the destination of the passenger's desire. Most of the flights from KCIA are to locations with limited direct access by air or surface transportation, such as the San Juan Islands and Victoria BC. Access by ferry is possible, but during busy tourist months the schedule of ferry access is unreliable due to long wait lines. Because King County, as operator of the Airport, cannot limit access to air taxi operators, no means exist to require use of alternative modes of transportation to those locations.

Air Cargo represents about 7% of today's operations, and is expected to represent 8% of total operations by year 2018. The primary air cargo operators at KCIA are United Parcel Service (UPS), BAX, and DHL/Airborne Express. These operators are providing overnight package express service from their locations at the Airport. Large cargo operators (such as Airborne and UPS) require use of an airport that has adequate runway lengths for the types of aircraft in the airline's fleet (in this case 7,000 feet or longer runways). In the Puget Sound Region, only three air carrier airports exist to provide such service: Sea-Tac Airport, Boeing Field, and Paine Field. To require these operators to occur at Sea-Tac or Paine Field would require development of additional facilities at those locations. However, these users have chosen KCIA over these other airports because of its centralized location in the region. King County cannot require these operators to leave the Airport, but might be able to limit future expansion. However, as was discussed for general aviation users, limiting development of cargo facilities would not necessarily limit the growth in aircraft operations in the short-term. Rather, these users could increase the cargo lift capacity of the aircraft serving the Airport, or reduce the size of aircraft to enable more operations to fit within their aircraft parking apron, but increase flight frequency. Further, while limiting cargo development within the Airport might be possible, it would not affect the need for increased facilities for other users.

By 2018, the Master Plan forecasts envision that a passenger service carrier may have initiated service at the Airport. As is shown in **Table 1-5**, much of the space that would be required by such operations is currently available at the Airport. However, some of this space would require re-allocation to meet projected needs. Such air service is likely to be initiated to cities in relatively close proximity to Seattle (such as other cities in Washington State, and cities in Oregon and Montana) or as specialized flights to high air service vacation destinations, such as southern California, Reno, and Las Vegas. Surface travel (auto, bus, and rail) is an alternative to air service to cities such as Portland or Spokane, as these cities are within 3 to 5 hours by car/bus from Seattle. However, air service is likely only to be initiated from KCIA to these locations if the demand for service at nearby Sea-Tac Airport is not being adequately served. Therefore, in this case, alternative modes of travel might serve the demand, and facilities would not be needed at KCIA. In the case of air travel to high volume vacation destinations outside Washington, Oregon, and Montana, surface travel is not a reasonable alternative to air travel. In this case, surface transportation time would require a loss of one (1) or more days of travel to reach these cities (they are over 750 miles from Seattle). This loss of time would be the reason that air travel would be the mode of choice.

Alternative modes of transportation would not serve the air travel needs of individuals that own or operate their own aircraft from Boeing Field. These users have chosen to operate by air travel and as a result, since King County cannot prevent public access to the Airport, alternative modes of travel are not a reasonable alternative for these users.

As was noted earlier, use of alternative modes of travel is not a prudent alternative, and in some cases may not be feasible. However, its effect at KCIA might be to limit or prevent future airport development, and as such the No Action or Without Master Plan Alternative represents the consequence of this alternative. Another alternative, referred to as the Community Alternative, is presented in **Appendix B**.

(B) Use of Other Airports or Construction of a New Airport Alternatives

This section presents a review of the ability of other existing area airports and undeveloped sites to reduce the existing and future facility requirements at KCIA. Such alternatives have been the subject of extensive debate in the Puget Sound Region as a result of the need for additional airfield capability at Sea-Tac Airport. Relative to airfield capacity issues at Sea-Tac Airport, a supplemental Airport and a replacement airport were found not feasible and not reasonable for the following reasons:

1. "There is no sponsor, identified source of funds or acceptable site for a new airport;
2. Extensive study of this issue resulted in the consideration of all alternatives for addressing air transportation capacity issues in this Region. Based on this process, the Puget Sound Regional Council (PSRC) adopted Resolution A-93-03 and EB-94-01 confirming that no feasible sites exist; and
3. If a new site could be identified, market forces would not enable it to successfully compete with Sea-Tac until regional origin and destination air travel demand exceeds 10 million enplanements annually - currently forecast to occur around the year 2010. "

Source: *Final Environmental Impact Statement – Seattle-Tacoma International Airport Master Plan Update Development*, FAA, February 1996.

While that evaluation did not examine the possibility of identifying a supplemental airport for KCIA, it is probable that the same issues noted above would be identified, resulting in the same conclusion that a supplemental airport is not a reasonable alternative. Similarly, a replacement airport for KCIA was not evaluated as part of that evaluation. However, that approach would not be feasible, because the continued presence of the Boeing Company's aircraft maintenance, development, and delivery functions would require an adjacent airfield.

(C) Activity or Demand Management Alternatives

Another alternative that is frequently suggested when considering airport development is the consideration of traffic demand management and activity restrictions. The primary objective of activity management is to increase airport efficiency by establishing pricing or regulatory actions, thereby delaying or eliminating the need for future airport development.

King County has accepted grants to maintain and enhance the Airport which contain assurances concerning the continued use of the facilities. Federal law, and the grant assurances require that access be permitted to the Airport on fair and reasonable terms, without unjust discrimination, and without imposing an undue burden on interstate commerce. Demand management techniques may not be implemented that unfairly discriminate against types of aircraft or impose an undue burden on interstate commerce.

Based on the issues disclosed throughout this chapter, activity or demand management might theoretically result in the No Action or Without Master Plan condition. However, it would not prevent the activity from occurring. Instead, congestion and operational inefficiencies could be exacerbated. As is described later in this chapter, the Without Master Plan or No Build condition is considered throughout this document.

(D) Alternatives At King County International Airport

During the Master Plan evaluation of alternatives, nine goals were considered:

- Assure safety;
- Maximize efficient use of space;
- Assure continued financial self-sufficiency;
- Enhance airport-community relationships and support the Airport being a good neighbor to surrounding communities;
- Assure compliance with environmental regulations;
- Promote community and business partnerships with the Airport;
- Allow the Airport to respond to changing market needs;
- Assure provision of high quality services; and
- Enhance the Airport's role as a gateway to the region.

Based on these goals, the Master Plan formulated a series of 10 initial alternatives. These alternatives were then narrowed to a list of four. Consideration was also given to a Community Alternative (as is discussed in **Appendix B**).

1. Alternatives Considered

As is demonstrated in Chapter 1, KCIA consists of about 600 acres of land (see **Table 1-1**) and is a significantly land constrained airport. While greater efficiencies could be achieved within certain parcels of land at KCIA, there are no large parcels available to satisfy future demands. In addition, substantial expansion of the Airport is constrained by its proximity to railroad tracks, local manufacturing development, and hillsides.

The following ten initial alternatives were identified during the Master Plan, based on input from the public and comments from the Strategic Plan and Noise Advisory Group:

a. *Close the Airport* – with this alternative, the land on which KCIA is located would be adsorbed into the industrial corridor for non-airport uses. This alternative was determined to not be prudent, as closure of the Airport would require The Boeing Company to relocate its facilities to another airport, which would most likely to be out of Washington State. In addition, KCIA is the base of Seattle operations for UPS, Airlift Northwest, Nordstrom, and a number of other corporate users. Closure of the Airport to these users would require relocation of 400-based aircraft to another airport in the region. No other airport in the region affords the close proximity to the downtowns of Seattle and Bellevue. For this reason, it was not considered further.

b. *Status Quo* – no change in policy would occur with this alternative. Market forces would determine how lands are used. This alternative would continue the existing policies of King County relative to KCIA. As a result, it was explored further.

c. *Maximize use by small aircraft* – this alternative would emphasize the use by operators of aircraft weighing less than 12,500 pounds. Facilities would be provided to support these users to their maximum market potential. Other markets would compete for the remaining available space. The Master Plan found that the market potential for these users could be fulfilled in the height-restricted areas of the Airport. This alternative was eliminated because it would not enable the Airport to achieve the objectives established by the Master Plan. This alternative would not enable the Airport to be financially self-sufficient if it were dominated by small aircraft users, and would not result in maximum efficiency of facility use and operations. Thus, this alternative is not prudent. Because these users can be accommodated in the height-restricted areas of the Airport, this was an option retained for all subsequent alternatives.

d. *Maximize use by large aircraft* – This alternative would seek to accommodate aircraft greater than 12,500 pounds. As general aviation (small aircraft) leases expire, areas would be re-developed to accommodate the larger aircraft (corporate, passenger, and cargo). Similar to the preceding alternative, this alternative was found not to be prudent, as it would not meet the goals established for the Master Plan. Deficiencies of this alternative include: it would not enhance service, it would not enable financial self-sufficiency, and would not meet general aviation needs.

e. *Maximize recreational and public education uses* – This alternative would expand the Museum of Flight on airport land, develop an interpretative center at the old terminal and other viewing areas and classrooms as facilities transition. When contrasted with the goals of the Master Plan, this alternative would not meet any of the goals. It would not make efficient use of airport lands, and would likely not allow the Airport to be financially self-sufficient. Thus, this alternative was found to not be prudent.

f. *Maximize corporate development* – To achieve this alternative, policies would be adopted, ensuring that corporate operators (large and small) would be given priority in leasing new and transitional lands at the Airport. Users that would be given priority would be corporate general aviation, air cargo, passenger, and aerospace. As a result, this alternative was determined to not be prudent, as it would not meet the needs of general aviation and would not address the recognized mix of needs of the existing and future users.

g. *Maximize cargo development* – Policies would be established to ensure that lands transition to cargo and freight forwarding services. Since many of the areas on the airfield are not suitable for large aircraft, this alternative does not preclude general aviation activity. This alternative would likely also lead to substantial increases in noise impacts. This alternative was found to be consistent with the goals of the Master Plan and was considered further.

h. *Maximize passenger services* – Additional passenger services could be developed to occupy the terminal area with improved ticket counters and active passenger waiting areas. This approach could be undertaken to encourage development of point-to-point passenger air service from KCIA. It, however, depends on many uncertain factors, including a passenger airline wishing to operate at KCIA. While substantial revenue would be generated, the cost of renovating the terminal building to comply with TSA security regulations, and passenger service needs (rental cars, concessions, flight kitchens) might be considerable. Passenger service is anticipated in the forecast horizon at KCIA.

i. *Maximize Boeing development and use of the field* – This alternative would result in an increase in Boeing's leasehold to lands suitable for heavy aircraft use and remote manufacturing activities. In evaluating this alternative, discussions with Boeing were conducted, which revealed that they do not need a larger leasehold. Consideration was also given to emphasizing Boeing subcontractors to fill the remainder of the Airport lands. However, that approach would not make efficient use of lands and would displace other aviation users. Because there is no need, and the alternative would not meet the goals of the Master Plan, no further consideration was given to this alternative.

j. *Expand the boundaries of the field to accommodate the growth of one or more of the above markets* – King County owns all but a few properties within the boundaries of Ellis Avenue, S. Hardy, Airport Way, South Norfolk Street and East Marginal Way. This alternative would consider expanding the Airport across these boundaries. Options considered were expansion across Norfolk Street to the AGA and associated lands: across Airport Way to land east of the Burlington Northern railroad tracks. This option was then retained for consideration in addressing the need of the users, as defined by all preceding alternatives.

One of the findings of the evaluation of scenarios was that large aircraft, such as those associated with air cargo operations are not capable of using land adjacent to the northwest portion of the airfield. This constraint is due to the limited amount of King County owned land, as well as aeronautical surfaces that protect safe flight.

A list of final alternatives was developed based on blending elements of the preceding alternatives. Based on the analysis, the following alternatives were given more detailed evaluation in the Master Plan:

1. Status Quo
2. Emphasize air cargo
3. Emphasize corporate general aviation
4. Balanced uses
5. Emphasize noise reduction

Issues that were considered in evaluating each of these alternatives include:

Status Quo – As noted earlier, this alternative would retain the current approach to allocation of airport lands – market demand. No method exists to predict exactly how the Airport would evolve in this scenario, as it would be reflective of regional and local economic conditions. However, it was estimated that this alternative could accommodate 93% of small general aviation, 85% of corporate general aviation, 40% of air cargo, and 15% of passenger facility requirements based on the current ratios of those market sectors. While a portion of the facility requirements could be accommodated, the Master Plan found that this scenario could not accommodate the full unconstrained/forecast activity levels. Facilities at the Airport would operate inefficiently, with substantial congestion during parts of the day. Unlike some of other alternatives considered, this alternative would not have "zones" allocated to user types. The market would likely respond where no effort is made to change the existing configuration of parcels and their use. Tenants might sell their leases and King County has little or no basis for denying approval of subleases. Currently, the use of airport land parcels is not restricted except by legal height restrictions and few changes would be required. Finally, this alternative would not necessarily allocate land to the most efficient uses. This alternative represents the Without Master Plan alternative and, thus was carried forward throughout the environmental analysis.

Emphasize air cargo – It was envisioned that with this alternative, King County would actively market KCIA to cargo users and would encourage cargo tenants to acquire parcels from other non-cargo users. Over time, cargo operations would dominate all sites except the Boeing leasehold and other long-term committed sites. Cargo tenants would be given priority for new leases and other users would be encouraged to relocate elsewhere. This alternative would likely accommodate 90% of small general aviation, 92% of corporate general aviation, 99% of air cargo and 15% of passenger facility requirements. Leases would be established that contain performance standards, and subleasing would be permitted to further the needs of cargo and freight forwarding. In this scenario, specific zones would be created for users. The Boeing EMF site would develop as air cargo, with the public ramp west of Ameriflight and Boeing EMF being dedicated to air cargo users. The Russak property on the southwest side of the Airport would be acquired and used for small general aviation, and the Washington Air National Guard site would be converted to general aviation use. Three-quarters of the public ramp west of the Arrivals Building would be dedicated to air cargo use and the 7300 Building and adjacent parking would be converted to air cargo use. Benefits to land use might accrue, as economies of scale might make shared infrastructure and other ground support equipment. However, truck access and employee parking needs would increase, and would likely result in the need to acquire land outside the current airport boundaries.

Emphasize corporate general aviation - Implementation of this alternative could occur by King County marketing the Airport to corporate users and would encourage corporate tenants to acquire parcels from other tenants. Corporate tenants would use all but the lands that are restricted in height usage or ownership. Based on that analysis, this alternative would likely accommodate 93% of small general aviation, 139% of forecast corporate general aviation (indicating that King County could attract demand that currently does not exist), 35% of air cargo, and 15% of passenger facility requirements. Similar to the preceding alternative, zones would be established dedicated to specific users (in this case corporate GA). Small general aviation would occur on the southwest, southeast, and northeast corners of the Airport. Corporate general aviation would occur north of the southeast small general aviation area and south of the northeast small general aviation area and in the central portion of the east side of the Airport. Cargo would occur in a few locations in the central portion of the east side of the Airport. Leases would contain performance standards and subleasing would be allowed to enhance the corporate tenant attraction. Such usage however, would result in increased desires for ramp space, ramp privacy with wide spacing and little sharing. This could result in reduced amount of public ramp space. Because sites would likely go to the highest bidder, efficiencies of land use might not be realized. In addition, increased demand for corporate or executive aviation would increase the demand for large hangars, requiring aesthetic amenities. Because this would not make efficient use of the Airport, it was not considered further.

Balanced use (Preferred Alternative) – Recognizing that not all market segments can be fully accommodated within the limited land envelope available, King County could establish a percentage of the demand in each market and allow growth up to that level. A balance between small general aviation, corporate general aviation and air cargo use could be established. As a result, proportionate access to all market segments would be allowed. Based on the forecast, it is anticipated that this alternative could accommodate 92% of small general aviation, corporate general aviation, and air cargo, and 41% of passenger facility requirements. To achieve maximum efficiencies, land use groupings would likely be necessary and as a result, all land use would have a clear designated future use. Small general aviation would occur on the southwest, southeast, and northeast corners of the Airport. Corporate general aviation would occur north of the southeast small GA area, and south of the northeast small GA areas, as well as in a central portion of the east side of the Airport. Air cargo would occur in the central portion of the east side. Because this alternative would respond to market demand and achieve the greatest efficiency of use of the airfield, it was selected by King County as the Preferred Alternative. It is discussed further in a subsequent section.

Emphasize noise reduction – this alternative would emphasize the reduction of aviation noise at KCIA by focusing on the aircraft operations that are expected to be the quietest or have least impact on the community. This alternative was recommended by the public due to concerns with aircraft noise, particularly in Georgetown, Tukwila, and Magnolia. It would focus on small general aviation, and as a result, would accommodate all of small general aviation demand and requirements, 86% of corporate general aviation, 26% of air cargo, and 16% of passenger facility requirements.

During initial formulation of the alternatives for the Master Plan, a group of citizens submitted an alternative for consideration by King County. This alternative, known as the Community Alternative, was also considered by the Master Plan. Further analysis of this alternative is presented in **Appendix B.**

As a result of the Master Plan's review of these alternatives, only one alternative was determined to be prudent and feasible – the Balanced Use alternative. Conclusions that lead to the selection of this alternative are:

- KCIA is a vital component of the regional and national airport system. Having a diverse aviation role, it is the primary general aviation/industrial aviation airport serving the Seattle area. As part of the Master Plan process, the following mission statement was developed for the Airport: *The mission of King County International Airport is to support the national air transportation system and the economic vitality of the county by providing safe and continuous general aviation airport services to King County businesses and residents and serving as a gateway to the county. In fulfilling this mission, the Airport will strive to be a good neighbor and to provide high quality facilities to Airport tenants and operators in an efficient and fiscally prudent manner.*
- To a large degree, demand will dictate development at the Airport. As required by Grant Assurances to the Federal government, and the Equal Protection Clause of the 14th Amendment, the Airport must be available for public use on fair and reasonable terms without unjust discrimination among or between classes of aircraft. Airport operators cannot attempt to regulate aircraft safety and operation of flight, as this responsibility lies solely with the Federal government. Airport operators cannot regulate rates, routes or services of an air carrier, nor can operators create an undue burden on interstate commerce. As a result, many of the alternatives discussed earlier are not feasible.
- The Airport has a relatively small land area and the majority of the property outside the runway/taxiway system has been fully developed. The lack of significant quantity of undeveloped land on or adjacent to the Airport which could accommodate future development indicates that the County must make the best use of its most scarce resource; undeveloped land. As a result, the developed land around the runway

system would continue to be in high demand for aviation use facilities and would continue to be developed/re-developed to accommodate that demand.

- Because of anticipated demand, the limited quantity of on-airport land, and the goals expressed in the Airport's mission statement, each parcel of airport property that could support use should be programmed for that potential.

Based on these key findings, the balanced program provides the most appropriate basis of the future conceptual layout of KCIA's on-airport facilities. It best achieves the mission statement, because it supports the broadest mix of aviation uses, allowing flexibility in responding to changing needs among the diverse general aviation markets, and efficiently utilizing scarce airport property.

2. The Preferred Alternative

As was noted earlier, the preferred alternative for satisfying the demand for additional airport facilities would establish zones or areas at the Airport. These areas represent locations where the operations and development associated with specific user types (small general aviation, corporate general aviation, and air cargo) are to be concentrated whenever possible. While not all facility requirements could be met due to shortage of available land, 92% of the required facilities could be provided and all of the demand could be met for those users. Only 41% of the passenger facility requirements could be met.

To correct the runway safety areas, King County proposes to implement operational procedures (as noted in **Appendix E**) and shift Runway 13R/31L 880 feet to the north, to extend the west parallel taxiway 880 feet to the north, construct crossover taxiway connectors, and to establish 880 feet displaced threshold on the south end of Runway 31R. To screen the Georgetown Steam Plant property from possible jet blast, a blast wall or fence would be developed on the west side of Taxiway Z.

The remainder of the Master Plan consists of programmatic recommendations (specific facilities would be proposed in response to specific user development needs). The general framework in which the Preferred Alternative would achieve the balanced use objectives could consist of the following types of improvements, as discussed in Section 1.3 of Chapter 1:

- *East Side Development*:
    - Small GA is recommended to be concentrated in the north and south ends of the east side;
    - Corporate GA is recommended to occur adjacent to the small GA on the inner portions of the north and south ends, in addition to retaining the middle area of the east side for corporate uses;
    - Cargo use is to be consolidated on parcels immediately to the south of the Terminal and Arrivals Buildings (east side);
    - Continued use of the passenger terminal for future passenger use as well as renovation of the aging terminal structure. The building on the north side of the terminal facility would also be reserved for future passenger terminal use.
    - *Construction of a helipad* on the north east side of the runway system, north of Taxiway A1, west of Classic Helicopter;

- *Construction of a second helipad* – to be located on the southern portion of the east side development area, adjacent to Apron 12, south of Taxiway A10;
- *West Side Development*:
  - Should Boeing release land, the land would be used to serve aviation needs;
  - GA and other aviation activities would continue to occupy existing space north of the Museum of Flight. Additional small GA facilities are proposed for a portion of the existing Boeing lease area north of the State Aeronautics hangar and office. The parcel of non-airport property north of the existing T-hangar site is proposed for acquisition and development. The existing airport-owned structures in the vicinity of the state facility would be rehabilitated or removed and replaced to better meet current airport needs;
  - Continued FAA Air Traffic Control Tower presence on the west side, with the FAA anticipated to replace the tower;
  - Continued use of the Northwest development area by users that do not require taxiway access; and
  - Evaluate the construction of an engine testing/run-up enclosure ("hush house").

(E) Without Master Plan/No Build/No Action

In accordance with the Washington State Environmental Policy Act and National Environmental Policy Act requirements, environmental impact studies are to consider future conditions without the proposed action. Therefore, the Without Master Plan/No Action alternative would result in KCIA building facilities remaining as they are today. Therefore, existing operational congestion and inefficiencies would continue and not be relieved. The southern end of the runway would not have a standard RSA – the dimensions of the RSA would be non-standard in as they would be less than 1,000 feet long by 500 feet wide. Under the No Action RSA, the RSA would only be 500 feet wide for a length of 120 feet off the end of the runway and would progressively narrow on the eastern edge of the RSA.

With or without the Master Plan the level of activity would be the same, as shown in **Table 2-3**.

TABLE 2-3
BOEING FIELD FORECAST OF ACTIVITY – WITH AND WITHOUT MASTER PLAN

	2018 Without Master Plan	2018 With Master Plan
General Aviation.	284,650	284,650
Air Taxi	70,050	70,050
Military	3,000	3,000
Air Carrier	14,090	14,090
Total	371,790	371,790
Enplaned Passengers	22,800	22,800

Source: Barnard Dunkelberg & Co., December 2003. Numbers rounded to the nearest ten.

Although this alternative may not be prudent, it is feasible, and therefore, is one of the alternatives considered throughout this SEPA/NEPA document.

Chapter 3
AFFECTED ENVIRONMENT

The area surrounding King County International Airport (KCIA), which may be affected by the proposed Master Plan recommendations, is described in this chapter. The existing conditions relative to each of the environmental disciplines addressed in this document are provided in Chapter 4, "Environmental Consequences". The following factors are described in the affected environment:

- General Character of the Area
- Future Planned Development

The study area evaluated throughout this document focuses on two specific areas: the immediate airport property and environs, and the area affected by significant (as defined by Federal or State guidelines) effects of the Airport. While other areas may experience influences from KCIA, these influences with or without the Master Plan recommendations are not significant.

3.1 GENERAL CHARACTER OF THE AREA

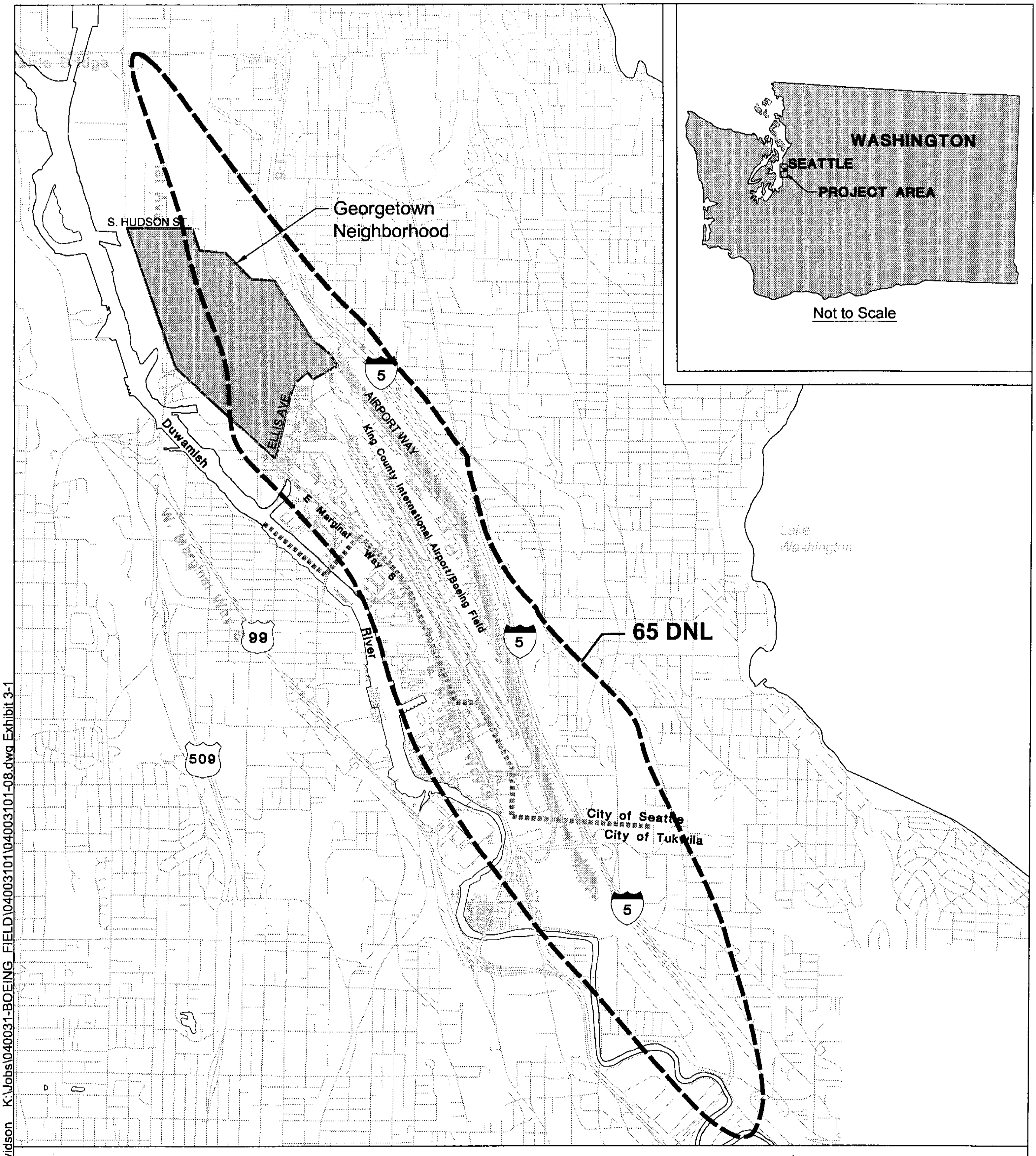
KCIA is located about five (5) miles south of Seattle's central business district and is bound on the east by Interstate 5 (I-5) and Airport Way, on the north by Ellis Avenue, the west by the Boeing Company and East Marginal Way, and the south by South Norfolk Street. **Exhibit 3-1** shows the Airport relative to the surrounding area. The Airport is located in the cities of Seattle and Tukwila.

Access to KCIA is provided by I-5 to the east, and SR-99 to the west, as well as local major arterials, such as Airport Way and East Marginal Way. Much of the Duwamish industrial corridor, located east and north of the Airport is also served by major rail, which is located between Airport Way and I-5 to the east.

(A) Land Use

Existing land use in the area around KCIA is predominantly industrial and commercial. The Boeing Company is a major landowner and operator on the west side of the Airport. The Georgetown neighborhood, located just northwest of KCIA, consists of a small commercial area and residences. Burlington Northern/Santa Fe Railroad (BNSF) Company maintains a switching yard in the area north of the Georgetown neighborhood and has multiple tracks, including the BNSF mainline, east of KCIA. The area south of the Airport is also used primarily for industrial and commercial activities, although there is a small pocket of low and medium density residential properties in the Allentown neighborhood of Tukwila. Bordering the east side of the area, on the bluff above Interstate 5, is a large residential area -- the Holly Park neighborhood of Tukwila. The South Park neighborhood, situated in a portion of King County, is located west of the Airport.

Exhibit 3-2 shows the locations of non-residential land uses that are sensitive to aircraft noise exposure. As is shown, nine (9) parks, four (4) schools, and five (5) sites listed on the National Register of Historic Places are located in the near vicinity of the Airport. Numerous other possible historic sites are also shown. **Table 3-1** summarizes these facilities.



Sources:
City of Tukwila, *Comprensive Land Use Plan*
December 4, 1995

Bridgenet Consulting Services, 2003

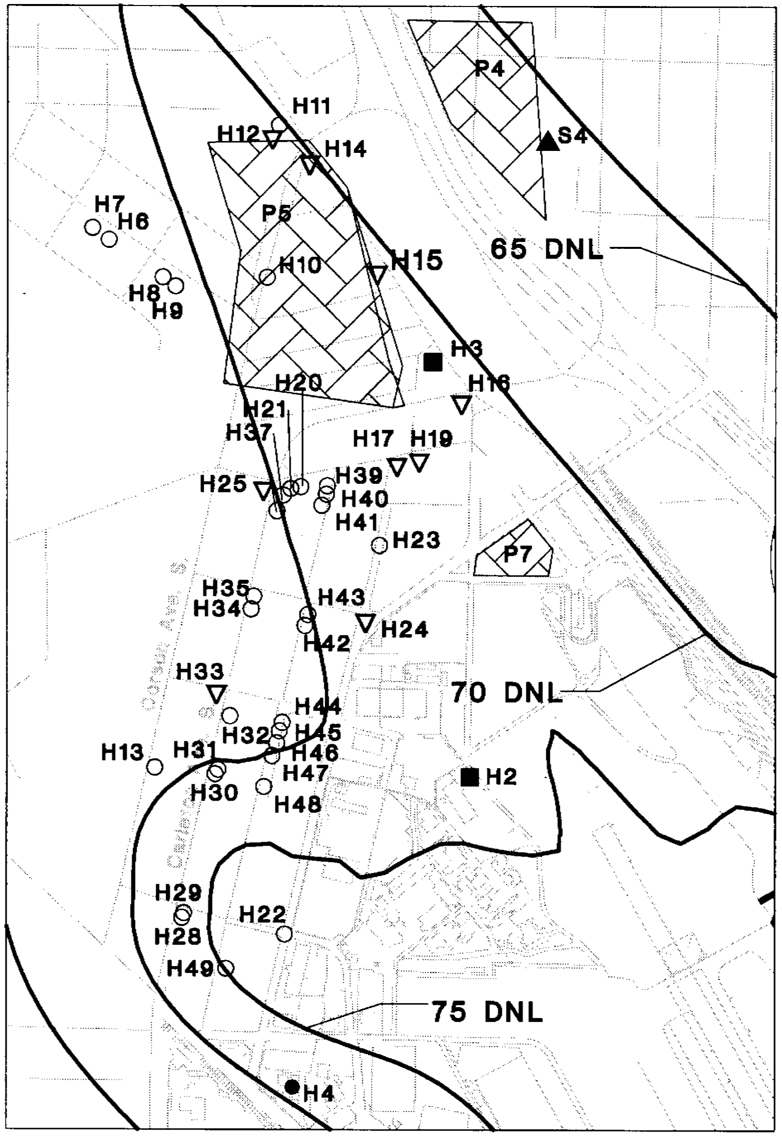
City of Seattle *Land Use Code*, Chapter 23.64

Jan 12, 2004 11:32am cdavidson K:\Jobs\040031-BOEING FIELD\04003101\04003101-08.dwg Exhibit 3-1

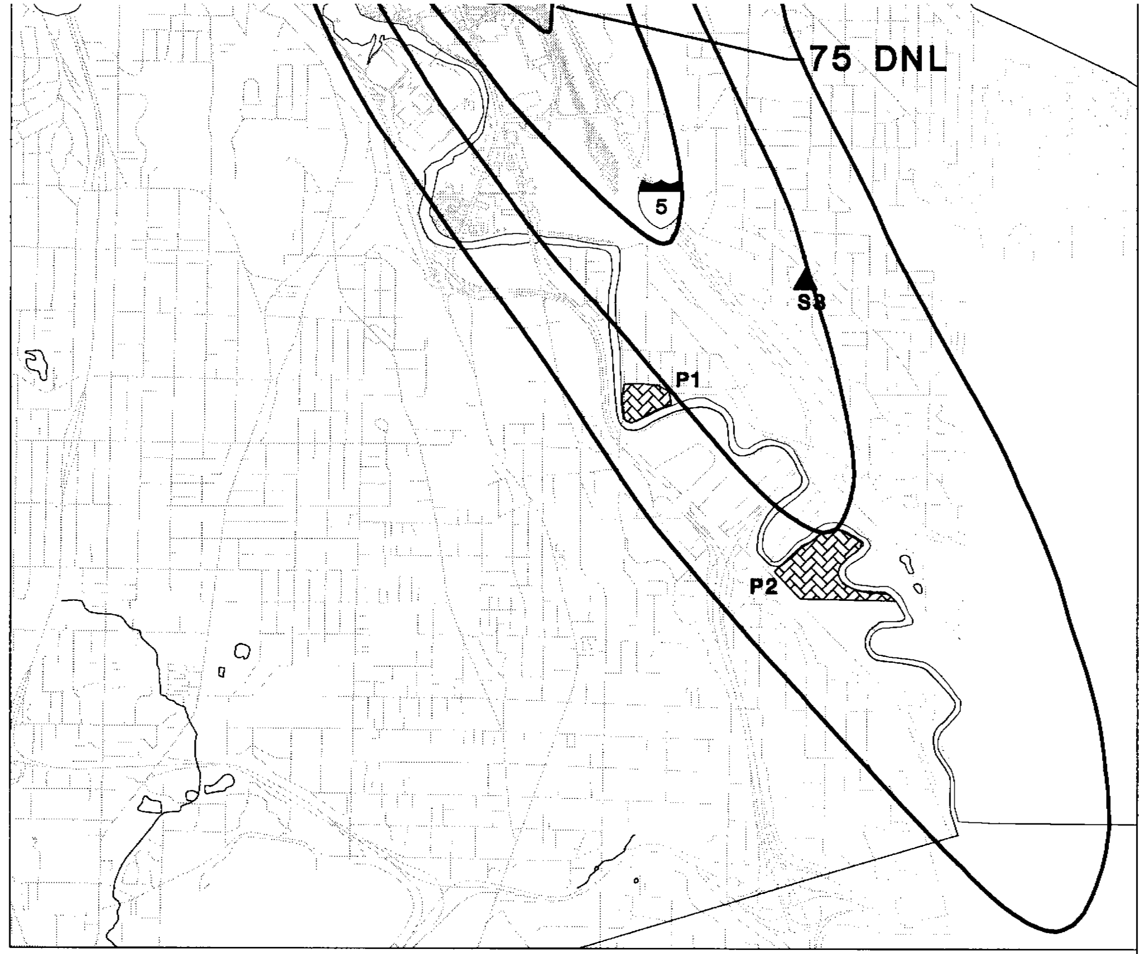
Exhibit 3-1
Vicinity Map

ANCHOR ENVIRONMENTAL, L.L.C.

Inset Area



Source:
Inital Review of Comprehensive Land Use Plans for Community Areas Within Sea-Tac Airport's Projected Noise Contour, Puget Sound Regional Council, February 1999, Thomas Guide, and Washington State Office of Archaeology and Historical Preservation.



Legend

- ● H18 Historical
- P1 Playground/Park
- ▲ S14 School

Notes:
1. Refer to Table 4.8-1 in text for full name of each facility.
2. Existing Conditions (2003)

Inset

- ○ Potential Residential Historical Site
- ▽ Potential Business Historical Site
- ■ Designated Historical Landmark

Source:
Bridgenet Consulting Services, 2003

Exhibit 3.2
Noise Sensitive Facilities

ANCHOR ENVIRONMENTAL, L.L.C.

TABLE 3-1
NON-RESIDENTIAL NOISE SENSITIVE FACILITIES

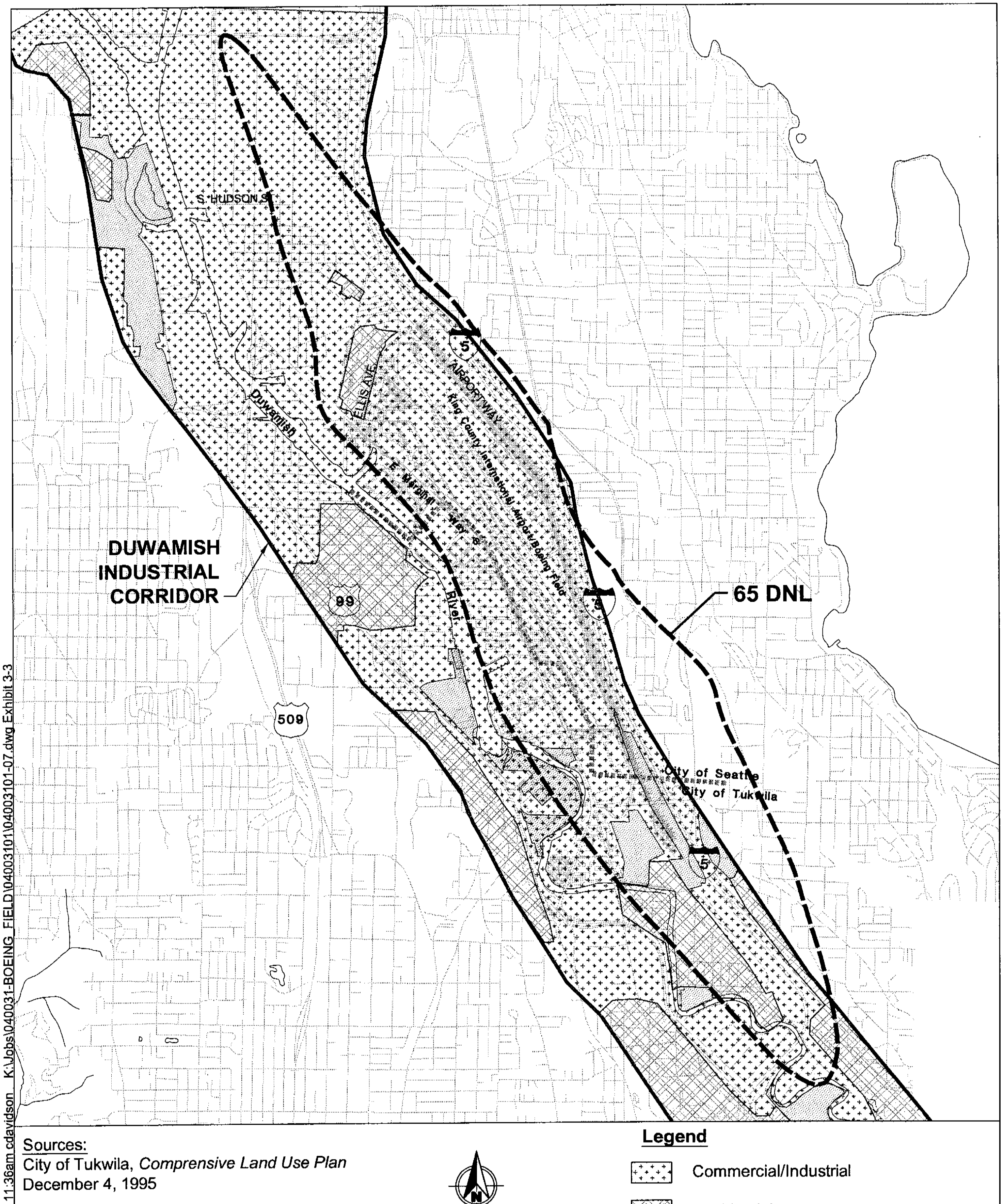
Code	Property	Location	Resource Type
P1	Pea Patch Park	Tukwila	Park
P2	Foster Golf Links	Tukwila	Park
P3	Van Asselt Community Center	Seattle	Park
P4	Cleveland Playground	Seattle	Park
P5	Georgetown Playfield	Seattle	Park
P6	Maplewood Playfield	Seattle	Park
P7	Ruby Chow Park	King Co.	Park
P8	First Avenue South Boat Ramp	Seattle	Park
P9	Duwamish Waterway Park	Seattle	Park
S1	Wing Luke Elementary	Seattle	School
S2	Maple Elementary	Seattle	School
S3	Rainier View	Tukwila	School
S4	Cleveland High	Seattle	School
H1	Museum of Flight/Boeing Airplane Co. Building (Red Barn)	Tukwila	Historic Site
H2	Georgetown Steam Plant	Seattle	Historic Site
H3	Old Georgetown City Hall	Seattle	Historic Site
H4	Georgetown Poor Farm Annex	Seattle	Historic Site
H5	Maple Donation Claim	Seattle	Historic Site
H6-H47	See Table 4.8-1 for listing of locally significant historic sites	Seattle	Historic Sites

Source: Anchor Environmental LLC, and The Sheridan Group

The approximate locations of these facilities can be found on **Exhibit 3-2**.

(B) Existing Zoning

Exhibit 3-3 shows the Airport area general zoning characteristics and the boundary between the two jurisdictions in which KCIA is located: Seattle and Tukwila. Most of the property within the KCIA area is zoned industrial to promote and recognize existing industrial activity in the lower Duwamish River valley. There are two small commercial areas located near the north end of the Airport. A three-block stretch of South Bailey Street is zoned as Neighborhood Commercial (NC3). This zoning designation functions as a pedestrian-oriented shopping district to serve the neighborhood. The other commercial area near South Bailey Street is zoned Commercial 2 (C2). The C2 zone is an auto-oriented, primarily non-retail commercial area that provides a wide range of commercial activities. This type of area is expected to provide employment and business support services to the surrounding neighborhood and vicinity. The six-block commercial area on 4th Avenue South between South Bennett Street and South Fidalgo Street is zoned Commercial 1 (C1). A three block section on the north side of East Marginal Way South, between Corson Avenue South and Ellis Avenue South, is also zoned C1. This designation is an auto-oriented, primarily retail/service commercial area, that serves surrounding neighborhoods and the larger citywide community.



Sources:
City of Tukwila, *Comprensive Land Use Plan*
December 4, 1995

Bridgenet Consulting Services, 2003

City of Seattle *Land Use Code*, Chapter 23.64

Jan 12, 2004 11:36am cdavidson K:\Jobs\040031-BOEING_FIELD\04003101\04003101-07.dwg Exhibit 3-3

Exhibit 3-3
General Land Use
in the Airport Environs

ANCHOR
ENVIRONMENTAL, L.L.C.

There are also properties zoned for residential uses within the KCIA study area. The general area northwest of KCIA bound by Ellis Avenue South, Corson Avenue South, South Bailey Street, and East Marginal Way South is zoned for single family (SF5000) and multi-family housing (L2). The SF5000 designation allows one single-family house per 5,000 square foot lot. The L2 zone encourages a variety of multi-family housing types at a scale compatible with single-family structures. There is also a roughly four (4) square block area bound by South Homer Street, South Orcas Street, 7th Avenue South, and Corson Avenue South that is zoned L2. The area on the bluff above and to the east of KCIA above Interstate 5 is a mixture of single- and multi-family residential zones.

In addition to the industrial, commercial, and residential zoning, there is also an Airport Height Overlay District in the Seattle Municipal Code.[8/] The purpose of this overlay district is to ensure safe and unobstructed takeoff and landing path to KCIA by limiting the height of structures within the Airport Height Overlay District. All properties within the Airport Height Overlay District are subject to both the requirements of the underlying zoning (industrial, commercial, or residential) and the requirements imposed by the Airport Height Overlay District. The boundaries of this district are based on imaginary surfaces developed by the FAA for height limits surrounding airports. There are five different types of areas defined in the Airport Height Overlay District and each area has different size and slope characteristics that make up the imaginary surfaces that cannot be penetrated by a structure. The outer limits of the Airport Height Overlay District extend about 9.5 miles from each end of the runway.

(C) Community History and Historical Resources

The area around KCIA shares an important portion of the history of the Puget Sound Region.

KCIA: Boeing Field was dedicated in 1928 on a river front airport site selected for its proximity to two major highways and to the Boeing Company. The numerous structures along the eastside of the Airport are mostly newer office and warehouse/hanger structures, primarily of concrete or metal construction; few older structures appear to remain. The two-story terminal building was built in 1930 and exhibits the stepped-back massing and detailing typical of the Art Deco period; it has been altered with new windows and a large modern addition and is currently undergoing a renovation. The building at 7300 Perimeter Way South is an older two-story brick building, which also has new windows and a large addition.

Georgetown: One of Seattle's oldest neighborhoods, Georgetown, adjoins KCIA on the north. The community has a small commercial district and about 1,000-1,500 residents. The historic boundaries of the community, as included in the historic the property survey, were from the Airport boundary on the south to approximately South Lucille Street on the north and from I-5 on the east to Corson Avenue South, South Orcas Street and 7th Avenue South on the west.

The Georgetown-airport area was originally a rich valley covered with fertile sediment and lush vegetation. The Duwamish River provided both an inexhaustible food source and an important means of transportation for the Native Americans. The earliest white settlers quickly discovered this valley, with John Holgate, Luther Collins, Henry Van Asselt, Jacob Maple, and Samuel Maple taking out claims along the lower Duwamish in

---

8/ *City of Seattle Land Use Code,* Chapter 23.64.

1850-1855 — before the famed Denny party landed at Alki. Over the next twenty years the area became a prosperous farming community.

In 1870 King County established the county poor farm on Corson Avenue South. This facility operated sporadically until 1894, when a large three-story hospital opened nearby. In the 1880s the flat, easily accessible land attracted other non-agricultural facilities wishing to take advantage of the new streetcar system (established in 1882) and the national rail network (1883). Breweries, brick making (using local clay) and the rail yards themselves came to dominate the local landscape.

In 1890, the town of Georgetown was platted, oriented to a bend in the river. In 1904, the town incorporated, in order to protect the licenses of the numerous saloons surrounding the breweries. A grand city hall was built in 1909. The booming industrial area attracted many families, and by 1910 the population had grown to 7,000 people. Businesses at this time included a power plant, the streetcar barns, breweries, foundries, shipbuilding, and support services such as groceries, banks, stables and saloons. During the first decade of the century many foreign immigrants arrived, particularly Italians who established truck farms and small businesses.

In 1910 Georgetown citizens voted to be annexed to Seattle. The same year voters approved a proposal to straighten the Duwamish River for flood control and to produce more industrial land. Between 1912 and 1917 more than 20 million cubic yards of earth were moved to create new, flat land. The river was shortened from sixteen to four miles, with ten of the sixteen bends being eliminated, including that around which Georgetown was built.

Prohibition (which began in Washington in 1916) drove the breweries out of business, but other industries came, including Bill Boeing's Pacific Aero Company in 1916. Seattle's first zoning code, in 1923, allocated the entire area for industrial use, but small businesses and housing continued to increase. Boeing Field was established in the late 1920s. During World War II, industrial activity increased, with Boeing producing more than 15,000 bombers in only four years.

After the war, the community declined. The 1956 Seattle Comprehensive Plan called for the residential areas to be phased-out to provide additional industrial land. The construction in 1962 of I-5 and the Michigan Street ramps carved up the community and destroyed many significant structures. This disruption ended most of the business district activity.

In the 1990s the residential community has revived, with the Georgetown Neighborhood Plan calling for continued coexistence between the residential communities and surrounding industries. The residential core is generally well maintained and few houses are abandoned or heavily deteriorated; several have been recently rehabilitated. The commercial core is centered on South Bailey Street and Airport Way South, near the old city hall. While there are a number of thriving businesses, a number of commercial structures are unused and appear to have significant structural problems.

Surrounding Areas: The area north of Georgetown to Spokane Street has primarily newer (1960s-90s) warehouses and commercial and industrial structures. Some of the industrial facilities appear to date from the pre-World War II era; many of these appear to be little used and poorly maintained.

The area west of the Airport has been used by heavy industry since early in the century and was the site of major activity during World War II. A number of the facilities, such as Boeing Plant II, Kenworth Truck Company, and Jorgenson Steel, date back more than fifty years. However, they have been modernized significantly to maintain efficient production. The historic "Red Barn," Boeing's first Duwamish manufacturing facility, has been relocated and incorporated into the Museum of Flight at the edge of the airfield.

The south end of the Airport has primarily newer concrete warehouse and wood-frame office structures. Farther south are the residential areas of Riverton and Allentown. Many older Craftsman and vernacular homes (1900-1930) are clustered on the hillside and along the river; most of these have been altered with new windows, siding or addition. Interspersed throughout are numerous post-World War II homes, primarily from the 1940s-60s.

(D) Economic and Demographic Character

The population of the Puget Sound Region nearly doubled between 1960 and 1990. While the growth rate is anticipated to slow, the 1.4 million new residents that are forecast by year 2020 is greater than the growth that occurred between 1960 and 1990 (1.2 million). Between 1960 and 1990, net in-migration (people moving from outside the Puget Sound Region to the four county area), averaged 57% of the annual population change over the period. Because the Region is a major employment center, migration into this area has been primarily for economic reasons (such as better jobs or business opportunities).

Population and employment growth of the Puget Sound Region has and will likely continue to outpace the national average. Between 1960 and 1990, the population of the United States grew at an average annual growth rate of 1.08%. In contrast, the population of the Puget Sound Region grew at a rate of 2.0%. The population of the United States is expected to grow at an average annual rate of 0.86% between 1990 and 2020, while the Puget Sound Region is forecast to grow at a rate of 1.4%, nearly double the national average.

Three Fortune 500 manufacturing companies are headquartered in the Puget Sound Region: Boeing Commercial Aircraft (commercial aircraft), PACCAR (diesel trucks), and Weyerhaeuser (forest products). A number of Fortune 500 service companies are also headquartered in the Region: Airborne Freight, Alaska Airlines, Costco Wholesale, Microsoft, Nordstrom, Safeco Financial, Univar, and Washington Mutual Savings and Loan Association. Although the Region's economic base is strong, it is highly concentrated in the aerospace industry. In the past, employment in the Puget Sound Region fluctuated by a much wider magnitude than that of the nation, due in large part to the cyclical swings of the aerospace industry. In 1997, aerospace accounted for about 7% of total jobs or around 45% of the total manufacturing sector jobs of the Region. Since the early 1970s, the Region has experienced a fast growth in service and trade sectors, paralleling the trends observed throughout the country.

The Region's economy is made up of two categories of industries: the basic sector, which exports goods and services outside the Region, and the non-basic sector, which produces goods and services consumed within the local economy. Growth in basic sector employers is critical for generating new employment, income, and sales by injecting new funds into the local economy. Exports of consumer and business services, and of goods sold through wholesalers located within the Region, are traded to outside communities through distribution channels in the Central Puget Sound Region. Forest products, pulp, paper, aircraft, ships, and seafood products are recognized as the traditional components of the

Region's economic base. Services such as transportation, engineering, and finance are also exported and thus considered base industries. In addition, an increasing share of software and durable goods are exported, making these industries significant contributors to the economic base.

Within the immediate area of the Airport, population has declined. **Table 3-2** lists the population of the forecast and analysis zones (FAZ) in the immediate vicinity of King County International Airport. As the table shows, of the four FAZ's in the vicinity of KCIA, population declined 3.2% per year over the decade of the 1970s, but again increased at an average annual growth rate of 1.4% during the 1980s and 1990s. The Airport area growth has been somewhat parallel to the overall growth of King County, which grew at an average annual growth rate of 0.9% during the 1970s, then at 1.7% annually during the 1980s slowing to 1.5% during the 1990s.

TABLE 3-2

POPULATION OF IMMEDIATE AIRPORT AREA

		Population				Avg. Annual Growth Rate		
FAZ		1970	1980	1990	2000	1970-1980	1980-1990	1990-2000
3825	Boulevard Park	14,776	13,921	15,153	17,118	-0.5%	0.8%	1.3%
3905	N. Tukwila	12,955	5,501	6,895	7,701	-5.2%	2.3%	1.2%
5815	Lower Duwamish/Boeing	7,140	3,857	4,047	4,898	-4.2%	0.4%	2.1%
5825	Duwamish Mouth	3,283	1,297	2,331	2,602	-5.5%	7.2%	1.2%
	Airport Area Totals	38,154	24,576	28,426	32,319	-3.2%	1.4%	1.4%
	King County Totals	1,159,464	1,269,649	1,507,320	1,737,034	0.9%	1.7%	1.5%
	% of County Totals	3.3%	1.9%	1.9%	1.9%			

Source: Puget Sound Regional Council database, December 1998 and 2000 Census.
FAZ refers to Forecast and Analysis Zones.

(E) General Ecological Character

KCIA is located in a heavily industrialized area of south Seattle/north Tukwila. The natural environment has been extensively modified and very few undisturbed areas remain in the general vicinity. The most notable natural feature is the Duwamish River, which flows about ½ mile to the west of the Airport. This particular section of the river is known as the Duwamish Waterway, as it is routinely dredged to allow navigation use by large ships and barges accessing industrial properties. The Duwamish River/Waterway hosts several runs of anadromous and resident fish, including Fall Chinook, Chum, Coho, Pink, and Sockeye Salmon, along with Summer and Winter Steelhead. No wetlands or floodplains are present on airport property. The Duwamish Waterway is the receiving waterbody for surface water runoff from this area, including airport property. A study by EPA confirmed that contaminated sediments are present in a five-mile stretch of the lower Waterway, from the southern tip of Harbor Island to just south of the turning basin. The contaminants include polychlorinated biphenyls (PCBs), poly-aromatic hydrocarbons (PAHs), mercury and other metals, and phthalates. The Environmental Protection Agency (EPA) listed the lower Duwamish Waterway as a Superfund site in September 2001. The natural environment is discussed in more detail in Chapter 4.

3.2 FUTURE PLANNED DEVELOPMENT

The purpose of this section is to clearly identify the actions that are considered in Chapter 4 "Environmental Consequences" in evaluating the cumulative impacts of the Master Plan recommendations in combination with other actions in the Airport vicinity.

The immediate Airport environs are intensively developed. No sizeable new developments are anticipated.

Regional actions, such as the **Sound Transit** Light Rail System, which would provide high speed transit between the downtown central business district and Tukwila/Sea-Tac is planned for the general area. A specific alignment was chosen for the light rail system in November 1999 and has since undergone revisions. From the southern terminus in the city of SeaTac, trains would connect to Sea-Tac International Airport and move through Tukwila and the Rainier Valley. They could pass through Beacon Hill in a tunnel, emerging in the industrial area south of downtown Seattle. From there Sound Transit could pass through the neighborhoods of First Hill, Capitol Hill, University District, and terminate at the Northgate Transit Center.

In addition to the Sound Transit Light Rail System, the Elevated Transportation Company is currently evaluating whether to expand the Seattle **Monorail** system throughout the city of Seattle. The southern terminus of the monorail is expected to be in West Seattle.

The **City of Seattle's Comprehensive Plan**[9/] includes establishing/maintaining a Manufacturing/Industrial Center in the lower Duwamish River valley. Most of the study area lies within this center. The goal of this center is to ensure that adequate accessible industrial land is available to promote a diversified employment base and sustain Seattle's contribution to regional high wage job growth.

The area surrounding the intersection of 13th Avenue South and South Albro Place in the Georgetown neighborhood is designated under the Comprehensive Plan as a Neighborhood Anchor. The goal of Neighborhood Anchors in the Comprehensive Plan is to provide a service and transit focus for surrounding neighborhoods in areas where, overall, existing conditions are to be maintained. Through the neighborhood planning process identified in the Comprehensive Plan, a neighborhood plan has been developed for Georgetown. The Georgetown Neighborhood Plan is comprised of a variety of goals, policy statements, and recommendations for specific and non-specific actions within the neighborhood.[10/] The recommendations were numerous and covered the following topics: Seattle Design District (Georgetown is looking to promote small industrial businesses that emphasize craftsmanship, art, and design), quality of life issues, safety, promoting industry, code enforcement, economic development, residential neighborhood issues, traffic and transportation, and environment. Residents of Georgetown were divided when addressing the topics of economic development and industry. It is noted in the Georgetown Neighborhood Plan that many respondents were not in favor of increased KCIA activity or emphasizing freight mobility. The final Georgetown Neighborhood Plan was published in June 1999, and the Seattle City Council accepted the Plan on February 7, 2000.

The **City of Tukwila's Comprehensive Plan**[11/] includes a 998 acre Manufacturing/Industrial Center (Center) in the KCIA study area south of the Seattle city limits. There are 114

9/ *City of Seattle Comprehensive Plan, Toward A Sustainable Seattle, A Plan for Managing Growth: 1994-2014*, July 1994.

10/ *Georgetown Neighborhood Plan*, June 1999.

11/ *City of Tukwila Comprehensive Land Use Plan*, December 1995.

businesses located in this area employing more than 18,000 people. The Center is characterized by light to heavy manufacturing uses, storage facilities, office development, small areas of commercial development along arterials, and a few older residences. KCIA occupies about 175 acres of the Center. Because the Center is an established industrial area, adequate infrastructure has been in place and maintained for years.

In addition to comprehensive planning efforts, King County and the Cities of Seattle and Tukwila agreed to modify their common boundaries near KCIA to provide a straight boundary between the cities. The proposed boundary adjustment would also place the flight areas at KCIA within the City of Seattle.

The **Museum of Flight**, located on the west side of the airfield at Boeing Field, is also evaluating an expansion plan. The Museum of Flight Foundation manages the museum and has established a mission "to preserve and collect examples of historical aircraft and space vehicles from every era, archives, blueprints, photographs, personal diaries and more." In 2002, the Museum Foundation completed a master plan that calls for three phases: Phase 1 - Personal Courage Wing (expansion of the north end of the main building by 88,000 square feet); Phase 2 – Red Barn Pavilion (enclosing the Red Barn); and Phase 3 – completion of a Commercial Aviation Wing and Space Gallery. As part of the Phase 3 work, land would be acquired from Boeing (through a donation), including land on the west side of East Marginal Way. An aircraft transit corridor would be developed to connect the museum galleries on the east and west side of the street. To enable the aircraft transit corridor, the Museum would build four new hangar buildings on two parcels (Lot 14 and lot 14-06) to replace Hangars A and B, which would be torn down and replaced by aircraft tie-downs and an aircraft towpath. Once construction is completed, the Museum Authority and King County would exchange lot 14-06 for a similarly sized parcel located on museum land. Completion of the project would enable 335,000 square feet of new building space and about 22,000 square feet of renovated space.

Separate from the Airport Master Plan recommendations, King County is working with Seattle Light concerning **improved access driveway to the Georgetown Steam Plant**. Currently, City Light has an easement through the secure portions of the airfield of the north Runway Protection Zone. King County is proposing to acquire the easement interests and to coordinate a land exchange between the County, the Boeing Company, and Seattle Light that would enable direct access to the Steam Plant property from Ellis Avenue. The County expects to complete all requisite NEPA and SEPA analysis on this access plan once the driveway access plan has been fully developed. A temporary access driveway has been developed to address short-term runway safety area concerns, while the permanent driveway is being developed.

In 1999, King County initiated a **Part 150 Noise Compatibility** Planning study for KCIA. The purpose of that study was to develop a balanced and cost effective program for reducing existing and future noise exposure from the Airport. In 2002, the County completed the study and recommended to the County Council a number of actions. The following action items were approved in February 2003 by County motion 11600:

1. *Develop combined noise contour with Sea-Tac Airport and King County Airport* –the purpose of this action would be to enable identification of people exposed to noise from the combined noise of both airports and to then extend mitigation to those affected;
2. *Implement a public instrument approach procedure with an Elliot Bay ground track to avoid over-flight of residential areas* - The implementation of an alternative instrumentation system for approaches from the north would enable aircraft to approach over Elliott Bay and avoid over-flights of residential areas, especially Magnolia. This would have negligible effect on the size of the 65 DNL but it would provide

substantial relief from single-event flyovers to the residential areas avoided by use of the alternative instrumentation approach and would be especially effective in reducing noise intrusion during nighttime hours.

3. *Implement Close-In Departure Procedure for North Departures* - The FAA has approved specific Close-in Noise Abatement Departure Procedures for all aircraft types over 75,000 pounds and each aircraft operator has such a procedure for their specific aircraft types. The Airport Sponsor can request that each operator utilize this particular procedure when departing north from King County International Airport. This recommendation would reduce the number of people within the 65 and greater DNL noise contours north of the Airport.

4. *Investigate the Viability of Undertaking a Part 161 Study for Stage 2 Jets* - This recommendation might reduce the night impacts of noise levels associated with the louder, older Stage 2 business jet aircraft. These aircraft are most intrusive during the nighttime hours (10 pm to 7 am), and this recommendation would result in eliminating their use during those hours. However, the implementation of this recommendation would require an additional study (called a Part 161 study, per the requirements of FAR Part 161 Noise and Access Restrictions) to be prepared and approved by the FAA.

5. *Upgrade flight tracking and noise monitoring program (Fly Quiet Program)* to achieve voluntary compliance and accountability with noise program. The Fly Quiet Program would consist of several distinct features: operator education program, a pilot's incentive program, and advanced technology to improve noise monitoring and reporting.

6. *Maintain existing curfew on nighttime engine run-ups* - The Airport has an existing nighttime curfew for engine run-ups that reduces the ground generated noise intrusion to nearby residences during critical nighttime hours. King County staff recommended that the curfew be maintained as it is currently written.

7. *Conduct site selection and feasibility study for Ground Run-up Enclosure (GRE)* - Based on the existing uses on Airport property, it is difficult to determine a feasible site for such a facility at this time. Therefore, King County Staff recommended that a more detailed site selection and feasibility study be undertaken.

8. *Establish building design/placement standards to reduce off-airport noise effects from aircraft movements on the ground* - Proper placement and design of future landside facilities can be useful in reducing ground generated noise intrusion to adjacent residences. Proper acoustical treatment and placement of buildings can act as barriers to sound transmission, and such considerations should be incorporated, if feasible, in future landside development.

9. *Provide a variety of options for people living in the 65 and 70 DNL KCIA contours, including purchase of avigation (noise) easements, sound attenuation, and sales transaction assistance* - Even if all feasible noise abatement measures are implemented, there would still be residences within the significant noise contours associated with aircraft operations occurring at the Airport. As such, there are several land use options (as noted in the recommendation) that can be offered to residents in an effort to reduce inside noise levels or provide some type of relief.

10. Provide variety of options for people living in the 65 and 70 DNL combined KCIA/Sea-Tac contours including purchase of avigation (noise) easements, sound attenuation, and sales transaction assistance. This recommendation would provide relief to those residents that are not currently eligible under existing noise programs or existing FAA Policy. The intent of this recommendation is to implement within the KCIA contours first and then address those noise sensitive uses within the Combined Contours. This would ensure that the residents closest to the Airport, in the loudest noise contours, would be provided assistance first.

11. *Insulate schools and public buildings*

12. *Investigate alternatives for voluntary purchase of homes within the 70 DNL contour using programs that are not available through the federal government* - All of the recommended programs and procedural changes within the 65 DNL contour and greater would leave areas of residential use inside the 70 DNL contour. Given the normal requirement that homes be brought up to building codes at the time of insulating, it's possible that some of the older homes cannot be sufficiently mitigated at a typical cost to reduce the noise levels to a range compatible with residential use under FAA guidelines (i.e., attain a level of no more that 45 dB inside the home). A mandatory purchase program applied to entire

neighborhoods would require residents to leave who are not troubled by the noise level and do not wish to live in other areas of the City. A voluntary program funded by the FAA could lead to degradation of the remaining neighborhoods because FAA funding requires either maintaining the purchased site in a cleared, unused state or changing the land use, both of which lead to neighborhood deterioration. On the other hand, it was felt that some relief should be provided to those who currently reside in an area of such high noise levels, if the residents would like relief that would not lead to neighborhood deterioration.

Based on the recommendations of the Part 150, it is estimated that the population exposed to aircraft noise would decrease upon implementation of the recommendations, as shown in **Table 3-3**. The table shows existing impacts, impacts in 2008 without the Part 150 recommendation, as well as with the Part 150 recommendations. Each of the future conditions (2008) also reflects completion of the proposed Master Plan recommendations (preferred alternative). As the population and housing data show, implementation of the Part 150 recommendations would alter the area affected, and thus slightly change the population and housing impacts. At the time of this document, the King County Council was reviewing the recommendations. Upon acceptance by the Council, the recommendations would be forwarded to the FAA for their review and approval. Implementation cannot occur until the FAA has approved the actions.

TABLE 3-3

NOISE IMPACTS ASSOCIATED WITH PART 150 RECOMMENDATIONS

	2003 Existing		Without Part 150 Recommendations 2008		Part 150 Recommendations – 2008	
	Population	**Housing**	**Population**	**Housing**	**Population**	**Housing**
60-65 DNL	12,440	4,770	11,530	4,470	11,380	4,410
65-70DNL	4,280	1,720	4,010	1,640	3,920	1,610
70-75 DNL	890	400	750	350	700	320
75+ DNL	60	20	40	10	30	10
	0	0				
65 DNL & Greater	5,230	2,140	4,800	2,000	4,650	1,940
60 DNL & Greater	17,670	6,910	16,330	6,470	16,030	6,350

Source: Barnard Dunkelberg & Company. Using 2000 Census data.

With implementation of the Part 150 recommendations, homes within the 65 DNL and greater noise exposure contours would be evaluated to participate in the various programs, consisting of about 1,880 homes.

As was identified in the Part 150 Study, the proximity of **Seattle-Tacoma International Airport** and its associated aircraft overflights combines with noise from King County International Airport to produce greater noise on residents near KCIA than from overflights alone from KCIA. Therefore, it is important to recognize that the Port of Seattle, as operator of Sea-Tac Airport, has adopted a Master Plan Update for that airport which anticipates completion of a Third Parallel Runway and development of improved terminal and landside facilities.

Chapter 4
ENVIRONMENTAL CONSEQUENCES

This section presents the assessment of the environmental impact of the proposed Master Plan recommendations per the requirements of the Washington State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA). In addressing NEPA requirements, the Federal Aviation Administration's Order 5050.4A "Airport Environmental Handbook" identifies the breadth of analysis required for an environmental assessment. SEPA requirements are addressed in Washington Administrative Code (WAC) 197-11-440. Environmental disciplines required for consideration are:

- 4.1 Noise
- 4.2 Land Use Compatibility
- 4.3 Social Impacts
- 4.4 Induced Socio-Economic Impact
- 4.5 Air Quality
- 4.6 Water Quality
- 4.7 Human Health and Safety
- 4.8 Historic, Cultural and Archaeological Resources
- 4.9 DOT 4(f) Lands
- 4.10 Plants and Animals/Biotic Communities and Endangered Species
- 4.11 Wetlands and Floodplains
- 4.12 Coastal Zone Management, Coastal Barriers and Wild and Scenic Rivers
- 4.13 Farmland
- 4.14 Energy Supply and Natural Resources
- 4.15 Public Services and Utilities (including Solid Waste and Hazardous Waste)
- 4.16 Light Emissions
- 4.17 Aesthetics and Visual Resources
- 4.18 Construction

The analysis of each of these environmental disciplines listed above focuses on existing conditions, and the conditions anticipated to occur in the future through year 2015 or 2018, with and without the proposed Master Plan recommendations.[12/] In addition, a cumulative impact evaluation was prepared for the cumulative effects of addressing the two master plan needs, as well as the effect relative to planned actions or development in the area (as noted in Chapter 3.2 "Future Planned Development").

Throughout this chapter, the analysis describes:

- Without Master Plan Recommendations (RSA Alternative A-5[13/] and facility Alternative D-5)
- With Master Plan
  - Shifted Runway- Full Use (RSA Alternative A-2)
  - Shifted Runway – Special Use Procedures (RSA Alternative A-3): Preferred Alternative
  - Other Facilities (D-4)

4.1 NOISE

One of the primary conditions that residents in the vicinity of an airport express concern with is aircraft noise. For the purpose of this evaluation, aircraft noise impacts are described in terms of the land area exposed to aircraft noise above predetermined levels. Contour lines representing average annual noise conditions were generated showing the Day-Night Average

12/ In December 2003, the existing conditions noise and land use-related analyses were updated reflecting the most recent 12 month period (July 1, 2002 through June 30, 2003). Based on the forecast update discussed in Chapter 1, the noise, land use, air quality disciplines were also updated to 2018 reflecting the new airport forecast. The documentation of all other environmental disciplines consider impacts in 2015 unless noted.

13/ Alternative A-5 reflects the status quo, such that a non-standard RSA would be available for Runway 31L.

Sound Level (DNL or Ldn) of 60, 65, 70, and 75 dBA for aircraft operations. The number of existing residents and dwelling units located within the noise exposure pattern were identified.

The following sections provide a brief summary of the methodology used and the resulting impacts. Chapter 4.2 "Land Use Compatibility" discusses the compatibility of various land uses with existing and future noise exposure and identifies the population and housing impacts. **Chapter 4.7** "Human Health and Safety" contains a summary of the human health effects due to noise.

(A) Methodology

Day Night Sound Level (DNL) contours were developed using the FAA's Integrated Noise Model (INM), Version 6.1 computer model. The INM is a sophisticated computer model that evaluates the cumulative noise exposure of all aircraft operating to and from the Airport on an average annual day. Noise levels associated with the aircraft while on the runway or in flight have been available since the introduction of the model in 1978. Version 6.1 of the INM, released by the FAA in spring of 2003, has features (which were used in this evaluation) that allow a standard evaluation of aircraft noise to include the effects of:

- Run-up noise
- Departure climbs adjusted for local elevation and temperature

Airfield layout and operational fleet mix for each condition were drawn from data produced for the Airport Master Plan and the Part 150 Study. Runway utilization was developed from Airport records. The detailed statistical information related to these and other factors important to the development of the noise contours are presented in **Appendix C**.

As required by the Federal Aviation Administration (FAA), the Day-Night Average Sound Level (DNL) is to be used in evaluating aircraft noise exposure impacts. The DNL is a 24-hour average annual sound level that includes a sound level weighting (penalty) for sounds occurring between 10 p.m. and 7 a.m. This weighting reflects the added sensitivity of sound sources occurring during the hours when the majority of the population is sleeping.

Appendix C contains a detailed description of the following:

- ➢ Noise Modeling Assumptions
- ➢ Locational Impact analysis
    - DNL levels
    - Time Above a threshold of A-weighted sound level (TA)
    - Peak sound exposure level (SEL)

(B) Existing Aircraft Noise Reduction Programs

The existing noise reduction program that is used at KCIA includes the following:

- **Noise monitoring** - KCIA's noise monitoring program was installed beginning in 1997 to quantify noise from the Airport. A total of ten monitors are in use: six moveable monitors and four fixed position monitors. Fixed position monitors are installed in Tukwila, West Seattle, Georgetown, and Beacon Hill. These monitors provide both a baseline and information about changes over time. The six mobile monitors have been installed inside camper vans so that they can be moved from location to location.

- **Noise hotline** - KCIA has also installed a noise hotline to track citizen concerns about noise. Established in 1996, the hotline can be reached at 206-296-KCIA. Airport staff investigates the cause of each complaint and provides a written response each month to the caller and also notifies airport users when their operations result in citizen complaints.
- **Flight tracking** – KCIA staff added flight tracking to the noise monitoring system in 1999. The Airport staff can identify Instrument Flight Rule (IFR) specific flights according to operator, direction, and altitude.
- **Pilots' brochure** – King County published a brochure designed to identify noise sensitive neighborhoods and recommend VFR (Visual Flight Rules) preferred approach and departure routes. This material encourages pilots to voluntarily use routes that avoid flying over residential areas when possible.
- **Operating procedures**: the following operating procedures are in place:
  - No 'touch and go" operations are allowed between 10 p.m. and 7 a.m.;
  - Intersection takeoffs for jet aircraft are prohibited;
  - Runway 13L/31R is not used between 10 p.m. and 7 a.m.;
  - Engine maintenance run-ups are not allowed between 10 p.m. and 7 a.m. During daytime hours, run-ups are conducted at a location on the west taxiway to minimize off-airport impacts. The Boeing Company has volunteered to prohibit its run-ups between 5:30 p.m. and 8:00 am and all day Sunday and holidays. However, when it is necessary that run-ups occur during this period, they coordinate their run-ups with King County; and
  - To aid general aviation aircraft at maximizing their altitude on approach, King County has placed Visual Approach Slope Indicators (VASIs) on Runway 13L/31R (the shorter runway).

Section 3.2 *Future Planned Development* summarizes the recommendations of the recently completed Part 150 Study.

(C) Existing Noise Exposure Area

Table 4.1-1 summarizes the area within each noise contour range for the existing noise condition.

TABLE 4.1-1
EXISTING AREA AFFECTED BY AIRCRAFT NOISE (square miles)

Noise Impact	2003 Existing
60-65 DNL	6.07 sm
65-70 DNL	2.63
70-75 DNL	1.09
75-80 DNL	0.37
80+ DNL	0.50
65 DNL and Greater*	4.58
60 DNL and Greater	10.65

Source: Bridgenet Consulting Services, December 2003. sm = square miles

* 65 DNL and greater includes 65-70 DNL, 70-75 DNL, 75-80 DNL and 80+ DNL

The aircraft noise exposure pattern for the average annual day in 2003 is presented in **Exhibit 4.1-1**. The levels represented by the noise contours range from 80 DNL within airport property to 60 DNL furthest from the Airport. The 60 DNL is provided for informational purposes only to assist the reader in better understanding the aircraft noise exposure patterns in the community.

On the basis of scientific surveys and analysis, the FAA has established 65 DNL as the critical level for the determination of noise impacts.[14] The existing 65 DNL and greater contours currently encompass 4.58 square miles (2,931 acres), including Airport property, while the 60-65 DNL contour includes 6.07 square miles. The predominant use of southerly traffic flows at the Airport results in a larger portion of the existing contour pattern falling south of the airfield due to the prevailing winds. Owing to the greater thrust levels used, departures are typically several decibels louder than approaches at the same distance from the aircraft, resulting in larger noise contours in the principal direction of departing traffic. Therefore, the noise contours for the existing condition reach farther into communities south of the Airport than into those to the north.

The existing 65 DNL noise exposure contour extends from its north end at about Spokane Street southward to terminate near the Foster Links Golf Course, between Interurban Avenue and the rail line.

(D) Future Aircraft Noise Exposure

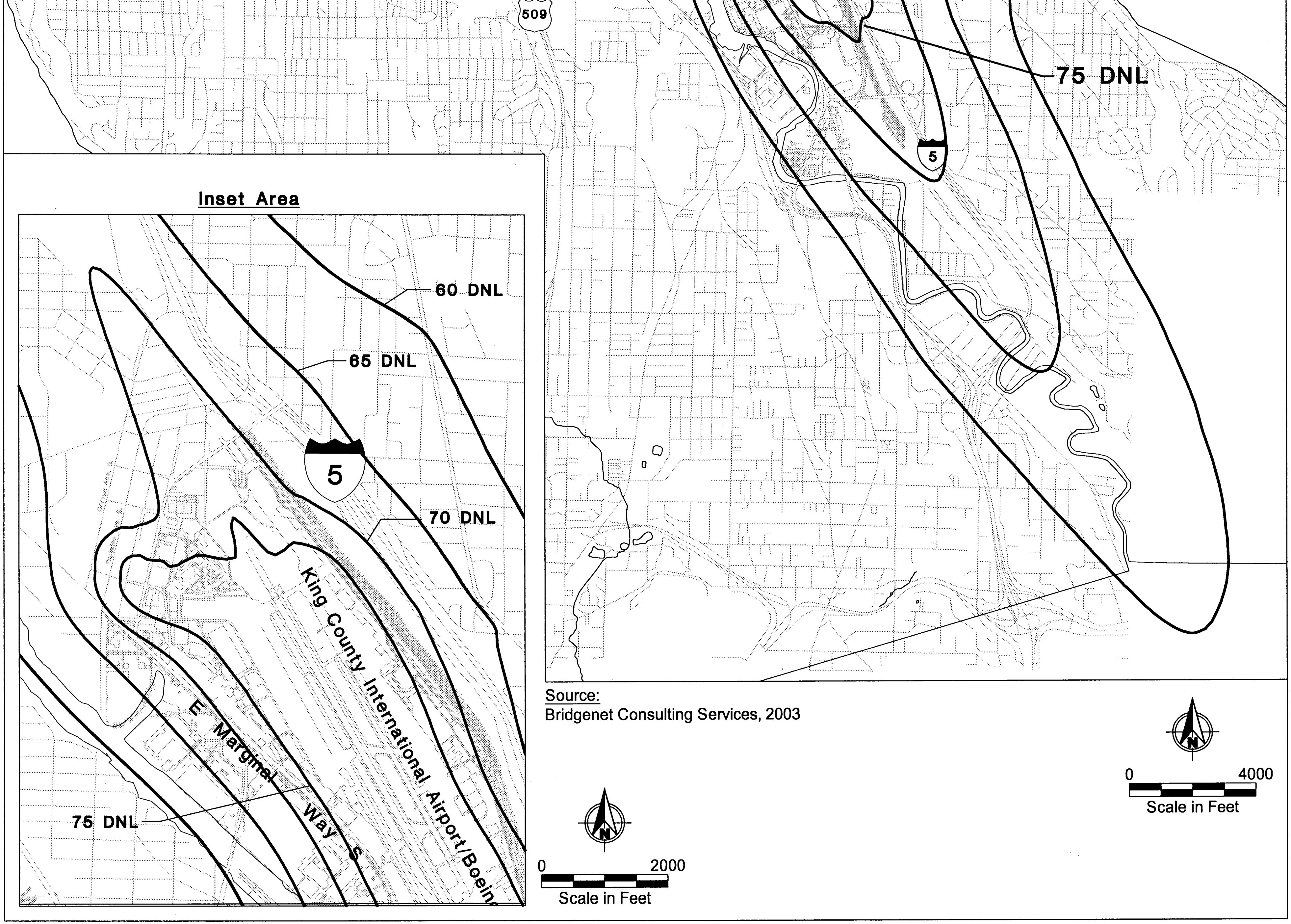
The following sections summarize the noise exposure pattern of the alternatives in year 2018. FAA Order 5050.4A, Chapter 5, Paragraph 47e (1)(d)2 states: "FAA's threshold of significance has been determined to be a 1.5 Ldn increase in noise over any noise sensitive area located within the 65 Ldn contour". The following sections summarize the changes in the noise exposure contours and identify any 1.5 DNL (Ldn) change of noise within the 65 DNL noise exposure contours. **Table 4.1-2** compares the "Without Master Plan" noise exposure to the "With Master Plan" scenarios. **Exhibits 4.1-2, 4.1-3, and 4.1-4** show the noise exposure conditions with and without the Master Plan respectively.

TABLE 4.1-2
AREA AFFECTED BY AIRCRAFT NOISE (square miles)

	2018		
Noise Impact	**(RSA Alt A-5) Without Master Plan**	**With Master Plan Shifted Runway Full Use (Alt A-2)**	**With Master Plan Shifted Runway Special Use Procedures (Alt A-3)**
60-65 DNL	5.52 sm	5.50 sm	5.52 sm
65-70 DNL	2.43	2.39	2.43
70-75 DNL	0.87	0.82	0.86
75-80 DNL	0.31	0.31	0.31
80+ DNL	0.43	0.43	0.42
65 DNL and Greater*	4.02	3.95	4.02
60 DNL and Greater	9.54	9.45	9.54

Source: Bridgenet Consulting Services, December 2003. sm = square miles
* 65 DNL and greater includes 65-70 DNL, 70-75 DNL, 75-80 DNL and 80+ DNL

14/ Federal Aviation Regulation Part 150 and the Federal Interagency Committee on Noise.

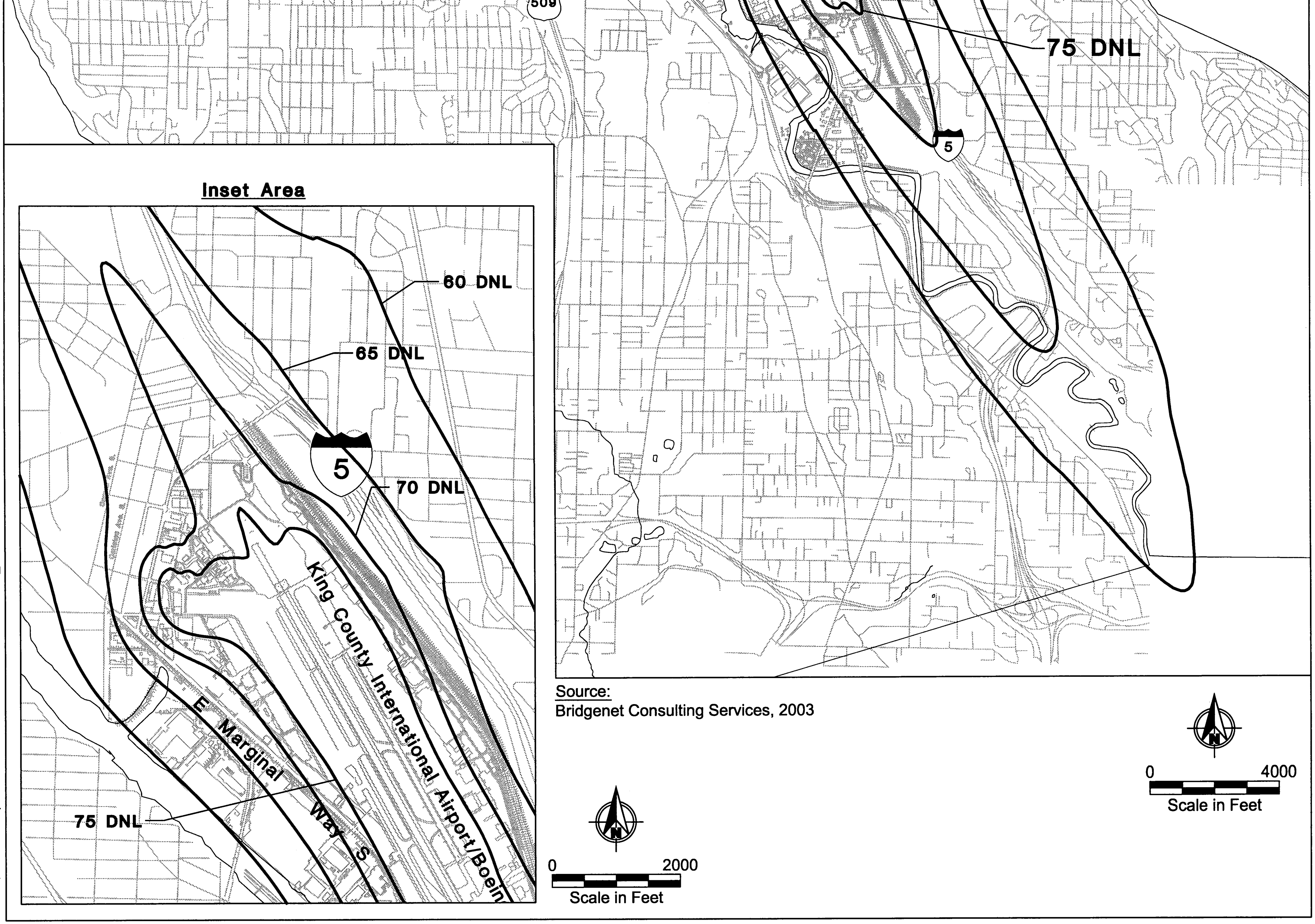


Source:
Bridgenet Consulting Services, 2003

Exhibit 4.1-1
Existing Conditions (2003)

ANCHOR ENVIRONMENTAL, L.L.C.

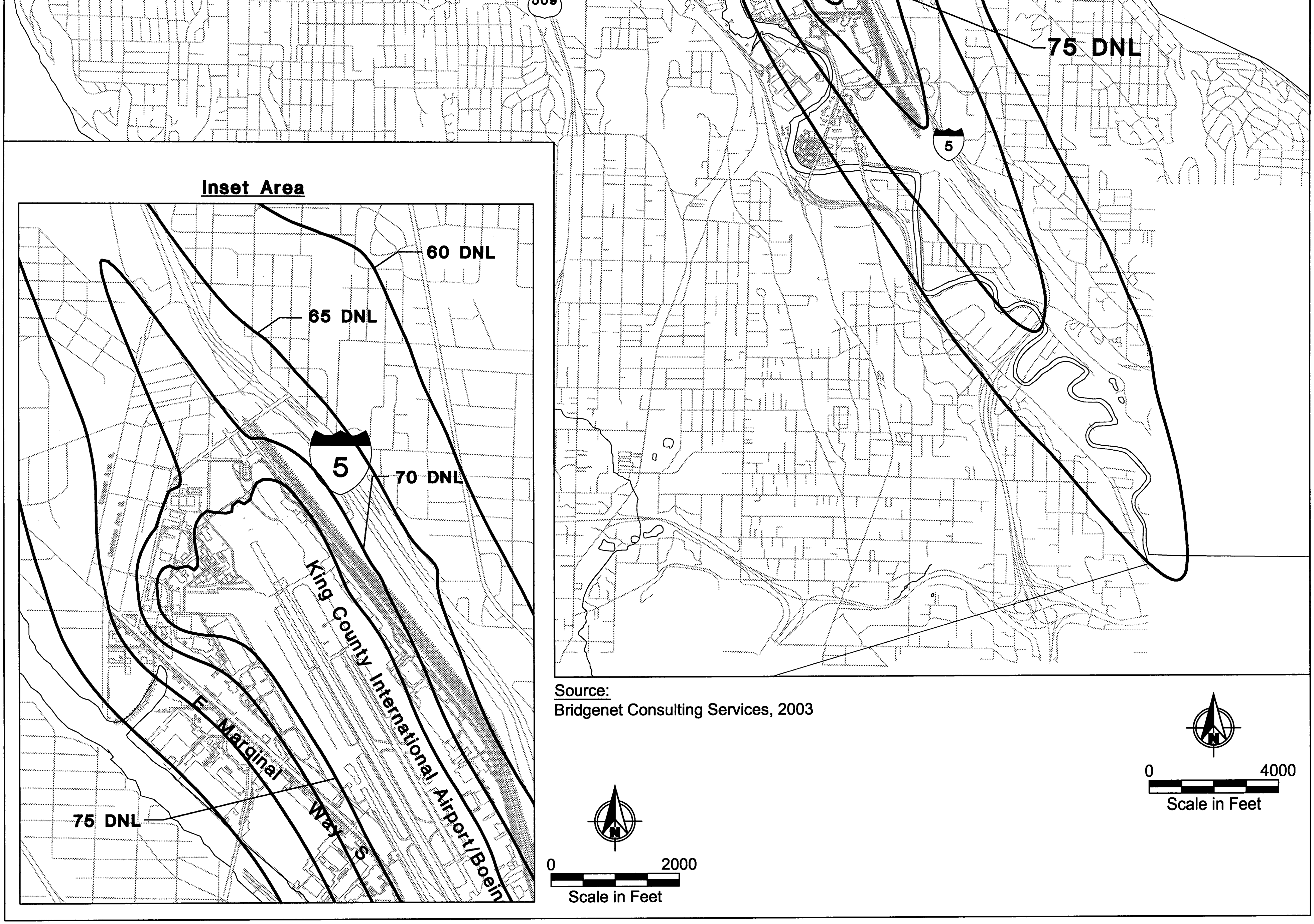
Jan 16, 2004 12:28pm cdavidson K:\Jobs\040031-BOEING_FIELD\04003101\04003101-02.dwg Exhibit 4.1-2



Source:
Bridgenet Consulting Services, 2003

Exhibit 4.1-2
Future Noise Exposure 2018 Without Master Plan

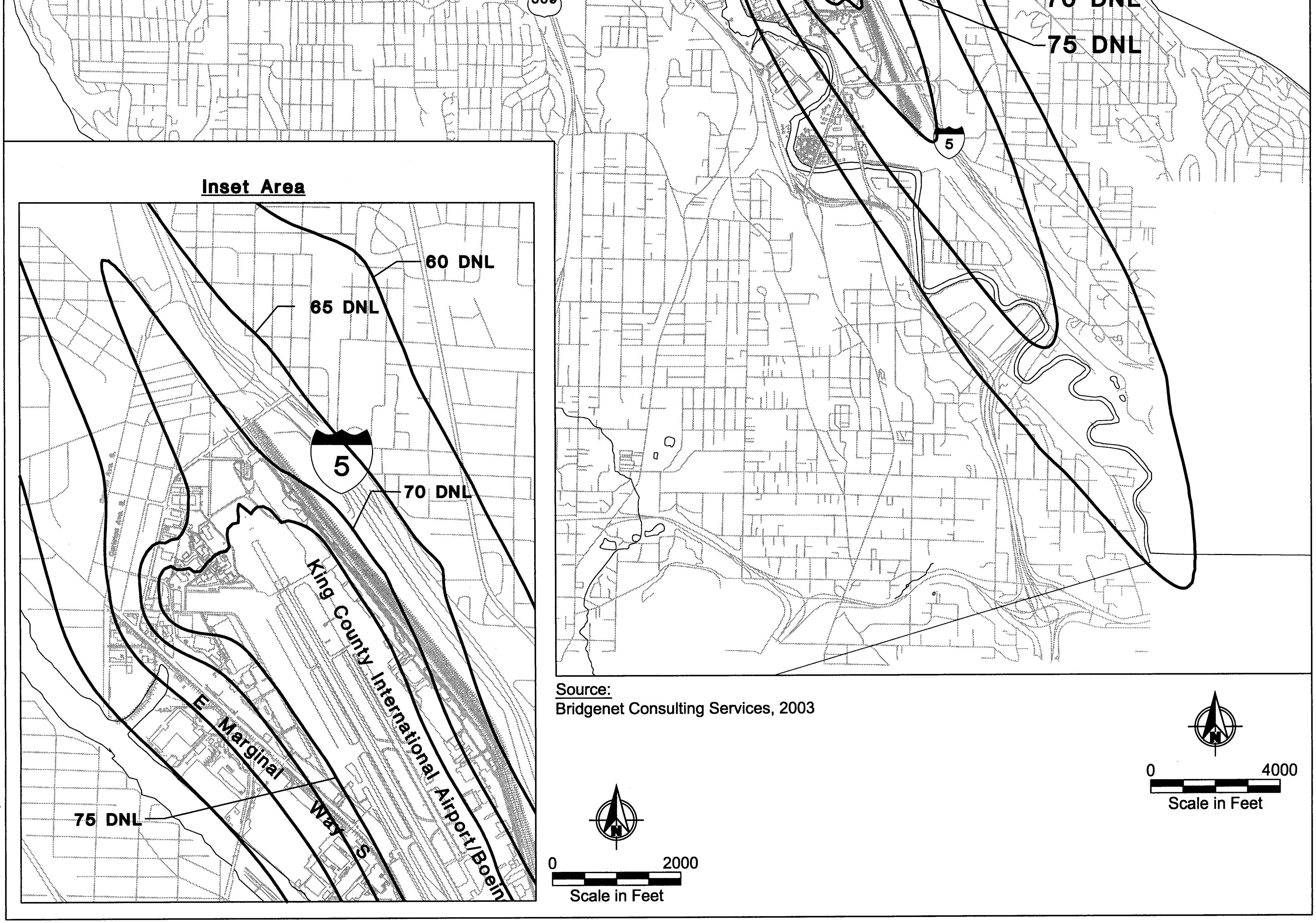
ANCHOR ENVIRONMENTAL, L.L.C.



Source:
Bridgenet Consulting Services, 2003

Exhibit 4.1-3
Future Noise Exposure 2018 With Full Use of Shifted Runway

ANCHOR
ENVIRONMENTAL, L.L.C.



Source:
Bridgenet Consulting Services, 2003

Exhibit 4.1-4
Future Noise Exposure 2018 With Special Use Area Procedures

ANCHOR ENVIRONMENTAL, L.L.C.

All future conditions (with and without the Master Plan) assume continued operation of the existing noise abatement procedures and policies.

1. Without Master Plan Recommendations (No Action RSA A-5)

As noted in Chapter 2, the No Action RSA alternative would retain the existing arrival and departure thresholds, with the RSA for the southern end of the primary runway (31L) not meeting current standards. It is also assumed that all forecast aircraft operations would use the Airport in the 2018 timeframe.

As is shown in **Table 4.1-2**, the area that would be affected by 65 DNL and greater noise contours without the Master Plan is expected to be 4.02 square miles or about 2,573 acres. This would be a reduction of nearly 12% over current noise exposure, estimated at 4.58 square miles versus without the Master Plan in 2018 at 4.02 square miles. The noise exposure contour for the 2018 "Without Master Plan" very closely resembles the existing conditions, with the exception of the size being smaller. The 65 DNL noise contour extends from its northerly location (just south of Spokane Street) to its southern most location near I-5 at 52nd Street South.

2. With Master Plan Recommendations

The With Master Plan recommendation scenarios were evaluated: a) full use of the shifted runway and b) establishment of procedures to require users to demonstrate the need for 10,000 feet of departure runway length when operating in south flow, and c) other facilities:

a) With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)

With the runway shift, all of the forecast operations would be capable of operating at the Airport. With this alternative, all activity using the Airport would depart from the new threshold in a south flow. Arrivals in a south flow would occur at the current threshold, and departures in a north flow would not be affected.

As is shown in **Table 4.1-2**, the area affected by 65 DNL and greater noise levels with this contour is expected to be 3.95 square miles, which would be slightly smaller than the area affected by the Without Master Plan noise contour (about 0.07 square miles smaller). The 60 DNL and greater noise contour would encompass 9.45 square miles, while the 75 DNL and greater noise contour would include 0.74 square miles. The noise contours for this alternative in 2018 would extend from their northern terminus at just south of Spokane Street to the southern extension at the south end of 50th Place South near S. 129th Street.

As is shown in the table, with this alternative (full use of the shifted runway), the 65 DNL and greater noise exposure contour would be slightly smaller than with the preferred alternative (Alternative A-3) – about 0.07 square miles or 45 acres. In this section of the document, the documentation identifies noise exposure without regard to the land uses within the contour. Section 4.2 "Land Use" presents the impacts of the alternatives, which shows that the noise sensitive use impacts are greater with this alternative than would suggest by the area within the contour. The shifted pavement results in aircraft being higher over areas south of the Airport when departing in south flow, and thus slightly less noise and a smaller noise footprint.

While the noise exposure contours are smaller with this alternative relative to the Without Master Plan, it would result in significant changes (1.5 DNL or greater) at six locations:

- Georgetown Steam Plant – in 2018, full use of the shifted runway would result in a 6.5 DNL increase over the Without Master Plan (from 70.8 DNL with the No Action to 77.3 DNL with this alternative)
- Grid 402 (7,36) at 1.5 DNL over the Without Master Plan along I-5
- Grid 340 (6,35) at 2.8 DNL over the Without Master Plan within the northern airfield portion of KCIA
- Grid 341 (6,36) at 5.8 DNL over the Without Master Plan within the northern airfield portion of KCIA
- Grid 280 (5,36) at 6.6 DNL over the Without Master Plan within the northern airfield portion of KCIA near the Steam Plant from 71.7 to 77.7 DNL
- Grid 279 (5,35) at 3.7 DNL over the Without Master Plan within the northern airfield portion of KCIA from 80.3 to 84.0 DNL

For the grid analysis performed for the Georgetown neighborhood area (250 ft), a number of sites were found to result in a 1.5 DNL increase over the Without Master Plan. However, all of these sites are located in areas that are undeveloped either at KCIA or along the right-of-way between Airport Way and I-5 and include: grid 142, 143, 144, 169, 170, 171, 197, 198, 225, 226, 227, 254, 255, 256, and 283. The greatest increases would be as high as 23.0 DNL at grid 197 (at the very end of the runway).

b) Preferred Alternative – Procedures for Use of Special Use Area (A-3)

With the runway shift, only those users that have a demonstrated need for 10,000 feet of departure runway would use the new pavement on the north. It is anticipated that one (1) to two (2) average daily aircraft operations would require the full 10,000 ft departure capability. This analysis reflects that annually, about 438 operations per year in 2018 might require 10,000-ft of departure runway length. These operations would consist of the Boeing Aerospace (including AWACs military flights) and heavy cargo operations consisting of: AWACs (707 version), B-747-400, B-757-200, B-767-300, and B-777.

The area affected by 65 DNL and greater sound level would total 4.02 square miles with the Master Plan recommendations, or the same area as the No Action/without the Master Plan. The 65 DNL and greater noise exposure contours would extend from their northern tip just south of Spokane Street to the southern extension near the south end of 56th Avenue South.

No off-airport sites would be exposed to a 1.5 DNL or greater change over the No Action/"Without Master Plan" to the Master Plan with the Runway Shift and Special Use Area procedures. Project-related noise increases with this alternative at the

Georgetown Steam Plant would be 1.1 DNL, increasing from the Do Nothing of 70.8 DNL to 71.9 DNL with the Preferred Alternative.

c) Other Facilities

As is noted in Chapter 1, the Master Plan recommends a land use plan that would concentrate uses to the extent possible in various areas of the Airport. These areas or zones are relatively consistent with the uses occurring today at KCIA. Therefore, further concentration of increases in activity could result in increases in ground-emanating noise (noise occurring within the apron area from surface vehicles and aircraft taxiing to and from the runways). As taxiing noise is masked by the greater noise levels generated by arriving (with reverse thrust) and departing aircraft, no significant adverse impacts are expected from further concentration of users in various areas of the Airport.

(E) Cumulative Impacts

The proposed Master Plan recommendations would have a cumulative impact on aircraft noise exposure conditions as described in the preceding sections. Planned regional development, such as the Sound Transit light rail system and Elevated Transit System (also known as the Monorail) would not affect aircraft noise exposure.

As noted in Section 3.2, King County has recently completed a Part 150 Noise Compatibility Planning Study for KCIA. The Noise Compatibility Plan developed for the recommendations also reflects the Preferred Alternative of the Master Plan (Runway Safety Area Alternative A-3 and airport facility development). **Table 3-3** shows that with the Part 150 Study recommendations, the population affected by 60 DNL would decrease by about 2% and that impacted population and housing within 65 DNL would decrease 3%. As required by FAR Part 150, the noise exposure contours focused on then existing (2000) conditions and conditions five years into the future (2006). Based on the Part 150 future analysis, it would be expected that future conditions (post 2006) would also experience a similar reduction with implementation of the Master Plan and Part 150 recommendations. Those recommendations, if approved and implemented, when combined with the Master Plan would result in further noise reductions than would occur in the future without the recommendations.

As is also noted in Section 3.2, the Port of Seattle has completed a Master Plan Update for Sea-Tac Airport that anticipates completion of a new runway and expansion of the terminal and landside complex in the next decade. As was shown during the KCIA Part 150, the noise from Sea-Tac and KCIA combine to result in greater noise exposure in the vicinity of KCIA than is shown when considering operations from KCIA alone. During the Part 150 Study for KCIA, the noise exposure contours considered the cumulative impact of both airports and presented the combined condition. Reflected in conditions at KCIA was the implementation of the preferred Master Plan recommendations, as well as assumed for Sea-Tac was the implementation of their Master Plan Update recommendations.

Table 4.2-4 shows a comparison of the impacts of the combined airports. As this table shows, the combination of overflights from KCIA and Sea-Tac Airport together result in a larger noise exposure pattern in the area around KCIA than would occur from just the KCIA flights. Implementation of the KCIA Master Plan recommendations (unrelated to the RSA), which are equal to the No Action, would combine with noise from Sea-Tac to result in slightly greater noise exposure, a cumulative airport increase in noise. However, the Master Plan projects would not induce additional noise exposure impacted population.

(F) Mitigation Measures

Because no significant new noise exposure impacts are anticipated to be caused by the proposed Master Plan Preferred Alternative recommendations, no mitigation is required. King County initiated a Part 150 Noise Compatibility Planning Study for KCIA in July 1999. The purpose of that study is to develop a balanced and cost-effective program for reducing current and future (through 2006) noise exposure. As discussed in Section 3.2, the Part 150 recommendations would further reduce existing and future impacts with the Master Plan.

4.2 LAND USE COMPATIBILITY

Aircraft noise is generally regarded to be the primary impact of an airport on surrounding land uses. This section summarizes the population, housing units, and non-residential noise-sensitive facilities that are affected by current Airport operations and by those of the proposed Master Plan and the alternatives for future years. The compatibility of the alternatives with local and regional land use plans is also discussed.

Existing noise contours indicate that noise levels in the residential and commercial areas of the Georgetown neighborhood currently exceed 65 DNL. Shifting the runway 880 feet north would increase the impacts from noise on these residential and commercial areas. Non-residential noise sensitive facilities north of the Airport would experience increased noise levels with a shifted runway; although the impacts would not be significant with the Preferred Alternative (RSA Alternative A-3 and the proposed facility concept).

(A) Methodology

Noise contours delineating locations of equal noise exposure (60, 65, 70, and 75 DNL) were developed for the existing (2003) condition, and for the With and Without Master Plan recommendation alternatives for the year 2018. To determine the amount of noise affected population and housing, the contours were electronically overlaid on the Census block group data. To evaluate the existing and future conditions, year 2000 census data was used. The area between two specific noise contours was calculated as a percentage of the total affected block group and then multiplied by the total population and housing of the affected block group to develop population and housing impact data. These data were then evaluated against aerial photographs overlain by noise exposure contours to determine the reasonableness of the data, which is shown in **Table 4.2-2**. The noise contours for existing conditions and the future alternatives were also electronically overlaid on the Airport environs database of non-residential noise-sensitive facilities (schools, churches, hospitals, and nursing homes, libraries, parks and recreation facilities, and historical sites) to determine which uses are affected by noise.

The degree of impact within the noise contour was determined using Part 150 of the Federal Aviation Regulations which contains guidelines for determining the sensitivity of specific land uses to various levels of aircraft noise.[15/] These guidelines note that if local land use authorities have enacted local aircraft overflight noise compatibility guidelines, these guidelines can be used in lieu of the Part 150 guidelines. However, none of the land use jurisdictions in the vicinity of KCIA have enacted guidelines concerning aircraft overflight noise exposure. Several jurisdictions (City of Seattle, King County, and State of Washington) have established property line noise guidelines, which do not relate to these land use compatibility guidelines, and do not relate to aircraft overflights.

Table 4.2-1 lists the Part 150 land use compatibility guidelines and notes that residences and certain public-use facilities are not compatible with high levels of aircraft noise. These Federal guidelines show that residential land uses are normally incompatible in areas exposed to noise levels in excess of 65 DNL. With appropriate soundproofing, however, residential structures may be compatible with noise exposure levels of 65-75 DNL. Other noise-sensitive land uses such as medical, educational, religious and cultural facilities, areas of public assembly, resorts, and group camps follow these same patterns of compatibility. As discussed later in **Section 4.9** "DOT Section 4(f) Lands", park and

[15/] *Noise Control and Compatibility Planning for Airports, Appendix 1*, FAA Advisory Circular AC 150/5020-1, August 5, 1983.

recreation uses are normally considered to be compatible with noise exposure levels below 75 DNL.

The Part 150 land use compatibility guidelines indicate that most land uses, including residences, are compatible with noise exposure levels below 65 DNL. The area within DNL 65 and greater noise exposure is considered significantly impacted by aircraft noise exposure by the FAA's land use compatibility guidelines. It is also generally recognized that some residents, especially owner-occupants of single-family homes, may be highly annoyed by exposure to noise below 65 DNL (yet circumstances can vary with individual residents). In view of this sensitivity, areas affected by 60 to 65 DNL are also included in this report for the information of the reader. However, there are no generally recognized standards for characterizing the actual effect of such noise exposure on these individuals. Accordingly, areas exposed to less than 65 DNL are described as being impacted, but these impacts are not judged to be significant. Section 4.7 "Human Health and Safety" discusses the health related concerns with aircraft noise.

(B) Existing Conditions

Land use in the Airport area is primarily industrial and commercial, consisting of two manufacturing/industrial centers (Duwamish and Tukwila) that were established to ensure adequate accessible industrial land is available to promote a diversified employment base. There are also small residential areas within the area (Georgetown neighborhood in Seattle and the Allentown neighborhood in Tukwila), and the eastern boundary of the area overlaps a portion of the Holly Park neighborhood in Seattle. The existing land uses in the general area are shown in **Exhibit 3-3**. KCIA lies within the Cities of Seattle and Tukwila. Land adjacent to the Airport is primarily industrial/manufacturing. The Seattle neighborhood Georgetown is located north and west of the Airport.

Existing land use impacts are categorized into two groups, residential uses and non-residential noise-sensitive facilities. All residential land uses, with the exception of motels and hotels, are considered to be sensitive to aircraft noise levels above 65 DNL. **Table 4.2-2** summarizes the population and housing impacts within the existing noise exposure contours. Of the parks, schools, and historic sites in the study area, only three (3) parks, one (1) school, and five (5) national historic sites are affected by the 65 DNL and greater sound level. **Table 4.2-3** lists the noise exposure at each of these facilities.

The aircraft noise exposure pattern for existing conditions is shown in the previous Section 4.1 "Noise" in **Exhibit 4.1-1**. As shown in **Table 4.2-2,** there are currently 5,230 people residing in about 2,140 housing units affected by 65 DNL or greater noise levels, the level of significant noise exposure.

TABLE 4.2-1

King County International Airport

PART 150 LAND USE COMPATIBILITY GUIDELINES

Page 1 of 4

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels <65	65-70	70-75	75-80	80-85	>85
RESIDENTIAL:						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Household units (11)						
Single units-detached (11.11)						
Single units-semidetached (11.12)						
Single units-attached row (11.13)						
Two units-side-by-side (11.21)						
Two units-one above the other (11.22)						
Apartments-walk up (11.31)						
Apartments-elevator (11.32)						
Group quarters (12)						
Residential hotels (13)						
Other residential (19)						
Mobile home parks (14)	Y	N	N	N	N	N
Transient lodgings (15)	Y	N[1]	N[1]	N[1]	N	N
PUBLIC USE:						
Schools, hospitals, and nursing homes	Y	25	30	N	N	N
Educational services (68)						
Hospitals, nursing homes (65.13, 65.16)						
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Cultural activities (including churches) (71)						
Auditoriums, concert halls (72.1)						
Governmental services (67)	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Railroad, rapid transit and street						
Railway transportation (41)						
Motor vehicle transportation (42)						
Aircraft transportation (43)						
Marine craft transport (44)						
Highway and street right-of-way (45)						
Parking (46)	Y	Y	Y[2]	Y[3]	Y[4]	N

Numbers in parentheses refer to Standard Land Use Coding Manual (SLUCM)

Footnotes contained on page 4 of table.

TABLE 4.2-1

King County International Airport

PART 150 LAND USE COMPATIBILITY GUIDELINES

Page 2 of 4

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	<65	65-70	70-75	75-80	80-85	>85
COMMERCIAL USE:						
Offices, business, and professional Finance, insurance and real estate services (61); Personal services (62); Business services (63); Professional services (65); Other medical facilities (65.1); Miscellaneous services (69)	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment Wholesale trade (51); Retail trade-building materials, hardware and farm equipment (52); Repair services (64); Contract construction services (66)	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail Trade - general Retail trade-general merchandise (53) Retail trade-food (54) Retail trade-automotive, marine craft, aircraft and accessories (55) Retail trade-apparel and accessories (56) Retail trade-furniture, home furnishings and equipment (57) Retail trade-eating and drinking establishments (58) Other retail trade (59)	Y	Y	25	30	N	N
Utilities (48)	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication (47)	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general Food and kindred products - manufacturing (21); Textile mill products-manufacturing (22); Apparel and other finished products made from fabrics, leather and similar materials-manufacturing (23); Lumber and wood products (except furniture) - manufacturing (24); Furniture and fixtures-manufacturing (25); Paper and allied products-manufacturing (26); Printing, publishing, and allied industries (27); Chemical and applied products-manufacturing (28); Petroleum refining and related industries (29); Rubber and misc. plastic products-manufacturing (31); Stone, clay and glass products-manufacturing (32); Primary metal industries (33); Fabricated metal products-manufacturing (34); Miscellaneous manufacturing (39)	Y	Y	Y[2]	Y[3]	Y[4]	N

Numbers in parentheses refer to Standard Land Use Coding Manual (SLUCM)

TABLE 4.2-1

King County International Airport

PART 150 LAND USE COMPATIBILITY GUIDELINES

Page 3 of 4

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels <65	65-70	70-75	75-80	80-85	>85
MANUFACTURING AND PRODUCTION (continued)						
Photographic and optical professional, scientific and controlling instruments, photographic and optical goods; watches and clocks manufacturing (35)	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry Agriculture (except livestock) (81) Agriculture related activities (82) Forestry activities and related services (83)	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding (81.5 - 81.7)	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction Fishing activities and related services (84) Mining activities and related services (85) Other resource production and extraction (89)	Y	Y	Y	Y	Y	Y
RECREATIONAL:						
Outdoor sports arenas and spectator sports (72.2)	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells, amphitheaters (72.11)	Y	N	N	N	N	N
Nature exhibits and zoos (72.1)	Y	Y	N	N	N	N
Amusements, parks, resorts and camps Amusements (73), Parks (76) Public assembly (72) Resorts and group camps (75) Other cultural, entertainment and recreation (79)	Y	Y	Y	N	N	N
Golf course, riding stables and water recreation (74)	Y	Y	25	30	N	N

Numbers in parentheses refer to Standard Land Use Coding Manual (SLUCM)

- The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses remains with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

TABLE 4.2-1

King County International Airport

PART 150 LAND USE COMPATIBILITY GUIDELINES

Page 4 of 4

KEY TO TABLE

Number in ( )	Standard Land Use Coding Manual (SLUCM).
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are <u>not</u> compatible and should be prohibited.
25, 30, or 35	Land Use and related structures generally compatible; measures to achieve Noise Level Reduction (NRL), outdoor to indoor, of 25, 30, or 35 must be incorporated into design and construction of structure.

NOTES FOR TABLE

1. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2. Compatible where measures to achieve NLR of 25 are incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
3. Compatible where measures to achieve NLR of 30 are incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
4. Compatible where measures to achieve NLR of 35 are incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
5. Land use compatible provided special sound reinforcement systems are installed.
6. Prime use only, any residential buildings require NLR of 25 to be compatible.
7. Prime use only any residential buildings require an NLR of 30 to be compatible.
8. Prime use only, NLR for residential buildings not normally feasible, and such uses should be prohibited.
   g. Designations contained in the table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptability and permissible land uses remain with the local authorities.
   h. Although TABLE 2 of FAR Part 150 defines the compatibility or non-compatibility of various land uses for the purposes of Federal Aid, programs, or sanctions under the ASNA Act, adjustments or modifications of the descriptions of the land use categories may be desirable after consideration of specific local conditions.

Source: Federal Aviation Administration Advisory Circular AC 150/5020-1, **Noise Control and Compatibility Planning For Airports**, Appendix 1, August 5, 1983.

TABLE 4.2-2

POPULATION AND HOUSING AFFECTED BY AIRCRAFT NOISE

	2003 Existing		Year 2018: (RSA Alt A-5) Without Master Plan		Year 2018: With Master Plan—Full Use of the Shifted Runway (A-2)		Year 2018: With Master Plan – Procedures for Special Use Area (A-3)	
	Population	Housing	Population	Housing	Population	Housing	Population	Housing
60-65 DNL	12,440	4,770	11,550	4,360	11,510	4,300	11,560	4,260
65-70 DNL	4,280	1,720	3,270	1,350	3,180	1,310	3,270	1,350
70-75 DNL	890	400	570	280	570	280	570	280
75 DNL	60	20	10	10	10	10	10	10
80+ DNL	0	0	0	0	0	0	0	0
65 DNL & Greater	5,230	2,140	3,850	1,640	3,760	1,600	3,850	1,640

Source: Barnard Dunkelberg & Co, December 2003 using 2000 Census data.

Preferred Alternative consists of the "With Master Plan – Procedures for Special Use Area" (RSA Alternative A-3)

TABLE 4.2-3
NON-RESIDENTIAL NOISE SENSITIVE FACILITY NOISE IMPACTS – DAY NIGHT AVERAGE SOUND LEVEL (DNL)

				2018		
					With Master Plan	
Code	**Property**	**Location**	**Existing**	**(RSA Alt A-5) Without Master Plan**	**With Full Use of Shifted Runway (A-2)**	**Procedures for Special Use Area (A-3)**
P1	Pea Patch Park	Tukwila	64.6	63.9	63.5	63.9
P2	Foster Golf Links	Tukwila	64.1	63.8	63.4	63.7
P3	Van Asselt Community Center	Seattle	59.1	58.8	58.7	58.8
P4	Cleveland Playground	Seattle	67.4	66.5	66.5	66.5
P5	Georgetown Play field	Seattle	72.5	72.3	72.3	72.3
P6	Maplewood Play field	Seattle	63.5	62.6	62.6	62.6
P7	Ruby Chow Park	King Co.	73.7	72.6	73.7	73.6
P8	First Avenue South Boat Ramp	Seattle	55.6	54.6	55.0	54.7
P9	Duwamish Waterway Park	Seattle	56.8	56.1	56.0	56.1
S1	Wing Luke Elem.	Seattle	61.9	61.8	61.9	61.8
S2	Maple Elem.	Seattle	63.5	62.6	62.6	62.6
S3	Rainier View	Seattle	63.3	62.4	62.1	62.4
S4	Cleveland High School	Tukwila	67.9	67.0	67.0	67.0
H1	Museum of Flight/Airplane Co. Bld.	Tukwila	82.4	79.7	79.3	79.7
H2	Georgetown Steam Plant	Seattle	71.7	70.8	**77.3**	71.9
H3	Old Georgetown City Hall	Seattle	73.1	73.0	73.0	73.0
H4	Georgetown Poor Farm Annex	Seattle	71.2	70.8	70.9	70.8
H5	Maple Donation Claim	Seattle	74.2	72.8	73.6	72.8
	Number of Historic/Cultural Sites Affected by 65 DNL & greater		5	5	5	5
	Number of Schools Affected by 65 DNL & greater		1	1	1	1
	Number of Parks Affected by 65 DNL & greater		3	3	3	3

Source: Anchor Environmental LLC and Bridgenet Consulting Services, March 2002.

Box notes that alternative would create a 1.5 DNL or greater impact at the site.

(C) Future Conditions

To evaluate the impact of the Master Plan recommendations, noise exposure in year 2018 was quantified, based on the aviation forecasts presented in Chapter 1. Year 2000 population and housing census data was used to estimate future impacts on population and housing. For the area affected by 65 DNL and greater noise levels, little or no population growth is anticipated.

1. Without Master Plan/No Action (RSA Alternative A-5)

The "Without the Master Plan" scenario considers the existing airport facilities, without the Runway Shift or other Master Plan recommendations. Without the Master Plan recommendations, noise exposure is expected to decrease over existing noise levels, despite an increase in aircraft operations. This reduction is expected as the noisier Stage 3 aircraft are retired from the fleet, and are replaced by quieter aircraft. As is shown in **Table 4.2-2**, the population affected is expected to decrease from current levels of about 5,230 people within the 65 DNL and greater noise contour to 3,850 people in 2018, about a 23% reduction; the majority of the reduction in impact is due to the reduced number of retrofitted Stage 2 aircraft that would be operating in 2008. The number of non-residential noise sensitive facilities affected by 65 DNL and greater sound levels is expected to remain about the same between 2003 and 2018.

2. With Master Plan Recommendations

Three With Master Plan recommendation scenarios were evaluated: a) full use of the shifted runway; b) establishment of special use area procedures to require users to demonstrate the need for 10,000 feet of departure runway length when operating in south flow and c) other facility recommendations. The land use implications of these scenarios are noted below:

a) With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)

Table 4.2-2 shows the population and housing impacts associated with shifting the runway 880 feet to the north and use of all aircraft to depart in a south flow from this relocated threshold. Relative to the Without Master Plan, this alternative would produce a slightly smaller noise contour and slightly lower population/housing impacts (90 less people in 40 less homes).

This alternative would also result in an increase in noise to properties located off the end of Runway 31L. As is noted **in Section 4.1** "Noise" and **Section 4.8** "Historic Cultural and Archaeological Resources", significant noise exposure would be caused by this alternative. Significant noise exposure is defined by FAA Order 5050.4A, which notes that a 1.5 DNL increase in sound to noise sensitive properties within the 65 DNL is considered significant. Similarly, if increases in impacts of 3.0 DNL occur within the 60 DNL, further evaluation is recommended. As was noted in Section 4.1 "Noise", this alternative would increase the noise to the Georgetown Steam Plant significantly (6.5 DNL) as well as to the north end of the airfield and the I-5 Airport Way right-of-way. No other off-airport noise sensitive uses would be expected to experience significant changes in aircraft noise exposure with this alternative.

As is noted in Section 4.8, a specialized vibration study was undertaken to examine the implications of aircraft taking off closer to the Georgetown Steam Plant, a historic landmark. That analysis showed that with the most conservative of criteria and the age of the steam plant windows, it might be possible that the windowpanes could vibrate loose, fall and shatter. See Section 4.8 for further details on this impact and mitigation.

Analyses indicate there are residential and business sites north of KCIA that may be eligible for historical status. Section 4.8 *"Historic, Cultural and Archaeological Resources"*, discusses these resources. A portion of the residential area east of KCIA on the bluff above Interstate 5 is currently between the 65 and 70 DNL contours. Shifting the runway north would move the portion of the residential area that is between these two contours. Some small portions of the residential area would drop below 65 DNL and other small areas would increase to the 65 DNL level.

b) Preferred Alternative – Procedures for Use of Special Use Area (RSA Alternative A-3)

With the Master Plan Preferred Alternative, noise exposure is also expected to decrease relative to existing conditions due to the transition to quieter aircraft. Relative to the Without Master Plan condition, the Preferred Alternative (Shifted runway with special use area procedures) would result in the same population and housing impacts as the No Action and the Full Use Alternative (A-2) within 65 DNL and greater sound levels. Within the 60-65 DNL noise exposure contour, this alternative would increase the impacts by 10 people with a reduction in the number of homes being affected relative to the Without Master Plan. The change in population relative to housing reflects the shift in noise and differences in residential/population density of the affected areas.

Shifting Runway 13R/31L 880 feet north would increase the impacts of noise on areas north of the runway. The majority of residential lands in the Georgetown neighborhood currently experience noise levels between 65 and 70 DNL with or without the proposed Master Plan recommendations. Shifting the runway north would result in a slight increase in aircraft noise levels to Georgetown. Portions of the residential area on the north side of Ellis Avenue South would receive noise exposure of between the 75 and 80 DNL under this Alternative, which is similar to the existing noise exposure. Most of the commercial area centered on South Bailey Street is currently between the 70 and 75 DNL contours. While the Preferred Alternative would move the 80 DNL contour closer to the commercial area, this area would not exceed 75 DNL. The commercial area on 4th Avenue South is currently below 65 DNL and would remain below 65 DNL under this Alternative.

Shifting Runway 13R/31L to the north would also result in a slight increase in noise to properties located off the end of Runway 13R. As noted in Section 4.1, this alternative would not result in a 1.5 DNL increase to noise sensitive facilities off-airport.

As is noted in Section 4.8, a specialized vibration study was undertaken to examine the implications of aircraft taking off closer to the Georgetown Steam Plant. That analysis showed that with the most conservative of criteria and the age of the steam plant windows, it might be possible that the windowpanes could vibrate loose, fall and shatter. As a result, King County is proposing to conduct window mitigation. See Section 4.8 for further details on this impact and mitigation.

Analyses indicate there are residential and business sites north of KCIA that may be eligible for historical status. Section 4.8 "*Historic, Cultural and Archaeological Resources*", discusses these resources. A portion of the residential area east of KCIA on the bluff above Interstate 5 is currently between the 65 and 70 DNL contours. Shifting the runway north would move the portion of the residential area that is between these two contours. Some small portions of the residential area would drop below 65 DNL and other small areas would increase to the 65 DNL level.

Similarly, the noise contours at the south end of the area would be reduced, and thus move north with the runway shift. The movement of the 65 DNL contour would result in a reduction in land use activity above the 65 DNL contour. The residential area in the Allentown neighborhood of Tukwila currently has noise levels between 65 and 70 DNL. Under this alternative, the noise levels would be reduced in this area, but not below 65 DNL.

c) Other Facilities

Building a "hush house" as part of Master Plan recommendations[16/] would reduce the noise from engine run-ups during maintenance activities at KCIA and provide a beneficial impact on land use. The wall, proposed as a screening for the northern portion of the Airport, could also provide slight noise reduction. However, the noise reduction benefits would be dependent on the height and materials used in the wall. No other facilities would be expected to result in a noise or land use incompatibility.

(D) Cumulative Impacts

As noted in Section 3.2, King County has recently completed a Part 150 Noise Compatibility Planning Study for KCIA. The Noise Compatibility Plan developed for the recommendations also reflects the Preferred Alternative of the Master Plan (Runway Safety Area Alternative A-3 and airport facility development). **Table 3-3** shows that with the Part 150 Study recommendations, the population affected by 60 DNL would decrease by about 2% and decrease 3% within the 65 DNL and greater noise exposure contours. As required by FAR Part 150, the noise exposure contours focus on existing (2000) conditions and conditions five years into the future (2006). Based on the Part 150 future analysis, it would be expected that future conditions would also experience a similar reduction with implementation of the Master Plan and Part 150 recommendations. Those recommendations (if approved and implemented), when combined with the Master Plan would result in greater noise reductions than would occur in the future without the recommendations.

As is also noted in Section 3.2, the Port of Seattle has completed a Master Plan Update for Sea-Tac Airport that anticipates completion of a new runway and expansion of the terminal and landside complex during the next decade. As was shown during the KCIA Part 150, the noise from Sea-Tac and KCIA combine to result in greater noise exposure in the vicinity of KCIA than is shown when considering operations from KCIA alone. During the Part 150 Study for KCIA, the noise exposure contours considered the cumulative impact of both airports and presented the combined condition. That evaluation considered noise from operations at Sea-Tac and KCIA in 1999. Reflected in conditions at KCIA was the implementation of the preferred Master Plan recommendations, as well as assumed for Sea-Tac was the implementation of the Master Plan Update recommendations. **Table 4.2-4** shows a comparison of the impacts of the combined airports noise exposure:

As the table shows, the combination of aircraft noise exposure from both airports results in an increase in about 480 more people being exposed to 70 DNL and greater noise in year 1999 than from aircraft noise associated with KCIA alone. Within the 65 DNL & greater contours, about 1,680 more people are exposed to the combined noise than from KCIA alone. Similarly, in 2006, the combined contours would result in about 840 more people

16/ As is noted in Section 3.2, the Part 150 Study recommends conducting a site selection and feasibility study of a GRE at KCIA.

being affected by 65 DNL & greater noise than would occur with KCIA operations alone. Section 3.2 discusses the land use compatibility actions that KCIA staff recommends to address the additional noise exposure.

Because the "With Master Plan" project conditions would be compatible and consistent with county, city, and neighborhood plans and goals (discussed in detail in the following paragraphs) significant adverse indirect impacts to land use are not anticipated.

TABLE 4.2-4
KCIA AND SEA-TAC COMBINED NOISE EXPOSURE

	1999 KCIA Only		Combined Airports 1999 (SEA & KCIA)		2006 KCIA Only		2006 Combined SEA & KCIA	
Noise Contour	Pop.	Housing	Pop.	Housing	Pop.	Housing	Pop.	Housing
60-65 DNL	8,350	3,370	8,010	3,240	12,360	4,600	13,970	5,300
65-70 DNL	2,450	1,140	3,650	1,620	3,590	1,550	4,430	1,920
70-75 DNL	300	140	780	340	670	330	670	330
75 DNL	0	0	0	0	0	0	0	0
80+ DNL	0	0	0	0	0	0	0	0
65 DNL & Greater	2,750	1,280	4,430	1,960	4,260	1,880	5,100	2,250

Source: Barnard Dunkelberg using 1990 Census data. The above analysis reflects an evaluation performed during the Part 150 study, which was based on existing (1999) conditions and year 2006 conditions. It is anticipated that the relative comparisons (effect of combining Sea-Tac noise with noise from Boeing Field) would remain as depicted above.

(E) Local Comprehensive Plans and Land Use Compatibility

This section examines the compatibility of the "With Master Plan" alternatives with relevant local land use plans. The following plans are discussed: City of Tukwila Comprehensive Plan, City of Seattle Comprehensive Plan, and the recommendations from the Georgetown Neighborhood Plan.

1. City of Tukwila Comprehensive Plan

The southern portion of the study area lies within the City of Tukwila, and the majority of the study area within Tukwila is in the Tukwila Manufacturing/Industrial Center. The Tukwila Comprehensive Plan contains one goal and many policies encouraging support and development of manufacturing and industrial uses in the area.

Goal 11.1 encourages "support for industrial activities in the Manufacturing/Industrial Center and development of new industrial activity in order to maximize the employment and economic benefits to the people of Tukwila and the region, while minimizing the impacts on residential neighborhoods."

The Preferred Alternative condition would be compatible with the goal for supporting the Manufacturing/Industrial Center. The noise assessment conducted for this document indicates that the 2018 Preferred Alternative conditions would reduce noise levels for some portions of the small residential areas within the study area south of KCIA, but not change the total population affected by significant noise. The noise levels would not increase in any portion of the residential neighborhoods under the Preferred Alternative.

The Tukwila Comprehensive Plan also includes goals and policies intended to protect neighborhoods from undue noise impacts to ensure the continued use, enjoyment and value of their homes, public facilities and recreation, and the outdoors.

Policy 7.2.5 encourages the reduction of noise at KCIA by promoting the development of new or retrofitting/modifying existing aircraft engines that are quieter.

Because controlling aircraft noise is largely federally pre-empted, it is important to consider what the Federal government has done. In 1990, Congress enacted the Airport Noise and Capacity Act (ANCA) that required the phase-out of the noisier Stage 2 aircraft weighing more than 75,000 pounds by December 31, 1999. The International Civil Aviation Organization (ICAO) sets aircraft engine noise standards. In June 2001, ICAO adopted a new Chapter 4 (known in the U.S. as Stage 4) noise standard, more stringent than that contained in Chapter 3/Stage 3. Commencing 1 January 2006, the new standard will apply to newly certificated aircraft.

Both the 2018 "Without the Master Plan" and "With Master Plan" alternatives exhibit a reduction in noise levels over existing (2003) conditions despite future activity levels being greater than existing. This reduction in noise is because noisier Stage 3 aircraft (or Stage 2 aircraft weighting less than 75,000 lbs) would be retired from the fleet and replaced with newer, quieter aircraft. The Part 150 Noise Compatibility Planning Study for KCIA recommends additional noise reduction actions. Section 3.2 "Future Planned Development" contains a brief discussion of those actions. Included in that study is a recommendation that a Part 161 Noise and Access Restriction be pursued in an attempt to remove the Stage 2 aircraft weighing less than 12,500 lbs from the aircraft mix at the Airport.

Policy 7.2.6 provides that the City will work with KCIA and the FAA to promote development and implementation of airport operational procedures that will decrease adverse noise effects of airport operations on residents of Tukwila.

Again, both the "Without the Master Plan" and "With Master Plan" alternatives exhibit a reduction in noise levels over existing conditions because noisier Stage 3 aircraft would be retired from the fleet and replaced with newer, quieter aircraft. The Preferred Alternative (With Special Use Area Procedures and Runway Shift) would reduce noise at the south end of the Airport in Tukwila as shown in **Exhibit 4.1-3**. In addition, actions identified by the Part 150 Study, discussed on page 3-13 are expected to result in additional reductions in Tukwila.

Policy 13.6.4 states that the City of Tukwila will participate with King County and the Port of Seattle in updating their airport master plans to ensure that airport operations and development: (1) enhances Tukwila goals and policies, (2) incorporates Tukwila land use plans and regulations, and (3) minimizes adverse impacts to Tukwila residents.

King County formed a group called the Airport Roundtable in September 1997 to advise the County on airport issues, including those associated with the Master Plan and noise impacts. The Airport Roundtable included members from the City of Tukwila. The Preferred Alternative does not create significant adverse noise impacts off airport property. KCIA helps facilitate manufacturing and industrial growth in the area by providing air transportation facilities for the movement of goods. The Preferred Alternative also reduces noise levels in parts of the residential area in the south portion of the study area.

2. City of Seattle Comprehensive Plan

The principal purpose of the City of Seattle's Comprehensive Plan is to provide policies that guide the development of the City in the context of regional growth management. The north half of the study area lies within the City of Seattle and the majority of that area is within the Duwamish Manufacturing/Industrial Center.

Goal G21 of the Comprehensive Plan establishes the goal of the Manufacturing/Industrial Center. The emphasis of this goal is to ensure adequate accessible industrial land is available to promote a diversified employment base and sustain Seattle's contribution to high-wage job growth. Policies in the Comprehensive Plan promote manufacturing and industrial employment growth and strive to expand existing manufacturing and industrial activity. Policy L27 also limits commercial or residential uses in the Manufacturing/Industrial Center that: (1) are unrelated to industrial functions, (2) occur at intensities posing short- or long-term conflicts for industrial uses, or (3) threaten to convert significant amounts of industrial land to non-industrial uses.

The "With Master Plan" alternatives would provide opportunities for airport-related activities to continue on KCIA property. These alternatives would not affect industrial or manufacturing activities outside of KCIA boundaries.

The Comprehensive Plan also contains goals related to Neighborhood Anchors. As described in Chapter 3, the area around the intersection of 13th Avenue S. and S. Albro Place has been designated as a Neighborhood Anchor. The goal of Neighborhood Anchors (G29) is that these areas will provide a service and transit focus for the surrounding neighborhood in areas where overall existing conditions are intended to be maintained. The "With Master Plan" alternatives would not affect the Georgetown Neighborhood Anchor and the area would retain its existing character.

3. Georgetown Neighborhood Plan Recommendations

Through the neighborhood planning process identified in the City of Seattle's Comprehensive Plan, the Georgetown neighborhood has drafted a neighborhood plan with eight general goals (which are referred to as "Cornerstones") and numerous recommendations, specific and nonspecific, for actions within the neighborhood. The Georgetown Plan encompasses 618 acres of the southern portion of the Duwamish Manufacturing/Industrial Center. The land use activity within the Neighborhood is 89% industrial, 4% commercial, and 7% residential. The final Georgetown Neighborhood Plan was published in June 1999, and the Seattle City Council accepted the Plan on February 7, 2000.

Goal 1 relates to encouraging/enhancing a "Seattle Design District". Generally, this goal's purpose is to promote economic vibrancy in the design and gift related trades. This includes encouraging retail, design, and light manufacturing and emphasizing art and craftsmanship.

None of the alternatives in this environmental document would result in the loss or change of use in the areas designated "Seattle Design District". Nor would the proposed alternatives affect policies that would encourage design district activities.

Goal 2 relates to a Neighborhood Anchor designation for Georgetown. The Neighborhood Anchor designation recognizes, preserves, enhances, and validates Georgetown as an important historical neighborhood in Seattle. The goal of the designation is to retain residentially zoned lands, promote the adaptive use of historic structures linking historic preservation with economic revitalization, and to create recreational opportunities. The language of the goal specifically encourages recognition of Georgetown's past by preserving, protecting, and promoting its historic character. Historically significant structures in the Georgetown area such as the old Georgetown City Hall and the 1906 Georgetown Steam Plant still stand.

Because the Master Plan recommendations associated with non-RSA related facilities are within KCIA property boundaries, the proposed Airport Master Plan would not affect the Neighborhood Anchor designation; no changes in land use outside airport property are proposed by the Master Plan. However, the Master Plan recommendations associated with the runway safety area could affect historic sites. The "Full Use of the Shifted Runway" (RSA Alternative A-2) would have a significant impact on the Georgetown Steam Plant. Noise at the Steam Plan with this alternative would increase by 6.5 DNL over the Without Master Plan (RSA Alternative A-5). The "With Shift and Special Use Area Procedures" alternative (RSA Alternative A-3 the Preferred Alternative) would not have a significant noise impact on historic sites; however, King County proposes to provide a window mitigation program to the Steam Plant to ensure that the glass windowpanes would not break loose, fall and shatter; based on the specialized vibration study conducted for all of the with runway shift alternatives, such potential exists using conservative evaluation criteria, as noted in the appendix. Section 4.8 "Historic, Cultural and Archaeological Resources" discusses this mitigation program. With mitigation, the Preferred Alternative would aid in preserving the historic resources of the Georgetown area.

Goals 4 and 6 relate to the Duwamish Manufacturing/Industrial Center policies. While the Georgetown Neighborhood Plan defers the larger policy decisions to the larger Duwamish Manufacturing/Industrial Center planning efforts, the Neighborhood Plan does suggest consideration of a few specific policies. The Georgetown Neighborhood Plan recommends a policy of no net loss of industrial zoning, recommends enforcing policies relating to limiting commercial or residential activities in industrial/manufacturing areas, and supports investment in necessary infrastructure to continue economic vitality. However, many of the community members were concerned that emphasizing industry and economic development would have an adverse impact on the quality of life for neighborhood residents. Specifically, the Plan reports that many respondents oppose the "800-foot extension to the Airport runway."

None of the alternatives would result in the loss of industrial area, and none would affect enforcement of policies limiting activities in industrial/manufacturing areas. In addition, though the runway would be shifted to the north 880 feet in RSA Alternatives A-2 and A-3, the runway would not be longer than it is currently, relative to operational performance.

Goal 7 contains recommendations for dealing with transportation facilities in the Georgetown Neighborhood. Transportation access to Perimeter Road South and the connection to Airport Way were specifically discussed in connection with KCIA. Recommendations included improving transportation access to Airport Way South and Perimeter Road South, participating in funding and evaluating noise and air quality studies conducted by KCIA, working with KCIA to address noise and air quality issues, and participating in KCIA's future planning efforts.

As noted earlier, King County has recently completed the Part 150 Noise Compatibility Planning Study to address noise issues at the Airport, and an air quality assessment would be undertaken to address air quality issues. King County formed a group called the Airport Roundtable in September 1997 to advise the County on airport issues, including those associated with the Master Plan and noise impacts. The Airport Roundtable included representation from the Georgetown neighborhood.

(F) Mitigation

No mitigation is required at this time, as no significant impacts are anticipated.

4.3 SOCIAL IMPACTS

The principal social impacts that KCIA creates relate to impacts on quality of living. During scoping, residents reported concerns with aircraft noise, air pollution, and quality of living. These issues are also addressed in **Section 4.1** "Aircraft Noise", **Section 4.2** "Land Use Compatibility", **Section 4.5** "Air Quality" and **Section 4.7** "Human Health and Safety".

Specific issues addressed in this section are:

- Environmental justice and
- Surface traffic conditions.

As no acquisition is necessary to implement the Master Plan recommendations or its alternatives, no displacement related impacts are anticipated.

(A) Methodology

Environmental Justice - The purpose of the environmental justice evaluation is to identify whether high and adverse human health or environmental effects from implementing the Master Plan are likely to fall disproportionately on minority or low-income populations. The methodology used in this analysis complies with Executive Order 12898 – Environmental Justice and the U.S. Department of Transportation (DOT) Order on Environmental Justice.[17/] The DOT order provides that a "disproportionately high and adverse effect on minority and low-income populations" means an adverse effect that:

"(1) is predominantly borne by a minority population and/or a low-income population; or

17/ *Environmental Justice Guidance under the National Environmental Policy Act*, Council on Environmental Quality. December 10, 1997. U.S. Department of Transportation Order on Environmental Justice. From Federal Register, April 15, 1997 (Volume 62, Number 72), pages 18377-18381.

(2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or low-income population."

The Order further provides that "disproportionate impacts on low-income and minority populations are to be avoided, if practicable, that is, unless avoiding such disproportionate impacts on would result in significant adverse impacts on other important social, economic, or environmental resources."

The evaluation of environmental justice issues focuses on the populations that are located within the area potentially affected by the Master Plan alternatives. The geographic boundary of the study area is based on the aircraft noise exposure contours presented in **Section 4.1** "Noise". The 65 DNL noise contour was used to define the study area for the affected population, as noise impacts typically have the potential to be significant and adverse. In accordance with the DOT Order, the assessment then identifies where minority and low-income populations reside and examines the probability of significant impacts relative to these populations.

Minority status. The definitions provided in the DOT Order state that minority "means a person who is:

(1) Black (having origins in any of the black racial groups of Africa),
(2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race),
(3) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or
(4) American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition)".

Minority populations are defined by DOT as "any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed DOT program, policy or activity". Low-income populations are defined in a similar manner.

However, neither the Executive Order on Environmental Justice nor the DOT Order provide specific methods for establishing minority and/or low-income populations (i.e. what percentage should be used to designate such a population.) The President's Council on Environmental Quality (CEQ) provides the following guidance: "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."

Low-Income Status. CEQ provides the following guidance on low-income populations: "low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty."

Establishing a Reference Population. Using CEQs guidance for minority and low-income populations, a reference population for the KCIA area was established against which populations possibly affected by a Master Plan alternative could be compared. For this purpose, CEQ guidelines state: "the selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population".

King County considered a number of alternatives for defining a reference population, and established the following limits as an appropriate boundary for the reference area – the area within the City of Seattle limits, plus an area to the south and southwest of the Airport, within 1-1/2 miles of the limits of existing the 65 DNL contour. Using the population of this area as the reference population would account for the population characteristics of:

(1) Those who would be impacted by the project

(2) Those who would not be impacted, but potentially could have been impacted by the project

(3) Those who would be benefited by the project

Effect Determination. The numbers of minority and low-income persons within the reference population and affected study area were calculated for all Census Block Groups[18/] within the 65 DNL noise exposure from King County International Airport. Census data is generally regarded as the most comprehensive source of information on population demographics, and is the most common source of data for environmental justice evaluations in this region.

For purposes of this study, it is necessary to identify the census block groups that meet the minority or low-income criteria. A minority or low-income area was defined as that which was one standard deviation or more above the mean (average) of the reference population.[19/] Based on data for Census Tracts/block groups within the geographic area of the reference population, the average percentage of the population that is minority or low income is 24% or 12% respectively. One standard deviation from the mean would consist of 45% of its population being a minority or 25% being of low-income. Census block groups meeting the criteria were then highlighted.

Once the potential minority and low-income communities were identified, then the effects of the proposed Master Plan and its alternatives were considered. For potentially significant impacts that could be considered adverse effects under the DOT order, a determination was made whether minority or low-income populations were disproportionately affected by implementation of the alternatives.

In addition to the analysis of minority and low-income communities, specific outreach efforts were made to involve the community in the decision-making process for the Master Plan. King County has implemented a public involvement program as part of the development of the KCIA Master Plan, as described in **Appendix A**. Through this public involvement effort, the community surrounding the project area has had many opportunities to become familiar

18/ Census data is aggregated through a geographic hierarchy. Census Blocks are the smallest geographic unit for which Census data is tabulated. Block Groups are a collection of Census Blocks within a Census Tract. Census Tracts are small statistical subdivisions of counties, averaging about 4,000 persons.

19/ One standard deviation typically represents "expected" variation – not necessarily a value that would constitute "meaningfully greater than the mean". Using two standard deviations is more commonly used to indicate statistical significance, and therefore would be a better representation of "meaningfully greater than the mean", however, in this case it was thought that one standard deviation would be a more conservative application.

with the planning process for the Airport, and has provided feedback during the scoping process for the EIS.

Surface Transportation - The current Comprehensive Plans for Seattle and Tukwila were reviewed to determine existing and forecast traffic conditions for the KCIA area. Projected traffic increases were then compared to area traffic counts to determine if there would be capacity to accommodate the increases.

(B) Existing Conditions

The following sections describe the existing conditions relative to environmental justice and surface traffic conditions:

1. Environmental Justice

Since the first Euro-American settlers arrived in the Duwamish River Valley in 1850, the residential areas and populations in the area have changed dramatically. Initially an agricultural community, the re-channelization of the Duwamish River in 1914 was the beginning of the change to an industrialization of the area. When Boeing Field opened in 1928, and in the years following WWII, many Boeing workers lived in the adjacent neighborhoods, and the community thrived on the economic opportunities of the post-war era. In the late 1950's the City of Seattle Comprehensive Plan eliminated all residential zones and replaced them with industrial zones.

Today, the neighborhoods surrounding the Airport have a small residential component. Some of the Census units that were evaluated show no persons living within their limits. The City of Seattle's Duwamish Manufacturing and Industrial Center Neighborhood Plan (April 1999) estimates that approximately 81% of the land area is in industrial use, with the remaining 19% in commercial, institutional, residential and undeveloped lands.[20/]

TABLE 4.3-1
MINORITY AND LOW-INCOME POPULATIONS IN STUDY AREA

Census Unit	Total Persons	% Minority Population	% Low-Income Population
Tract 93 (Block group 3)	97	**64**	13
Tract 104 (Block group 4)	375	**80**	4
Tract 109 (Block groups 1 & 2)	655	38	18
Tract 110 (Block group 3)	341	**89**	4
Tract 117 (Block groups 2, 3, & 4)	1,386	**83**	10
Track 119 (Block group 4)	297	**80**	8
Tract 261 (Block groups 4 & 5)	99	**61**	6
Tract 263 (Block groups 1 & 2)	822	44	6
Tract 264 (Block group 1)	5	**56**	1
Tract 272	28	38	19
	Average	63.3	8.9

Note: Minority population threshold – 45%; low-income population threshold – 25%. Census Tracts/Block groups that meet the study reference area Minority or Low-Income designations are shown in ***Bold.***
Source: 2000 Census Data, Anchor Environmental, LLC

20/ City of Seattle Department of Neighborhoods. Greater Duwamish Manufacturing and Industrial Center Plan. April 27, 1999.

Exhibit 4.3-1 shows the location of the census tracts and blocks for the affected study area and visually contrasts the population and income data with the reference population data. **Table 4.3-1** lists the percentage minority population and percentage low-income.[21/]

As noted above, some sections of the affected study area within seven (7) census tracts can be described as minority population areas: Census Tracts 93, 104, 110, 117, 119, 261, and 264 can be described as minority population areas. None of the census areas are above the low-income population threshold, although tract 109 is close to approaching this threshold (census indicated 18% of the population in that tract is low-income, whereas the threshold for this evaluation was 25%). As a collective group, the average population in the study area exceeds the threshold for minority populations, but is within the threshold for low-income populations.

2. Surface Transportation

Airport Way South, East Marginal Way South, and South Boeing Access Road are the primary access points to KCIA. Perimeter Road provides automobile access to and from all facilities on the eastside of the Airport. Perimeter Road is connected to Airport Way South through four separate entrances: north, main, Portland Street, and south. In addition to businesses having direct access onto Ellis Avenue South, the northwest portion of airport property is provided access via South Warsaw Street, South Myrtle Street and South Willis Street. On the west side of the Airport, individual Airport tenants are accessed directly off of East Marginal Way South.

The majority of the public/semi-public parking on the Airport is located in the vicinity of the Terminal Building. The largest lot is located on the east side of the Terminal Building and has 195 automobile parking spaces. There are numerous other lots in the vicinity of the 7300 building, between Perimeter Road and Airport Way South associated with individual leased tracts.

The City of Seattle's Comprehensive Plan[22/] included a traffic analysis that summed volumes for all arterials crossing a particular screenline. This methodology judges the performance of an arterial system, rather than a single intersection or arterial.

The South City Limit screenline (which includes KCIA) was assigned a level of service rating of 1.00. The 2010 volume-to-capacity ratio (v/c), with implementation of the Comprehensive Plan, was estimated at 0.24 for northbound traffic and 0.54 for southbound traffic. This forecast v/c ratio is well below the level of service (LOS) standard established for the screenline.

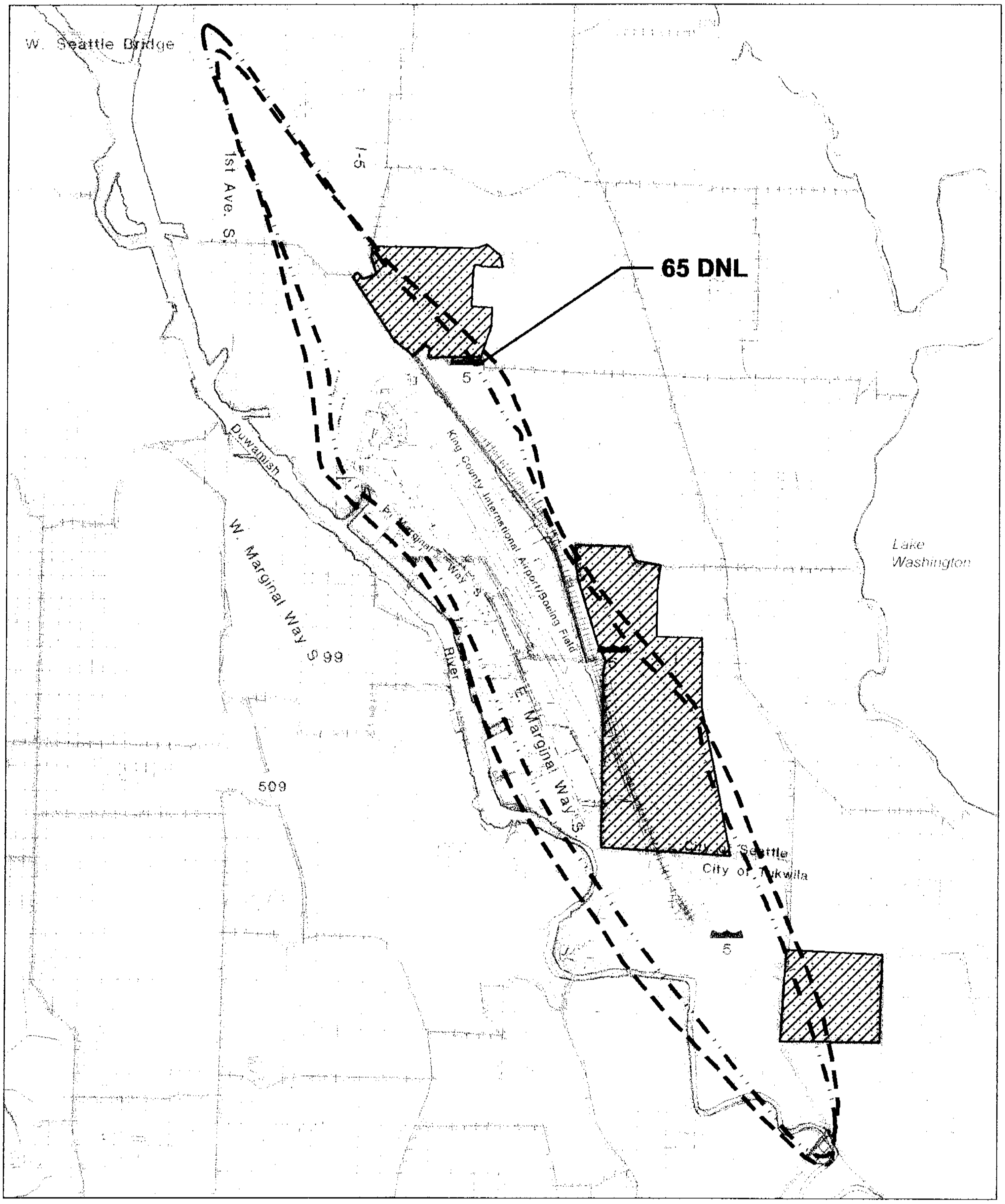
The City of Tukwila Comprehensive Plan[23/] and associated Environmental Impact Statement[24/] assessed traffic conditions with the Manufacturing/Industrial Center (MIC). The MIC includes the area along the Duwamish River, between the boundary with Seattle and South 125th Street, including KCIA. The highest traffic

21/ U.S. Census Bureau, 1990 Census Data, Summary Tape File 3 (SFT3), Minority and Poverty Population statistics. http://homer.ssd.census.gov/cdrom/lookup/

22/ City of Seattle. 1995. *Seattle's Comprehensive Plan, A Plan for Managing Growth 1994-2014.* Prepared by City of Seattle.

23/ City of Tukwila. 1995a. *City of Tukwila Comprehensive Land Use Plan.* Prepared by the City of Tukwila.

24/ City of Tukwila. 1995b. *Tukwila Comprehensive Plan Environmental Impact Statement.*



Jan 16, 2004 12:36pm cdavidson K:\Jobs\040031\BOEING_FIELD\04003101\04003101-09.dwg Exhibit 4.3-1

Source:
Bridgenet Consulting Services, 2003

Existing 65 DNL

2018 65 DNL Full Use of Shifted Runway

Areas Exceeding 45% Minority

Areas Exceeding 25% Low Income (none)

0 4000
Scale in Feet

ANCHOR ENVIRONMENTAL, L.L.C.

Exhibit 4.3-1
Environmental Justice Populations

volumes in the MIC are on South Boeing Access Road and East Marginal Way South, just north of South Boeing Access Road. The City approved a LOS E as the standard for these street systems. LOS E is defined as conditions where drivers travel at about 30% or less of posted speed, traffic volumes are approaching road capacity during peak hours, and drivers experience significant delays.[25] Tukwila proposed several street and intersection improvements for East Marginal Way South and South Boeing Access Road to maintain the LOS E to 2010.

In addition to these improvements, Boeing – as the major employer and thus source of traffic in the area – prepared a Transportation Management Plan for its North Duwamish Campus. The objective of the plan is to reduce single occupant vehicles generated by Boeing during the p.m. peak traffic period (3:00 to 5:00 p.m.) by 5%.

The combination of the street improvements, implementation of the Transportation Management Plan, and the relatively low LOS standards for the area indicate that there is capacity in the MIC to accommodate additional increases in traffic. The MIC Land Use Element states that "there is additional capacity in the MIC to accommodate an estimated 15,000 more employees above Boeing's projected 25,000".[26]

(C) Future Conditions

Future conditions with and without the proposed Master Plan recommendations were evaluated relative to conditions in year 2018.

1. Environmental Justice

As stated earlier, the environmental justice analysis serves to identify disproportionately high and adverse impacts on minority and low-income populations, meaning an "adverse effect that: (1) is predominately borne by a minority population and/or a low-income population, or (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population" (from the DOT order).

a) Without Master Plan Recommendations (No Action RSA Alternative A-5)

In examining environmental justice, consideration was given to changes in each of the environmental impact categories discussed in Chapter 4 of this report. Key issues of noise, air pollution, surface traffic, and water quality were identified during scoping and thus served as a key focus of this evaluation.

A minority population has been identified in the area affected by the Master Plan improvements, as defined by the 65 DNL noise exposure contour. However, there is no probability of significant impacts relative to this population that would occur as a result of implementing the Without Master Plan Alternative. As is shown in **Table 4.2-2**, the total population affected by significant aircraft noise exposure (65 DNL and greater noise levels) would decrease nearly 23% in the future in comparison to

[25] Transportation Research Board. 1994. *Highway Capacity Manual, Special Report 209*. December 1994.

[26] City of Tukwila. 1994. *Tukwila Tomorrow Phase II Draft Land Use Element Manufacturing/Industrial Center*. Prepared by the City of Tukwila.

existing noise exposure regardless of whether or not the Master Plan improvements are undertaken.

While total Airport activity is expected to increase in the future regardless of whether or not the Master Plan recommendations are implemented, environmental impacts are not expected to increase substantially. As is shown in Section 4.5 "Air Quality" total Airport-related emissions are expected to increase in the future with the increased level of activity. However, no exceedances of the National Ambient Air Quality Standards are expected with or without project.

This alternative is not expected to alter water quality or surface traffic condition.

As a result, this alternative would not result in disproportionate adverse impacts to minority or low-income populations.

b) *With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)*

Similar to the preceding alternative, in examining environmental justice, consideration was given to changes in each of the environmental impact categories discussed in Chapter 4 of this report. Key issues of noise, air pollution, surface traffic and water quality were identified during scoping and thus served as a key focus of this evaluation.

As is discussed in Section 4.1, "Noise", noise exposure associated with this alternative is expected to slightly increase over the Without Master Plan. A significant increase in aircraft noise exposure was identified to the Georgetown Steam Plant and to the undeveloped right-of-way between I-5 and Airport Way with full use of the shifted runway. However, no significant impacts relative to minority or low-income populations would occur as a result of implementing the Runway Safety Area Correction with Full Use of Runway Shift Alternative (RSA Alternative A-2).

Air emissions would be slightly greater with the full use alternative in comparison to the Without Master Plan, but no exceedances of the National Ambient Air Quality Standards are expected.

This alternative is not expected to alter water quality or surface traffic condition.

c) *Preferred Alternative – Procedures for Use of Special Use Area (RSA Alternative A-3)*

A minority population has been identified in the area affected by the Master Plan improvements, as defined by the 65 DNL noise exposure contour. However, there is no probability of significant impacts relative to this population that would occur as a result of implementing the Special Use Area Procedures with the Runway Shift (RSA Alternative A-3). This conclusion is based upon the finding that the noise exposed population is not expected to change with this alternative relative to the No Action Alternative (Section 4.2 "Land Use Compatibility"). As was noted in Section 4.1 "Noise" and 4.2 "Land Use Compatibility", the proposed project is not expected to result in a significant adverse noise effect on residential uses. Therefore, no minority (or low-income groups) would be disproportionately adversely affected under this alternative, the preferred Master Plan Recommendations. Future noise projections with this alternative would reduce the area affected by high noise levels, further reducing the population base that is affected.

This alternative is not expected to alter water quality or surface traffic condition.

It is concluded that the Preferred Master Plan Alternative meets the intent of Executive Order 12898, as the project would not produce significant adverse impacts to minority or low-income populations.

d) Other Facilities

The proposed terminal and landside facilities would not require the acquisition of property, nor would they substantially change the off-airport impacts. Therefore, no environmental justice related issues are expected.

2. Surface Transportation

The following paragraphs describe the impact of the "Without Master Plan" and "With Master Plan" on surface transportation in the Airport area.

Without the Master Plan Recommendations (No Action)

The Without Master Plan alternative would not affect surface transportation. Conditions would be expected to be as predicted by the City of Seattle and City of Tukwila.

With Master Plan Recommendations (All alternatives)

The runway shift to address the runway safety areas would not affect surface transportation. However, other terminal or landside elements of the Master Plan recommendations could affect traffic movement patterns along segments of Airport Way or East Marginal Way. Implementation of the proposed Master Plan would not increase surface transportation generated by the Airport. The Master Plan is primarily a reconfiguration of existing land uses at the Airport. Those land uses, and the traffic they generate would continue, however, they would be in different locations within the Airport boundary.

The Master Plan forecasts an increase in passenger activity at KCIA relative to existing levels, particularly due to passenger and air taxi operations. It is important to note that although an increase in passenger demand is forecast, there is no proposal currently under consideration by King County that would bring significantly increased scheduled passenger service to the Airport. Therefore, it is not possible to definitively evaluate the anticipated surface traffic impacts. However, based on the passenger traffic forecast of 89,000 annual passengers, this would translate to about 90,000 additional vehicle trips on the local roads. The increase in annual traffic would translate to about 265 additional vehicles on the roads per day, or about 15-20 additional vehicles per hour. This increase in vehicles would not have a notable effect on traffic conditions. **Table 4.3-2** lists traffic counts at selected intersections near the Airport.

TABLE 4.3-2.
TRAFFIC COUNTS AT SELECTED INTERSECTIONS IN STUDY AREA (VEHICLES)

Intersection	Flow[a]	AM Peak[b]	PM Peak[c]	AWDT[d]	ADT[e]
S. Norfolk St/ Airport Way S	EB	85	499	1,848	1,494
Military Road S/ Airport Way S[f]	NB	27	96	578	496
S. Othello St/ Airport Way S[f]	EB	104	122	1,492	1,189
13th Ave S/ Airport Way S	NB	235	267	3,270	2,714
Ellis Ave S/ S Myrtle St	NB	555	587	6,529	5,841
E Marginal Way/ 14th Ave S	NWB	2,131	1,405	19,841	16,400

Source: City of Seattle Transportation Department. 1999·
a: EB = east bound, NB = north bound; NWB = northwest bound
b: AM Peak - morning hour in which the maximum traffic is experienced
c: PM Peak – afternoon hour in which the maximum traffic is experienced
d: Average Weekday Traffic
e: Average Daily Traffic
f: Primary passenger access points to KCIA

(D) Cumulative Impacts

No cumulative impacts are identified that have the potential to impact the minority population group that has been identified in the study area. The implementation of the Part 150 Noise Compatibility Study recommendations would lessen the existing noise exposure on already affected minority and low-income communities, as discussed in Section 3.2.

As noted, aircraft noise exposure from Sea-Tac Airport combines with noise at KCIA to result in a cumulatively larger noise exposure contour. However, as is also described earlier, the combination of the Part 150 Study recommendations with the Master Plan would result in a reduction in aircraft noise exposure and, therefore, any effects on minority or low income populations would also be reduced.

(E) Mitigation

As no significant adverse impacts have been identified, no mitigation measures are proposed.

4.4 INDUCED SOCIO-ECONOMIC IMPACT

As the following section shows, King County Airport currently has a significant positive economic impact on the Puget Sound Region, as evidenced by the jobs, payroll and expenditures in the local community. As activity at the Airport grows in the future, regardless of the implementation of the Master Plan recommendations, the economic impact of the Airport is expected to increase. The runway shift is not expected to have a significant adverse effect on the economic conditions, but would result in a slight temporary increase in employment due to construction.

(A) Methodology

In 2000, King County prepared a detailed economic impact study regarding activity at King

County International Airport. These effects are documented in the report titled *King County International Airport Economic Impact Study*, prepared by William B. Beyers of the University of Washington in February 2000.

Throughout the evaluation, the following terms are used:

- *Direct Impacts* are the immediate economic consequences of airport firms employing local labor, purchasing locally-produced goods and services, contracting for airport facility construction and maintenance, and other value added (including taxes paid, rental income, corporate profits, etc). These include airlines, fixed base operators and aviation-related goods and services.
- *Indirect Impacts* are those effects from off-airport business that serve airport users and tenants. These impacts are limited to the direct exchange between the on- and off-airport businesses and frequently include services provided by restaurants, hotels, travel agents, retail establishments and freight forwarders.
- *Induced Impacts* are the result of the successive rounds of spending from direct and indirect expenditures

The evaluation of direct effects was performed based on a survey commissioned by King County of tenants at the Airport in 1997. The survey requested information concerning number of jobs, and payroll, expenditures locally, and other value added. In addition, tenants were requested to provide employment and expenditures related to construction and maintenance. The indirect impacts were then derived based on the industry accepted input-output model representing King County's economic structure. Multipliers are highest in the industries that are most self-sufficient within the region; industries that require fewer imports as inputs for each dollar of output have the highest multipliers and so have the greatest impact per dollar.

Future economic impacts (jobs and expenditures) were estimated to be in proportion to the change in activity levels at the Airport.

(B) Existing Conditions

Based on the 2000 report, activity as a result of KCIA contributed nearly $1.8 billion dollars to the economy of the Puget Sound Region. About 4,078 jobs exist at the Airport, including jobs in the aerospace industry, as well as 1,228 indirect and induced jobs, totaling 5,526 jobs. **Table 4.4-1** lists the economic impact.

TABLE 4.4-1

EXISTING ECONOMIC IMPACT OF KING COUNTY INTERNATIONAL AIRPORT (1998 dollars)

	Manufacturing	Non-Manufacturing	Total
Employment (jobs)	2,744	2,782	5,526
Labor Income	$141,479,000	$220,611,000	$362,090,000
Output	$833,710,000	$598,163,000	$1,431,864,000
Total	$975,189,000	$818,774,000	$1,793,954,000

Source: *King County International Airport, Economic Impact Study*, William Beyers, University of Washington; February, 2000.

(C) Future Conditions

Based on existing conditions, future impacts both with and without the Master Plan alternatives were estimated.

TABLE 4.4-2
ECONOMIC IMPACT WITH AND WITHOUT THE MASTER PLAN

Economic Impact	(RSA A-5) 2015 Without Master Plan	2015 With Master Plan— RSA Compliance Alternatives	2015 With Master Plan – Cumulative Impacts
Employment	6,794	6,794	7,151
Labor Income	$445,161,741	$445,161,741	$468,591,306
Output	$1,760,366,405	$1,760,366,405	$1,853,017,267
Total	$2,205,528,145	$2,205,528,145	$2,321,608,574

Note: RSA Compliance Alternatives includes the Full Use of the Shifted Runway and the Special Area Use Procedures (Alternatives A-2 and A-3)

A comparison of **Table 4.4-1** and **Table 4.4-2** shows that the economic impact of the Airport is expected to increase regardless of the implementation of the Master Plan projects. This increase in economic impact is expected as a result of the forecast growth in aviation activity at the Airport. With or without the Master Plan projects, the economic impacts from KCIA are anticipated to grow as activity grows. It is not possible to precisely estimate the number of full-time jobs or economic impact from specific facilities that have not been identified. However, it is expected that there would be a short-term increase in construction opportunities as the facilities are built. It is likely that increased space allocation may result in increased employment and expenditures. For purposes of discussion, it was presumed that the inefficiencies would result in about a 14% reduction in economic output and payroll.

(D) Cumulative Impacts

The proposed Master Plan projects in combination with the Museum of Flight expansion projects would be likely to bring additional economic development to the Airport area, further enhancing economic conditions. Cumulative impacts from the Airport and regional projects are not expected to be adverse. Similarly, implementation of the Part 150 Noise Compatibility Planning recommendations would also result in construction related socio-economic impacts.

(E) Mitigation

As no significant adverse impacts were identified, no mitigation is required.

4.5 AIR QUALITY

The following sections discuss the air quality implications of the proposed Master Plan improvements in terms of air emissions, including a general conformity evaluation, per the requirements of the Clean Air Act.

(A) Background

The U.S. Environmental Protection Agency (USEPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of air contaminants. The National, State, and local Ambient Air Quality Standards (AAQS) consist of a primary and secondary standard for each pollutant as presented in **Table 4.5-1**. Air quality standards are the levels established to protect the public health from harm within a margin of safety. All areas of the country are required to demonstrate attainment with the AAQS.

The Washington State Department of Ecology (Ecology) and the Puget Sound Air Pollution Control Agency (PSAPCA) have established State and local ambient air quality standards that are at least as stringent as the national standards. Local standards that are more stringent than the national standards for sulfur dioxide have been in effect since 1968.

The air quality standards focus on limiting the quantity of six criteria pollutants:

- Ozone (O_3)
- Carbon Monoxide (CO)
- Nitrogen Dioxides (NO_2)
- Particulate Matter (PM_{10})
- Sulfur Dioxide (SO_2)
- Lead (Pb)

Volatile Organic Compounds (VOCs) are not a criteria pollutant and therefore no ambient air standards have been established for this pollutant. Since VOCs, however, react with nitrogen oxides in sunlight to form ozone, VOCs, and nitrogen oxide emissions are included in this analysis. Because air monitoring in the Puget Sound Region has indicated compliance with the lead standard since 1980, lead was not examined in this study.

The Clean Air Act requires states with areas that exceed the AAQS to develop plans for each area that, when implemented, would reduce air pollutants and attain the standards. These attainment plans must be adopted by the state and submitted to the USEPA in the form of a State Implementation Plan (SIP). Compliance with the AAQS (i.e., establishing the area as attainment or non-attainment) is determined by long-term monitoring throughout the Region.

TABLE 4.5-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	National		State of Washington	Puget Sound Region
	Primary	Secondary		
Carbon Monoxide				
8 Hour Average	9 ppm	N/A	9 ppm	9 ppm
1 Hour Average	35 ppm	N/A	35 ppm	35 ppm
Particulate Matter (PM_{10})				
Annual Arithmetic Ave.[b]	50 μg/m³	50 μg/m³	50 μg/m³	50 μg/m³
24 Hour Average[c]	150 μg/m³	150 μg/m³	150 μg/m³	150 μg/m³
Particulate Matter (TSP)				
Annual Geometric Average	N/A	N/A	60 μg/m³	60 μg/m³
24 Hour Average	N/A	N/A	150 μg/m³	150 μg/m³
Ozone				
1 Hour Average[d]	0.12 ppm	0.12 ppm	0.12 ppm	0.12 ppm
Sulfur Dioxide				
Annual Average[e]	0.03 ppm	N/A	0.02 ppm	0.02 ppm
30 Day Average	N/A	N/A	N/A	0.04 ppm
24 Hour Average	0.14 ppm[a]	N/A	0.10 ppm[a]	0.10 ppm[e]
3 Hour Average	N/A	0.50 ppm	N/A	N/A
1 Hour Average[f]	N/A	N/A	0.25 ppm	0.25 ppm
1 Hour Average	N/A	N/A	0.40 ppm[a]	0.40 ppm[e]
Lead				
Calendar Quarter Average[e]	1.5 μg/m³	1.5 μg/m³	N/A	1.5 μg/m³
Nitrogen Dioxide				
Annual Average[e]	0.053 ppm	0.053 ppm	0.053 ppm	0.053 ppm

Notes:

ppm = parts per million

μg/m³ = micrograms per cubic meter

Annual, Quarter and 30 Day standards never to be exceeded; shorter-term standards not to be exceeded more than once per year unless noted.

N/A - Not Applicable

a. Not to be exceeded more than once a year.

b. Standard attained when the expected annual arithmetic mean concentrations is less than or equal to 50μg/m³.

c. Standard attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one.

d. Standard attained when expected number of days per calendar year with maximum hourly average concentration above 0.12 ppm is equal to or less than one.

e. Never to be exceeded.

f. Not to be exceeded more than twice in seven consecutive days.

The severity classifications for non-attainment areas are in increasing order of severity: marginal, moderate, serious, severe, and extreme. The Puget Sound Region was designated as a 'high-moderate' non-attainment area for carbon monoxide, and as a 'marginal' ozone non-attainment area until 1996, when an attainment with the standards was demonstrated and a maintenance plan developed to ensure that pollutant levels do not increase. The Duwamish corridor also was designated as a non-attainment area for PM_{10} but similarly has been re-designated as maintenance for this pollutant. No exceedances of the PM_{10} standard have occurred in the region since 1990.

As found by the State's emission inventory, motor vehicles (i.e., cars, trucks, buses, taxis, motorcycles) are the primary air pollutant generator in the Region. Motor vehicles contribute 75% of the total pollutant levels in King County, while non-road activity such as lawn and garden equipment, construction equipment and airport activity represent 20% of the pollutant emissions in the Region.

TABLE 4.5-2
PUGET SOUND REGION EMISSIONS (tons/day)

Carbon Monoxide (CO)

Sources	1998	2005	2007	2010
Point Source	69.55	69.55	69.55	69.55
Area Source	92.95	95.82	98.13	99.72
On-Road	1,401.97	1,157.56	1,155.44	1,140.97
Non-Road	773.0	610.70	582.3	572.5

Volatile Organic Compounds (VOC)

Sources	1998	2005	2007	2010
Point Source	20.24	20.24	20.24	20.24
Area Source	121.47	128.46	131.20	134.32
On-Road	191.42	165.31	164.00	159.83
Non-Road	143.80	133.10	131.10	131.60
Biogenic	291.25	291.25	291.25	291.25

Nitrogen Oxides (NOx)

Sources	1998	2005	2007	2010
Point Source	24.31	24.31	24.31	34.31
Area Source	18.41	17.62	17.75	17.85
On-Road	245.24	228.26	223.13	217.67
Non-Road	87.50	91.00	93.10	97.60

Source: *Central Puget Sound Region Redesignation Request and Maintenance Plan for the National Ambient Ozone Standard*, PSAPCA, November 1995; Figure 3, 4, and 5.

The SIP "inventories" pollutant levels by a variety of sources within the Region including airports. Once all the pollutant sources are inventoried, the SIP focuses on measures to reduce pollutant levels in order to meet pollutant reduction goals for the Region.

The Puget Sound Clean Air Agency has prepared emission inventories for all airports in King County, including KCIA for the years 1995 and 1996.[27/] Boeing Field aircraft emissions are a minor portion of overall air emissions. Relative to non-road emissions, the KCIA emissions are:

- Carbon Monoxide – aircraft are less than 0.1% of total area emissions.
- Nitrogen Oxides – aircraft are less than 0.3% of total area emissions.
- Volatile Organic Compounds - aircraft are less than 0.1% of total area emissions.

27/ The Puget Sound Clean Air Agency is currently working with the Department of Ecology to prepare an updated emissions inventory for the Puget Sound Carbon Monoxide and Ozone Maintenance Plans. However, the 1996 Maintenance Plan remains the current EPA approved SIP.

TABLE 4.5-3

SIP EMISSIONS INVENTORY – AIRCRAFT (tons per year)

	1995 Aircraft		1996 Aircraft	
Pollutant	**King County**	**KCIA**	**King County**	**KCIA**
Carbon Monoxide	10,485	266	8,090	212
Nitrogen Oxides	3,058	238	4,113	85
Particulate Matter (<10 microns)	631	43	779	18
Particulate Matter (<2.5 microns)	626	43	772	17
Sulfur Dioxide	145	10	119	3
Volatile Organic Compounds	824	45	1,954	134

Source: Puget Sound Clean Air Agency, August 1999.

The closest air quality monitoring station to the Airport is located at 4752 E. Marginal Way South. Another air quality monitoring station is located on Beacon Hill, to the northeast of the Airport. Pollutant level measurements at the E. Marginal Way site are higher than other monitoring stations in the Puget Sound Region, although the measurements indicate that pollutant levels are less than the National, State, and local ambient air quality standards. The Duwamish Valley is designated as maintenance at this time for particulates less than 10 microns in size. During the last ten years, no exceedances of the PM_{10} standard were measured in the Puget Sound Region. Annual average concentrations at residential sites were less than a fifth of the Federal standard. At industrial sites, these averages were only slightly higher" according to the Puget Sound Clean Air Agency (PSCAA). The highest 24-hour PM_{10} value recorded by PSCAA was 137 micrograms per cubic meter, which is below the 150 standard. During 1997, PSCAA conducted a study in the area for purposes of locating a PM2.5 monitor. Measurements indicated that there were no "hot spots" (exceedances of the PM2.5 standard).

(B) Methodology

For this environmental analysis, an aircraft pollutant inventory was prepared similar to the SIP inventory. The aircraft pollutant inventory summarizes the *total* quantity of each pollutant emitted by aircraft operating at the Airport. The aircraft emissions inventory was performed using the EPA approved Emissions and Dispersion Modeling System (EDMS) computer model version 4.12. The following present the existing inventory levels and future pollutant emissions for the Airport for the years 2003 and 2018. Because surface traffic conditions would be the same with or without implementation of the Master Plan recommendations, air emissions associated with that activity were not evaluated. Instead, the air quality evaluation focused on the air emissions associated with aircraft and service vehicles.

(C) Existing Conditions (2003)

Based on current activity levels and aircraft fleet mix, an emissions inventory was prepared as listed in **Table 4.5-4** to quantify the yearly emissions by aircraft and ground service equipment. Emissions of Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Nitrogen Oxides (NOx), Sulfur Oxides (SOx), and Particulate Matter (PM_{10}) were quantified.

The emissions inventory prepared for this study was then compared with the emissions inventory prepared for the SIP/maintenance plan. A substantial difference exists between the two data sources:

- The analysis prepared for this report occurred using the FAA's EDMS Version 4.12 model, the current EPA approved model. In contrast, the SIP was prepared using a different method, the FAAED model which is no longer supported by the FAA or EPA;
- Default ground support equipment (GSE) assumptions were used in EDMS;
- The EDMS was used for this analysis using default time-in-mode. A comparison to the time used in the SIP for many aircraft, indicates that this analysis used times as much as 18 to 36% higher than the SIP assumptions; and
- The SIP evaluated 168,691 landing and takeoff cycles (LTOs) for 1996 in comparison to the 2003 evaluation considering 149,231 LTOs (298,462 annual operations). The SIP evaluated emissions from these LTO cycles grouped into 9 different aircraft/engine categories, while the evaluation for this report considered 27 different aircraft/engine categories.

TABLE 4.5-4

CURRENT EMISSIONS FROM ACTIVITY AT KCIA (2003)
(Tons/Year)

Pollutant	Aircraft	Ground Equipment	Total
Carbon Monoxide	1,460	646	2,106
Volatile Organic Compounds	105	27	132
Nitrogen Oxides	128	39	167
Sulfur Oxides	11	4	15
Particulate Matter (PM10)	Unknown*	1	1

Source: Bridgenet Consulting Services, December 2003

*Note – the EDMS contains very little data concerning PM10 emissions, as little industry accepted data is available concerning particulate matter emissions from aircraft engines.

(D) Future Conditions

To evaluate the effect of the Master Plan recommendation and its alternatives on air quality, emissions inventories for the With Master Plan and Without Master Plan scenarios were prepared. **Table 4.5-5** lists the existing and future conditions.

TABLE 4.5-5

FUTURE EMISSIONS FROM ACTIVITY AT KING COUNTY INTERNATIONAL AIRPORT (Tons/Year)

Pollutant	Year 2018 RSA A-5 Without Master Plan	RSA A-2 With Full Use of Safety Area	RSA A-3 With Special Area Use Procedures
Carbon Monoxide	2,538	2,550	2,543
Volatile Organic Compounds	183	187	184
Nitrogen Oxides	205	206	205
Sulfur Oxides	18	19	18
Particulate Matter (PM10)	3	3	3

Source: Bridgenet Consulting Services, December 2003.

1. Without Master Plan (No Action including RSA A-5)

As is shown in **Table 4.5-5**, emissions of all pollutants are anticipated to increase regardless of whether or not the Master Plan recommendations are implemented. Without the Master Plan, CO emissions are expected to increase 21% (from 2,106 tons to 2,538 tons per year), VOC emissions are expected to increase 39% (from 132 tons to 183 tons per year), NOx emissions are expected to increase 23% (from 167 tons to 205 tons per year), SOx is expected to increase 36% (from 15 tons to 19 tons per year), and PM_{10} is expected to increase 200% (from 1 ton to 3 tons per year). The increase in emissions is expected due to the increase in aircraft operations of 24% expected between 2003 and 2018.

2. With Master Plan Recommendations

Emissions associated with the criteria pollutants are expected to increase in the future regardless of which alternative is pursued, primarily due to increased aircraft activity levels. The two runway safety area alternatives would affect air emissions in different ways. The following sections summarize these impacts as listed in **Table 4.5-5.**

a) *With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)*

With development of the shifted runway and full use by all users of the new departure threshold would increase the taxi time for all aircraft departing in a south flow by about 45 additional seconds. This increase in taxi-time would increase pollutant emissions, such that CO would increase by 12 tons per year (a 0.4% increase), VOC would increase by 4 tons per year (a 2.2% increase), NOx and SOx would increase by about 1 ton per year (a 0.4% increase), and PM10 would not change in comparison to the Without Master Plan. The change in runway threshold associated with the runway shift would not alter ground support equipment usage, and thus, the only change in air pollution would be associated with aircraft emissions.

In addition to operating emissions, the construction of the 880 feet of runway would produce construction-related emissions. Construction emissions are expected, which would produce 11 tons of CO, about 17 tons of NOx, about 2 tons of VOCs, and 20 tons of particulate matter and would be limited to the construction period of about 8 months to complete the runway shift and associated taxiway.

b) *Preferred Alternative – Procedures for Use of Special Use Area (RSA Alternative A-3)*

Emissions would increase slightly with the proposed special use area procedures in comparison to without the runway shift. The shift would result in a slight increase in aircraft taxi distance to and from the new threshold for those aircraft that would have prior permission. This increase in taxi distance is expected to result in a five (5) ton per year increase in CO, and a one (1) ton or less per year increase in other pollutants. In addition, construction related emissions would occur, representing 11 tons of CO, about 17 tons of NOx, about 2 tons of VOCs, and 20 tons of particulate matter.

c) *Other Facilities*

Until the time at which the specific building expansions are known, the emissions changes that might be associated with those projects cannot be quantified. However, those changes would be expected to be slight and it is likely that the primary emissions associated with undertaking terminal and landside improvements would be emissions associated with constructing these facilities. However, until specific development proposals are identified such construction emissions are not reasonably quantifiable.

(F) Cumulative Impacts

As is noted the proposed Master Plan projects are expected to result in a slight increase in air emissions relative to not undertaking the projects. These changes in combination with the changes anticipated as a result of other regional development projects could result in increased air emissions in the vicinity of the Airport. However, as both projects are shown to conform to the Washington State Implementation Plan, no significant adverse air pollution conditions are expected. Implementation of the KCIA Part 150 recommendations is not expected to materially alter the existing or future air emissions from the Airport. Further, implementation of the improvements at Sea-Tac Airport is not expected to alter the emissions associated with KCIA. While total vehicular travel in the Puget Sound Region is expected to continue to increase in the future, emissions associated with surface travel are generally decreasing due to technological improvements and regulatory requirements associated with surface travel vehicles.

(G) Mitigation

No mitigation is required, as the proposed Master Plan recommendations do not result in emissions that likely result in exceedances of the ambient air quality standards.

(H) General Conformity

Because King County is seeking approval for the Master Plan Runway Safety Area recommendations, this Federal approval must be preceded by a Clean Air Act general conformity evaluation. To identify potential air emissions from the Master Plan recommendations, an emissions inventory was prepared and contrasted with the de-minimis levels for a maintenance area for ozone, carbon monoxide, and particulate matter of 10 microns or less. This analysis shows that the emissions from the Master Plan recommendations are below the Clean Air Act defined de-minimis thresholds, and thus the planned improvements do not require a conformity determination.

TABLE 4.5-6
TOTAL PROJECT-RELATED IMPACTS
(tons per year emissions)

Year	CO	NOx	VOC	PM10
Year 2004 (construction – rwy shift)	11	17	2	20
Year 2010 (operation)*	5	1	<1	<1
Year 2018 (operation)	5	1	<1	<1
De-minimis (maintenance area)	**100**	**100**	**100**	**100**

Source: Bridgenet Consulting Services, December 2003. Sources reflect direct and indirect emissions from on and off-airport sources. * 2010 was evaluated as it is the current end of the horizon considered in the SIP/Maintenance Plan.

Appendix D contains the general conformity working paper.

4.6 WATER QUALITY

Changing the Airport's landscape, as would happen with the proposed Master Plan recommendations, could affect the discharge of water from the Airport area as well as the downstream systems. The addition of impervious surface would decrease the amount of rainfall infiltrating the soil and increase stormwater runoff flow rates and volumes.

Although the proposed Master Plan recommendations would not directly affect groundwater, because of interest expressed during the scoping period, a discussion of groundwater quality is also included. Pollutant loading would increase somewhat because of greater amounts of stormwater runoff associated with the "With Project" alternatives. Therefore, compliance with mitigation requirements would be expected to prevent significant pollution or degradation of surface and groundwater resources.

(A) Methodology

A literature review of reports related to KCIA's surface water runoff and KCIA's Stormwater Pollution Prevention Plan was conducted. The National Pollutant Discharge Elimination System (NPDES) permit, and Ecology's Hazardous Sites List (February 1999) and Confirmed and Suspected Contaminated Sites Report (May 1999) were also reviewed.

(B) Existing Conditions

The following subsections characterize the existing storm drainage system and quality of the receiving waters.

1. Existing Storm Drainage/Outfall System

King County International Airport property consists of about 600 acres. Of that, approximately 435 acres (about 73%) are covered by impervious surfaces. The remaining acreage is covered by grass and landscaping. The Airport is generally flat, with the operational area (e.g., runways and taxiways) averaging a 1 to 2% slope. Other surface slopes at the Airport range from 0 to 5%. Non-paved areas generally have grass or landscaping. Therefore, erosion potential at KCIA is slight, except when surfaces are disturbed for construction.

The Airport storm drainage system includes approximately 15 miles of drainage pipe.[28] Seven stormwater outfalls (numbered 01 through 07) serve the Airport, all of which discharge to the Duwamish Waterway. Pumping stations are associated with Outfalls 03 and 04. Storm water reaches outfalls 02 and 05 by gravity. Drainage at the south end of the Airport goes to an Airport-owned pipe system that connects to a system owned by The Boeing Company. That system eventually interties with a system owned by King County/Metro before it reaches the Duwamish Waterway as Outfall 01. This particular system also receives stormwater runoff from other sources not related to the Airport or The Boeing Company (for instance, sources such as Associated Grocers, City of Seattle, Burlington Northern right-of-way). Seattle City Light owns Outfall 06, which primarily drains the Georgetown Steam Plant. Several facilities at the north end of the Airport drain to Outfall 07, which is owned by the Washington State Department of Transportation (WSDOT). However, the primary source of drainage to Outfall 07 is Interstate 5.

KCIA has two pump stations for stormwater. The north pump station has a capacity of 80.4 cfs and the south pump station has a capacity of 60.3 cfs. The capacity of both facilities can accommodate in excess of a 25-year storm. The Airport has a total of 26 gravity oil/water separators at various locations on Airport property, and two coalescing plate oil separators. King County staff inspects these oil/water separators daily.[29]

2. Quality of Receiving Water

The Duwamish River is classified by the State of Washington as Class B (good).[30] Class B waters are not considered clean enough for domestic water supply – only for industrial and agricultural uses. The waters are considered safe for secondary contact (like fishing and boating) but not safe for direct contact like swimming. **Table 4.6-1** lists the pertinent water quality standards for these waters.

---

[28] *Storm Water Pollution Prevention Plan, King County International Airport.* Prepared by Jeffrey W. Winter, P.E., Airport Engineer. KCIA. November 1993.

[29] Personal conversation with Rick Renaud, King County Airport Stormwater Engineer, July 2000.

[30] WAC 173-201-080

TABLE 4.6-1

PARTIAL LIST OF WATER QUALITY STANDARDS FOR SURFACE FRESHWATERS OF WASHINGTON (WAC 173-201A)

Parameter	Class AA "Extraordinary"	Class A "Excellent"	Class B "Good"
Temperature	Less than 61°F	Less than 64°F	Less than 70°F
Dissolved Oxygen (mg/L)	More than 9.5	More than 8.0	More than 6.5
pH	6.5-8.5	6.5-8.5	6.5-8.5
Fecal Coliform Bacteria (colonies/100 mL)	Less than 50	Less than 100	Less than 200
Turbidity	Less than 5 NTU	Less than 5 NTU	Less than 10 NTU

Source: Ecology. 1999. *Working in the Water.* Ecology Publication No. 99-06, May 1999.

The Duwamish Waterway is listed as an impaired waterbody on the States' 303(d) List of Impaired and Threatened Water bodies. It is located in the Water Resource Inventory Area (WRIA) 9 – Duwamish/Green. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs. A TMDL or Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

Table 4.6-2 lists the parameters of concern identified by the State in its listing of the Duwamish Waterway on the 303(d) list.

TABLE 4.6-2
PARAMETERS OF CONCERN IN THE DUWAMISH WATERWAY

Butylbenzyl Phthalate	Dibenz(A,H)Anthracene	Benzo(Ghi)Perylene
Chrysene	Copper	Benzo(A)Pyrene
Benzo(B,K)Fluoranthenes	Fluorene	Arsenic
2,4-Dimethylphenol	Phenol	Benz(A)Anthracene
Phenanthrene	Acenaphthene	Benzyl Alcohol
Fluoranthene	Dibenzofuran	1,4-Dichlorobenzene
4-Methylphenol	PCB-1260	PCB-1254
Hexachlorobenzene	Lead	N-Nitrosodiphenylamine
Mercury	Total PCBs	Zinc
Diethyl Phthalate	Cadmium	Bis(2-Ethylhexyl)
Phthalate	Indeno(1,2,3-Cd)Pyrene	Chromium

Source: U.S. EPA web page: http://www.epa.gov/owow/tmdl/states/watmdltables.html

Numerous studies have been conducted in the lower five miles of the Duwamish Waterway to document the level of contamination in sediments within the Waterway. The primary contaminants include polychlorinated biphenyls (PCBs), poly-aromatic hydrocarbons (PAHs), mercury and other metals, and phthalates. Contaminants may have entered the river via several transport mechanisms, including spillage during product shipping and handling, direct disposal or discharge, contaminated groundwater discharge, surface water runoff, stormwater discharge, or contaminated soil erosion. On September 13, 2001, EPA added the lower Duwamish to the National Priorities List as a Superfund site.

3. Potential Sources of Pollutants at KCIA

Table 4.6-3 lists the potential pollutants found in runoff from KCIA. Activities at the Airport that generate the pollutant sources include the following:

(a) Aircraft Maintenance - Aircraft and ground vehicles are stored and maintained by the majority of tenants at KCIA. Most maintenance occurs in hangars, however some work is done on aircraft while they are parked outside in a tiedown stall. Some, but not all, of the hangars have floor drains, which feed to oil/water separators before discharging to the sanitary sewer system. Incidental spills of lubricating oils, hydraulic oils, degreasers, and other materials commonly used for aircraft maintenance are typically cleaned up with absorbents.

(b) Aircraft Fueling - Aircraft fueling is done throughout the Airport from fuel trucks that get the fuel from underground storage tanks. Diesel and gasoline fuel loading into underground storage tanks and from the tanks into the fuel trucks is done with a closed hose transfer connection. Closed hose connections are also used for fueling large aircraft. Smaller planes are fueled with a person holding the nozzle (similar to putting gasoline in an automobile). Fuel spills occur infrequently and are cleaned up with absorption material and vacuum pumps.

TABLE 4.6-3
POTENTIAL POLLUTANTS AT KCIA AND THEIR SOURCE

Pollutant	Source
Petroleum	Aircraft and vehicle storage
Hydrocarbons	Outside aircraft and vehicle maintenance
Detergents/Solvents	Aircraft and vehicle washing
Metals (Aluminum, Antimony, Barium, Chromium, Iron, Magnesium, Selenium, etc.)	Outside aircraft maintenance
Siltation	Unpaved areas
Ethylene Glycol	Aircraft deicing

Source: Storm Water Pollution Prevention Plan, KCIA, November 1993.

(c) Aircraft Washing - There are designated areas for aircraft washing at KCIA. Currently, there are three designated wash pads for smaller planes that are maintained by the Airport. Tenants own two small wash pads and one large one. Designated wash areas contain a wash rack and an oil/water separator to collect the runoff, which is then routed to the sanitary sewer system.

(d) Aircraft and Pavement Deicing - Deicing is performed on aircraft to minimize the ice build-up on the wings and body during cold weather. Deicing at KCIA is relatively infrequent because of the moderate weather in Western Washington. All of the pads used for washing and de-icing discharge to the sanitary sewer system. The Boeing Company has a specific area for deicing where runoff can be contained. The runoff from the United Parcel Service (UPS) area is routed to the sanitary sewer system during the de-icing months (general November through March), and the stormwater system during the remaining months. In Fall 2001, UPS also installed isolation valves in the storm drainage pipes to allow them to isolate runoff from their area when they need to deice. After each deicing event, UPS washes down the apron and vacuums out the contaminated storm water. The primary aircraft deicing material is ethylene glycol. Very little pavement deicing/anti-icing is done at KCIA.

(e) Material Loading and Storage - Various chemical products, such as oils and waste oils, are transferred to and from tenant facilities at the Airport daily.

(C) Future Conditions

The following sections summarize the impact in the future.

1. Without Master Plan (No Action including RSA A-5)

There would be no change to water quality or quantity under the Without Master Plan alternative. With increased demand for use of the Airport, as predicted for the Without Master Plan scenario, increased use of pollutants that have the potential to become runoff would occur. Existing and future runoff would be expected to comply with all Federal, State, and local regulations and requirements.

2. With Master Plan Recommendations

Water quality impacts were identified for the following "With Master Plan" scenarios:

a) *With Runway Shift – Full Use (RSA Alternative A-2)*

The runway shift would add approximately 6.5 acres of additional impervious surface at KCIA, or an increase of about 0.9%. The additional surface would generate stormwater runoff that would be routed through the renovated storm drain system through existing outfalls to the Duwamish Waterway. The additional runoff would be generated from a relatively "clean" surface. The new pavement would not be used for activities that could generate pollutants (i.e., aircraft maintenance, etc) that could degrade the quality of the receiving waters.

The increased quantity of water would flow directly to outfalls to the Duwamish Waterway. The waterway feeds into Elliott Bay, an embayment of Puget Sound. These are relatively large receiving waters and the increase in runoff would have a negligible effect in terms of erosion or downstream flooding.

Groundwater would not be directly affected by the runway shift recommendation.

b) *Runway Shift - With Special Area Use Procedures (RSA Alternative A-3)*

Impacts of this alternative would be the same as the preceding alternative. The runway shift would add approximately 6.5 acres of additional impervious surface at KCIA, or an increase of about 0.9%. The additional surface would generate stormwater runoff that would be routed through the renovated storm drain system through existing outfalls to the Duwamish Waterway. The additional runoff would be generated from a relatively "clean" surface. Further, the new pavement would not be used for activities that might generate pollutants, which could degrade the quality of the receiving waters.

The increased quantity of water would flow directly to outfalls to the Duwamish Waterway. The waterway feeds into Elliott Bay, an embayment of Puget Sound. These are relatively large receiving waters and the increase in runoff would have a negligible effect in terms of erosion or downstream flooding.

Groundwater would not be directly affected by the runway shift recommendation.

c) Other Facilities

Groundwater would not be directly affected by the Master Plan recommendations. There are no proposed actions that would require soil or groundwater cleanup. Moving the Fuel Farm would require specific studies for underground storage tank decommission/removal and construction of a new fuel storage/delivery system.

(D) Cumulative Impacts

Any increase in impervious surface has downstream impacts. Planners and engineers are developing a better understanding of the ramifications of additional impervious surface in terms of potential changes to aquatic habitat and increases in flooding. However, in this particular instance, the proposed pavement increase is relatively small in contrast with the regional development and the use of the new surface would likely generate very few pollutants. In addition, the site drains directly to the Duwamish and is near the end of the watershed. For these reasons, the cumulative effect to water quality and quantity would be relatively negligible.

(E) Mitigation

As no potentially significant adverse impacts have been identified, no mitigation measures are proposed.

4.7 HUMAN HEALTH AND SAFETY

There is a body of research available concerning possible impacts that airports have on the neighbors surrounding them. However, except in very discrete areas, many of these evaluations are inconclusive. In response to a number of questions that arose during the scoping process on this document (see **Appendix A**), a summary of key research in the following areas are summarized:

- Noise
- Air Quality
- Water Quality
- Air Traffic Safety

The Airport presently creates environmental impacts that have the potential to affect human health. This impact is characterized as potential since many research studies indicate conflicting reports of human health impacts.

(A) Noise

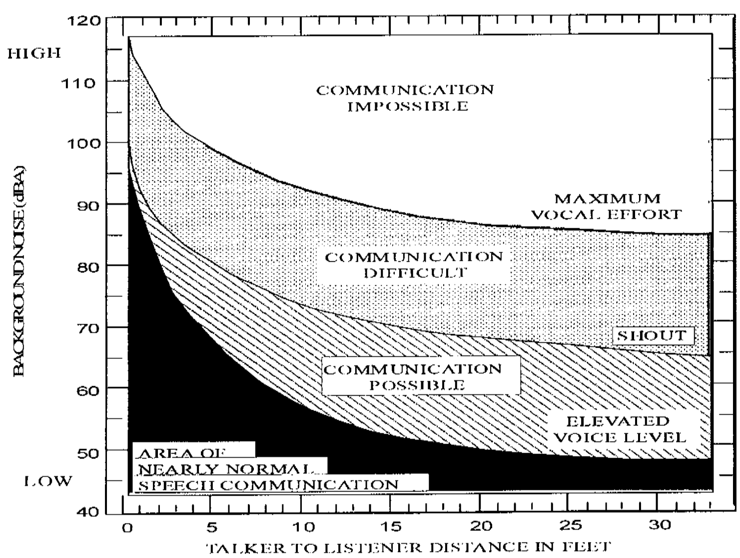
Noise by definition is unwanted sound. In general, noise can interfere with activities such as face-to-face conversation, radio and telephone use, sleep, etc. It may also have detrimental impacts on human health. Noise can cause actual physical harm such as hearing loss, and it may have an adverse effect on mental health. All of these issues have been studied, but there are few clear-cut conclusions relative to airport noise.

Research on the effects of aircraft noise on the human or social environment typically focuses on physiological effects and psychological effects. Two primary effects have been found in noise-exposed areas: effects on hearing and other effects, such as stress. Each of these potential noise impacts on people are briefly discussed in the following:

- *Hearing Loss* is generally not a concern in community noise problems, even close to a major airport or a major freeway. The potential for noise induced hearing loss is more commonly associated with occupational noise exposures in heavy industry, very noisy work environments with long-term exposure, or certain very loud recreational activities such as target shooting, motorcycle or car racing, etc. The Occupational Safety and Health Administration (OSHA) identifies a noise exposure limit of 90 dBA for 8 hours per day to protect from hearing loss (higher limits are allowed for shorter duration exposures). Noise levels in neighborhoods, even in very noisy neighborhoods closest to an airport, are not sufficiently loud to cause hearing loss. No off-airport sites would experience an 8-hour duration of sound above 90 dBA as is shown in the tables in **Appendix C**.

- *Communication Interference* is one of the primary concerns in noisy situations. Communication interference includes speech interference and interference with activities such as watching television. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech. There are specific methods of describing speech interference as a function of distance between speaker and listener and voice level. **Exhibit 4.7-1** shows the relation of quality of speech communication with respect to various noise levels.

EXHIBIT 4.7-1
SPEECH INTERFERENCE WITH RESPECT TO BACKGROUND NOISE



SOURCE: Environmental Impact Analysis Handbook
John G. Rau and David C. Wooten, 1980

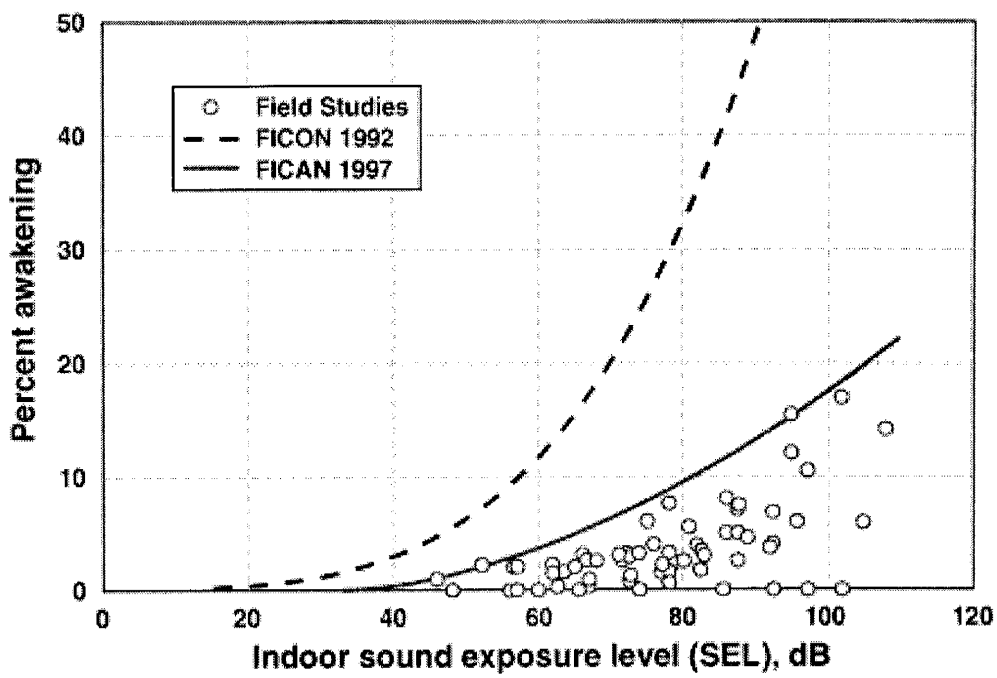
As the chart above shows, as noise increases communication becomes more difficult unless either the voices become elevated or the distances between speakers decreases. The Time Above tables in **Appendix C** show the amount of time that various areas would experience sound levels in excess of 65 dBA for each Master Plan alternative.

- *Sleep Interference* is a major noise concern in noise assessment and, of course, is most critical during nighttime hours when the majority of the population is sleeping. Noise can make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages, and cause awakening. Noise may even cause awakening that a person may or may not be able to recall.

  Extensive research has been conducted on the effect of noise on sleep disturbance. Recommended values for desired sound levels in residential bedroom space range from 25 to 45 dBA with 35 to 40 dBA being the norm. Recent research from England and the USAF has shown that the probability for sleep disturbance is less than what had been reported in earlier research. This research showed that once a person was asleep, it is much more unlikely that they would be awakened by a noise. The significant difference in the recent study is the use of actual in-home sleep disturbance patterns as opposed to laboratory data that had been the historic basis for predicting sleep disturbance. The results of such research are presented in **Exhibit 4.7-2**. As the exhibit shows, the most recent 1997 FICON research indicates that if the interior SEL reaches 95 dBA, about 15% of the population would be awakened.

EXHIBIT 4.7-2

RECOMMENDED SLEEP DISTURBANCE DOSE-RESPONSE RELATIONSHIP



- *Physiological Responses* are those measurable effects of noise on people that are realized as changes in pulse rate, blood pressure, etc. While such effects can be induced and observed, the extent is not known to which these physiological responses cause harm or are a sign of harm. Generally, physiological responses are a reaction to a loud short-term noise such as a rifle shot or a very loud jet overflight.

- *Annoyance* is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability. The level of annoyance depends on the characteristics of the noise (i.e.; loudness, frequency, time, and duration), and how much activity interference (e.g. speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10% of the population is highly susceptible to annoyance from noise not of their own making, while approximately 20% are unaffected by noise. Attitudes are affected by the relationship between the person and the noise source.

(B) Property Value Effects

A limited number of studies have attempted to measure the impact (if any) of noise on property values. No specific studies of the impact of KCIA on real property values have been conducted. Studies conducted at other airports have concluded that airport noise has only a slight impact on property values. Additionally, comparison of older studies to more recent studies indicates that the impact was greater in the 1960's, when jet aircraft first entered the fleet, than in the 1980's or 1990's. This presumably is the result of stabilization of real estate markets following an initial adjustment to noisier jets, and of noise reduction in more modern Stage 3 planes.

An FAA summary report on aviation noise effects states:

> "Studies have shown that aircraft noise does decrease the value of residential property located around airports. Although there are many socio-economic factors which must be considered because they may negatively affect property values themselves, all research conducted in this area found negative effects from aviation noise, with effects ranging from 0.6 to 2.3 percent decrease in property value per decibel increase of cumulative noise exposure ... The studies can be divided into two groups and some conclusions drawn. The first group of estimates ... was based on 1960 data (and included New York, Los Angeles and Dallas) and suggests a range of 1.8 to 2.3 percent decrease in value per decibel (DNL). The second group of estimates, covering the period from 1967 to 1970, suggests a mean of 0.8 percent devaluation per decibel change in DNL...... The bottom line is that noise has been shown to decrease the value of property by only a small amount -- approximately 1 percent decrease per decibel (DNL). At a minimum, the depreciation of a home due to aircraft noise is equal to the cost of moving to a new residence. Because there are many other factors that affect the price and desirability of a residence, the annoyance of aircraft noise remains just one of the considerations that affect the market value of a home."[31/]

One of the difficulties in evaluating the effect of aircraft noise on property values is the application of findings from one location to another. The Effect of Airport Noise on Housing Values, a report prepared in 1994 by Booz-Allen & Hamilton for the FAA, outlined a viable method of examining the effects of airport noise on housing values at the national level by using an approach referred to as the "neighborhood pair model." A series of studies conducted at Baltimore-Washington International, Los Angeles International, and New York LaGuardia and Kennedy International Airports determined that the neighborhood pair model can be used to establish the boundaries of the effect that airport noise has on housing values at a given airport. However, Booz-Allen recommended that their approach not be used at this time to determine property values.

[31/] *Aviation Noise Effects*, J. Steven Newman and Kristy R. Beattie, Report No. FAA-EE-85-2, March, 1985.

In the *Summary and Conclusions* section of the report, it was stated "the magnitude of this impact [of noise on property values] cannot be estimated at the national level at this time, since the results varied across a wide range for the Airports studied, and only a small sample of airports was considered."

(C) Air Quality

Section 4.5 "Air Quality" presents the impact of the proposed Master Plan recommendations in terms of the national ambient air quality standards designed to protect public health and welfare. As is noted in that section, the proposed Master Plan is not expected to generate project-related emissions in excess of thresholds that would indicate concerns with the standards. However, other pollutants have been a concern to area residents, and this section addresses those other pollutants.

It has been estimated that as many as 1,800 to 2,400 cancer cases per year nationally can be attributed to air pollution, not including radon. Individual industrial operations and facilities that congregate large numbers of fossil fuel burning equipment and vehicles present high-localized risks. However, a higher level of cumulative risk from air toxins are produced by activities that are more population oriented, such as driving motor vehicles, and operating non-road equipment and vehicles, and heating with fireplaces and wood burning stoves.

Monitoring in some larger cities has indicated that risk levels in residential areas have approached levels comparable to the highest risk industrial facilities.[32] As society becomes more urbanized, the level of risk associated with everyday lifestyles will increase our exposure to health deteriorating airborne pollutants.

In July 1999, the Washington State Department of Health completed its "Draft Health Consultation for the King County International Airport". This study was initiated in response to concerns of the Georgetown Crime Prevention and Community Council concerning the impacts on human health from exposure to air emissions from jet activity. In 1998, the Agency for Toxic Substances and Disease Registry (part of the U.S. Department of Health and Human Services) reviewed and analyzed data collected by the Washington State Department of Ecology, Boeing, and the community group. Based on that review, the Agency recommended that the Washington State Department of Health evaluate the existing data, more completely define the issues that need to be addressed, identify additional community concerns, and determine necessary further actions. The Health Consultation was prepared in response to that recommendation.

Issues addressed in their Draft Consultation were:

- *Site Background* characterizes the Airport and its activity levels. Noted is that residents were worried about the potential for adverse health effects caused by jet fumes. Their examination of hospitalization rates from the two airport area zip codes for 1991 through 1995, indicates a rate "significantly higher than other King County areas for persons ages 0-64. Hospitalization rates for asthma are also significantly higher than King County rates for persons ages 0-44. While increased hospitalization rates may reflect higher rates of asthma and other illnesses in the 98108 zip code, they may also be associated with a lack of access to health care

---

[32] *The Air Toxics Problem in the United States: An Analysis of Cancer Risks for Selected Pollutants,* U.S. EPA, 1985.

which could lead to higher numbers of hospital visits and increased hospitalization rates. When compared to overall Seattle averages, the Georgetown community, as well as other surrounding neighborhoods, has higher mortality rates and decreased life expectancies."

- *Environmental Contamination:* The Draft report notes "samples were not always collected and analyzed using the best available methodologies and techniques. The exact sampling methods are unknown and strict laboratory controls and standardized test protocols were not always employed.... Nevertheless, the data represents a good starting point to identify chemicals that might be of particular concern." Using this data collected in December 1996, it was found that many hydrocarbons were detected, but only three exceeded health based screening guidelines at a site 2-3 blocks north of KCIA: 1,3-Butadiene, Benzene, and 1,3,5-Trimethylebenzene. A second collection of data in March and August of 1997 found levels much lower than the 1996 levels. However, this sample was analyzed for other pollutants, which found formaldehyde levels higher than the screening guidelines. During a third sampling process, all pollutants were below health based screening values.

- *Potential Sources of Contamination*: The report notes "Jet fuel emissions are not the sole source of emission in the Georgetown neighborhood. As with many urban and industrial areas, there is heavy automobile and truck traffic in Georgetown. ... There are also at least 16 companies subject to Toxic Release Inventory (TRI) reporting..." An appendix of the report notes " .. in Georgetown, the detected levels for each contaminant are within the range of U.S. average urban background levels. ... The high background levels of these contaminants does make it very difficult to determine the specific sources(s) of contamination. It is possible that what was measured in Georgetown can be attributed simply to urban background levels caused by light industry and mobile source emissions. With the current data, it is impossible to determine what portion of the air pollution is due to KCIA or any other source."

- *Conclusions*: It was noted "Due to the quality of the limited air sampling data, it is very difficult to draw firm conclusions regarding the potential for adverse human health effects." Based on the results, however, the report estimates that a potential health hazard may exist due to exposure to 1,3-butadiene, benzene, and formaldehyde and that the risk "over a lifetime exposure, would be considered moderate." It was unable to determine a concern with 1,3,5-trimethylbenzene. Based on these conclusions, the study recommends additional monitoring, modeling, and evaluation.

- *Comparison to Average U.S. Urban Background Levels*: The apparent purpose of an appendix to the study is to provide an indication of how levels in Georgetown compare with the average U.S. location. For 1,3-butadiene, the highest level recorded was substantially higher than the U.S. average, indicating a moderate risk. For Benzene, the highest levels were greater than the U.S. average, but would represent a low risk.

(D) <u>Water Quality</u>

Human health was also evaluated in terms of water quality of surface water and groundwater sources used for drinking water, and the potential effects of the alternatives on water quality. A summary of surface and groundwater quality is presented in **Section 4.6** "Water Quality". The assessment of potential impacts on surface and groundwater resources from the Master Plan recommendations can be avoided or mitigated through effective implementation of stormwater and pollution control design standards. Potential impacts on human health from waterborne pollutants generated from the proposed Master Plan is based on pollutant types, pollutant fate and transport, and risks of exposure to contaminated surface water and groundwaters. Federal, State, and local regulations would be complied with under all alternatives to minimize (1) pollutant loads to surface and groundwaters, (2) risks of pollutant exposure, and (3) risks to human health.

Construction activities, if not properly managed, could adversely affect surface waters through temporary increases in suspended solids, caused by erosion and sedimentation. Minor quantities of fuels, solvents, or lubricants in accidental spills could result in elevated levels of volatile organic compounds (VOC). Stormwater pollution prevention measures, however, are expected to protect receiving waters from releases of such contaminants at construction sites. If such measures are not effectively implemented, there is a low probability that VOCs, a potential human health risk, could enter the conveyances from the outfalls at the Airport that lead to the Duwamish Waterway.

Airport operations are not anticipated to result in significant levels of pollution in surface water or groundwater resources. Potential spills of fuel, petroleum products, and other environmentally hazardous materials, and stormwater discharges resulting from Airport operations, would be managed by implementing Federal, State, and local standards for spill prevention and control and stormwater management. This is expected to significantly protect the outfalls and channels leading to the Duwamish.

Potential human health risks from polluted surface water and groundwaters are directly related to the specific pollutant, route of exposure, level of exposure, duration of exposure, and frequency of exposure. There are generally two routes of exposure to polluted surface water and groundwaters: ingestion or consumption, and skin contact (e.g., contact recreation). The greatest risk of exposure to polluted surface waters is through skin contact, since none of the outfalls or waterways is used as a drinking water source. Airport stormwater runoff generally contains low concentrations (a few parts per billion) of pollutants, except for total zinc, which may occur at several hundred parts per billion. These concentrations are diluted once the stormwater mixes with receiving waters. Therefore, the concentrations of waterborne pollutants available for human exposure are very low. Because little or no contact recreation (e.g., wading and swimming) occurs in these discharge areas, it is unlikely that people would be exposed for any significant duration to these low levels of pollutants. For these reasons, the potential human health risks from water contact or consumption appear to be extremely low.

Other potential routes of exposure to pollutants are through consumption of contaminated fish and shellfish or skin contact with contaminated sediments. The Duwamish Waterway supports commercial fisheries. However, the forms of metals discharged from aviation activity do not bioaccumulate or bioconcentrate in fish or shellfish. Therefore, it is unlikely that consumption of fish is a significant potential source of exposure to pollutants bound to suspended solids that would be deposited and accumulate on the bottom of the Duwamish Waterway or Puget Sound where potential for human contact would be negligible. Furthermore, even if contaminated sediments were deposited in accessible areas these pollutants are not in forms that would be adsorbed through the skin. Therefore, none of these sources are expected to be a likely route of exposure to contaminants found in Airport stormwater runoff and they do not appear to represent a significant potential risk to human health.

Because proposed mitigation would prevent significant pollution in water resources, human health risks are not likely to occur as a result of the alternatives. Compliance with construction design standards and various environmental management plans would reduce the potential that contamination of surface water would result from construction and operation of the proposed alternatives. Human health risk related to exposure to polluted surface water could be mitigated by implementation of:

- Stormwater pollution prevention plan;
- Spill prevention, control, and countermeasures plan;
- Construction waste handling and disposal plan;
- Construction erosion and sediment control plan;
- Spill prevention, control, and countermeasures plan;
- Wellhead protection plan; and
- State and Federal surface- and drinking-water standards.

State and federal drinking-water standards establish Maximum Contaminant Levels (MCLs) for drinking water supplies.[33/] In the event that MCLs are violated, state regulations (i.e., referenced sections of the WAC) identify specific actions that are required to protect human health. Specifically, the water supplier is required to: 1) Notify the Washington State Department of Ecology (Ecology) when a violation of an MCL has occurred; 2) Notify the consumers served by the system; 3) Determine the cause of contamination and 4) Take action as directed by Ecology.

(E) Air Traffic Safety

During the public scoping process conducted prior to preparation of this document, a number of comments were received concerning the impact of the proposed runway shift on aircraft flight safety. The proposed Master Plan recommendations, including the runway shift (either with full use or the preferred alternative with the special area use procedures) would not alter the paths that aircraft follow on approach or departure from the Airport.[34/] Today, aircraft on approach to King County International Airport approach on a straight path along a three-degree glideslope. This approach is anticipated to remain through the foreseeable future. The proposed runway shift would not lower the altitude (height) of aircraft above properties on approach in either a north flow or south flow, as the shift would not change the location on the runway where aircraft would land. On departure, aircraft departing to the north would not have a different altitude over the altitude that would exist today. For the preferred alternative (shifted runway with operational procedures), aircraft operators who have demonstrated the need for 10,000 feet of departure length in south flow, however, would begin their departure roll 880 feet further north, and thus would be about 100 feet higher in their departure than occurs today when passing over properties south of KCIA. With Alternative A-2 (full use of the shifted runway) all departures to the south would be about 100 feet higher relative to existing conditions.

Concerns were also expressed with jet blast to non-aviation facilities in close proximity to the shifted runway. FAA airport design standards require that no facilities be located within 400 feet of an active runway or taxiway to ensure protection from jet blast. As no facilities would be located within 400 feet of the shifted taxiway and runway threshold, no jet blast impacts would be expected. However, increased jet exhaust could be experienced to facilities located on the northwest side of the airfield, when aircraft taxi through the Special Use Area

---

33/ Washington Administrative Code (WAC) 246-290-310(3) *Primary and Secondary MCLs for Inorganic Chemical and Physical Parameters.* Washington State Department of Health, Olympia, Washington. July, 1994.

34/ The proposed Master Plan recommendations, including the runway shift, are not expected to adversely affect the interaction that exists between aircraft arriving and departing from Sea-Tac Airport and King County International Airport.

for 13R. With the Preferred Alternative, King County will develop a jet blast fence/wall subject to FAR Part 77 height requirements to minimize the effect on these properties, from the north end of the Boeing ramp and north to parallel the airfield, past the Georgetown Steam Plant. Without a blast wall, locations in this area could experience short bursts of jet exhaust at speeds of 35MPH at the fence line. At the edge of the Steam Plant building, the exhaust from a B767-300 or an AWACS could generate exhaust of less than 15 MPH. In comparison, exhaust today from these operations would not be felt. Therefore, to be protective of properties on the west side of the airfield, King County would install fences that deflect jet blast upward.

4.8 HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

Impacts to archaeological, cultural, and historical resources, both on and off-airport, can be caused by airport development and airport activity. Examples of impacts often encountered at airports are:

- Direct impacts caused by acquisition and relocation of resources
- Indirect impacts due to alteration of surface transportation patterns or addition of adverse environmental impacts, such as noise, air pollution, and water pollution, that change the use of the site

In this section, the Master Plan recommendations were evaluated in terms of potential impacts to objects, buildings, structures, and sites of archaeological, cultural, and historical importance. The primary requirements for the protection of the resources are stipulated in the National Historic Preservation Act of 1966 (particularly Section 106) and its implementation regulations for "Protection of Historic Properties (36 CFR Part 800)."[35] The purpose of the legislation is to ensure that cultural resources are inventoried, evaluated, and considered in analyzing proposed development and that steps are taken to avoid or mitigate any adverse effects.

Before this environmental impact evaluation was initiated, the City of Seattle (owner of the Georgetown Steam Plant, a National Historic Landmark) requested that King County and the FAA initiate consultation in accordance with Section 106 of the National Historic Preservation Act. In January 2000, the FAA initiated Section 106 consultation to ensure that proper consultation was conducted before the Master Plan process concluded and the environmental impact evaluation was initiated.

An archaeological resources and traditional Cultural places assessment, as well as coordination with Duwamish, Muckleshoot, and Suquamish Indian tribes. As that assessment showed, Current proposed construction excavation ... would not penetrate fill deposits, and therefore would not disturb probably significant hunter-fisher-gatherer or historic period archaeological resources." As this section shows, the proposed runway shift could affect aircraft noise and vibration emanating from KCIA. However, the effects of the shift vary depending upon whether or not full use occurs or if the special area use procedures are in place. A significant noise impact would occur if full use of the shifted runway were to occur as described in Section 4.1 "Noise". However, the Preferred Alternative, where only aircraft with a demonstrated need of 10,000 feet of departure runway length in a south flow, would not produce a significant noise impact. Using conservative vibration criteria, however, the runway shift (with or without the special area use procedures) was found to potentially result in a significant vibration effect on

[35] *National Historic Preservation Act*, Section 106. 1966 (as amended).

the one historic site closest to the end of the runway – the Georgetown Steam Plant. As a result, King County proposes to replace the windows in the structure to mitigate the only effect of the preferred alternative. No other significant adverse impacts were identified.

(A) Methodology

In July 2000, Larson Anthropological Archaeological Services Limited prepared the Archaeological Resources and Traditional Cultural Places Assessment, as noted in **Appendix G**. That report was prepared based on a review of environmental reports, ethnographies, histories, and General Land Office maps. Site records and survey reports were reviewed for previously recorded hunter-fisher-gatherer and historic period archaeological resources within or near the project area. In addition, contacts were made with Duwamish, Muckleshoot, and Suquamish Indian tribes regarding any knowledge Tribal members may have regarding potential traditional cultural places in the project area. The study area for purposes of the cultural investigation of direct impacts was the immediate construction area of the proposed runway safety area.

For purposes of the indirect impact analysis, the study area is the same as used in **Section 4.2** "Land Use" and encompasses the existing 65 DNL noise exposure contour for purposes of considering effects on historic sites. Sites listed on the National Register of Historic Places and those designated as City of Seattle historic landmarks were identified through lists produced by the City of Seattle Division of Urban Conservation and the Washington State Office of Archaeology and Historic Preservation. Sites considered to be potentially eligible for listing on the National Register were obtained from "Historic Property Survey Report: Georgetown (Seattle, Washington)", completed in September 1997 for the city and the state. Finally, a windshield survey of the entire area identified the general age and type of buildings and uses throughout the study area. **Exhibit 4.8-1** shows the location of National Register properties, designated city landmarks and sites potentially eligible for the National Register. As determined by the State Historic Preservation Office (SHPO), all properties of Federal, State, or local significance would be required to comply with the National Historic Preservation Act and U.S. Department of Transportation Section 4(f) requirements. Consultation with the SHPO was initiated and is underway.

Environmental effects of the proposed Master Plan recommendations and the alternatives are based on the analysis described in other sections of this chapter. The primary effects on these sites are associated with noise, water quality, air quality, and surface traffic conditions, as the Master Plan does not exert any direct effects on these properties.

In 2000, the FAA initiated Section 106 Consultation concerning the proposed Master Plan, noting the potential vibration effect of the project on historic sites as well as a separate project that involves modification of access to the Georgetown Steam Plant. As documented in **Appendix A and H**, consultation included Federal, State, and local parties, including: Department of Interior, the SHPO, National Parks Service, King County, and the City of Seattle. FAA announced that Section 106 would be undertaken and invited participation. This invitation was followed up with the FAA's review and distribution of the analysis of the effect of the proposed project. The following sections summarize the existing effect on historic sites, as well as the project effects.

(B) Existing Conditions

The proposed Master Plan project area is within the aboriginal territory of the Duwamish, a Puget Salish group that lived within and near the present City of Seattle. The Duwamish lived in cedar plank houses built on riverbanks, lakefronts, or shorelines of water bodies including Elliott Bay, Lake Washington, Lake Union and the Duwamish River. Neighboring groups of Green River and White River people, ancestral to the contemporary Muckleshoot Indian Tribe, traveled down the Duwamish River to harvest salmon in the river or to go to Elliott Bay to harvest shellfish. The Suquamish had strong cultural and economic connections with the Duwamish, as demonstrated by Chief Seattle, who had a Duwamish mother and a Suquamish father.

Section 3.1 of the "Affected Environment" chapter contains a detailed discussion of the community history and key historical resources. **Table 4.8-2** lists the sites identified as well as the existing and future DNL noise levels for the historic sites. A total of 46 previously recorded sites were identified in the existing 65 DNL or greater noise contour. Three of these facilities are landmarks in the Georgetown area. This table also contains a detailed description of the Georgetown Steam Plant, a National Historic Landmark. Of the more than 67,000 properties on the National Register of Historic Places, fewer than 3% are considered of such national significance that they receive this level of designation. The Georgetown Steam Plant is also a National Engineering Landmark and a City of Seattle Historic Landmark, subject to its regulations and review requirements.

In addition to these designated landmarks, an historic property survey completed in 1997 for the Washington State Office of Archaeology and Historic Preservation and the Urban Conservation Division of the City of Seattle Department of Neighborhoods identified 43 structures potentially eligible for listing on the National Register of Historic Places. These facilities are all listed in **Table 4.8-1**. These commercial and residential buildings all exhibit good physical integrity and possess one or more of the following attributes: a) known to be associated with an individual of significance in the history of the community; b) reflects a significant developmental era within the community; and c) a noteworthy example of architectural style or house type.

In addition to these buildings, others were identified that are less likely to be eligible for the National Register due to extensive deterioration or alteration, but appear to have architectural or historical significance. However, some of them may be eligible for the city or State historic registers, particularly if the physical integrity is restored.

As is listed in **Table 4.8-2**, all of the sites currently experience noise from aircraft operations at KCIA. Only the very western portions of Georgetown experience sound levels less than 65 DNL and as a result, all of the sites experience sound levels greater than 65 DNL. Twenty-seven (27) sites directly under the path of arriving and departing aircraft or immediately adjacent to the Airport experience sound levels greater than 70 DNL. As most of these historically notable locations are residences, aircraft noise is incompatible with their use as a residence, unless the residence has been sound insulated. Such sound insulation has been recommeded as part of the Part 150 Study, as discussed in Section 3.2.

TABLE 4.8-1 (page 1 of 3)
SITES OF HISTORICAL SIGNIFICANCE

Georgetown has three designated historic landmarks:
1. Boeing Airplane Building (Red Barn)
2. Georgetown Steam Plant, a National Historic Landmark, a National Engineering Landmark and a Seattle historic Landmark;
3. Old Georgetown City Hall, listed on the National Register and a Seattle historic landmark; and,
4. Georgetown Poor Farm Annex;
5. Maple Donation Claim;

Sites *potentially eligible* for the register:

	Address	Historic Name	Use
6.	738 S. Orcas Street	Charles Sinnett House	Residence
7.	718 S. Orcas Street	Mary E. Brown House	Residence
8.	817 S. Orcas Street	Minnie Butterworth House	Residence
9.	819 S. Orcas Street	Charles & Elizabeth Fickeisen House	Residence
10.	5801 Corson Avenue S.	Scott & Imogen Woodin House	Residence
11.	5609 Corson Avenue S.	Bernardo & Rose Germani House	Residence
12.	5622 Corson Avenue S.	Raecolith Flooring Company	Business
13.	6722 Corson Avenue S.	Oscar W. Jarvis House	Residence
14.	5629 Airport Way S.	Georgetown Department Store	Business
15.	5813 Airport Way S.	Marino Station/Palace Hotel	Business
16.	6285 Airport Way S.	Vega Hotel and Roadhouse	Business
17.	1201 S. Vale Street	Horton Hotel/Union Trust & Savings	Business
18.	6111 13th Avenue S.	Victor L. Miller Building	Business
19.	1210 S. Bailey Street	Porcella & Co. Building and Garage	Business
20.	1021 S. Bailey Street	V.I. Sprinkle House #1	Residence
21.	1015 S. Bailey Street	V.I. Sprinkle House #2	Residence
22.	6901 Ellis Avenue S.	Edwin & Margaret Benedict House	Residence
23.	6286 Ellis Avenue S.	Maggie Daugherty House	Residence
24.	1128 Albro Place	James Gordon Building	Business
25.	6206 Carleton Avenue S.	Buhl Home & Grocery	Business
26.	6212 Carleton Avenue S.	Dora E. Carle House	Residence
27.	6201 Carleton Avenue S.	John & Bertha Mueller House	Residence
28.	6906 Carleton Avenue S.	Benjamin W. Ehring House	Residence
29.	6901 Carleton Avenue S.	Joseph R. Huber Double House	Residence
30.	6709 Carleton Avenue S.	Tony Nichoota House	Residence
31.	6703 Carleton Avenue S.	Dollie Jarvis House	Residence
32.	6625 Carleton Avenue S.	Anton & Antonia Modenese House	Residence
33.	6601 Carleton Avenue S.	County Inn (roadhouse)	Business
34.	6426 Carleton Avenue S.	Antonio Banchero Residence	Residence
35.	6429 Carleton Avenue S.	Peter Gessner/ Dr. Corson House	Residence
36.	6402 Carleton Avenue S.	Harry Rogelet House	Residence
37.	6245 Carleton Avenue S.	William R. Burke House	Residence
38.	6245 Flora Avenue S.	Victor & Thyra Tornquist House	Residence
39.	6247 Flora Avenue S.	August Faust House	Residence
40.	6256 Flora Avenue S.	John Finley House	Residence
41.	6266 Flora Avenue S.	Perry & Eura Barker House	Residence
42.	6417 Flora Avenue S.	Charles & Mary Sprinkle House	Residence
43.	6433 Flora Avenue S.	Anton Fischer House	Residence
44.	6611 Flora Avenue S.	James & Josephine Reeves House	Residence
45.	6616 Flora Avenue S.	Budnick House	Residence
46.	6622 Flora Avenue S.	Lucas & Kate Budnick Residence	Residence
47.	6657 Flora Avenue S.	Antonio & Mary Albanese House	Residence
48.	6709 Flora Avenue S.	Joseph & Jennie Budinich House	Residence
49.	6942 Flora Avenue S.	Rudolf & Frieda Dreger House	Residence

TABLE 4.8-1 (page 2 of 3)

SITES OF HISTORICAL SIGNIFICANCE

Georgetown Steam Plant: The Georgetown Steam Plant, located near the northwest corner of the airfield, is a designated National Historic Landmark.

The plant is significant for three reasons:

1. The two vertical Curtis turbines are the only ones in the world that are still operational, despite the fact that they were the most common turbine in the first decade of the century, prized for their low cost, compact size, simplicity, efficiency, and low maintenance. This was the world's first large-scale steam turbine, patented by Charles G. Curtis in 1896 and manufactured by General Electric. The success of these vertical steam turbine generators marked the end of an era of generators driven by reciprocating steam engines. It was the beginning of the steam turbine technology that is still in use today, and ensured the survival of General Electric as a manufacturer of large-scale steam-driven generators.
2. The plant is an excellent example of the innovative fast-track design and construction method pioneered by Frank Gilbreth, a nationally recognized efficiency engineer.
3. The plant also reflects an important part of the unique history of electrical utilities in the Pacific Northwest. It was for many years used as a standby or peaking facility, maintained as a reserve unit on the West Coast power grid, available if other plants became incapacitated.

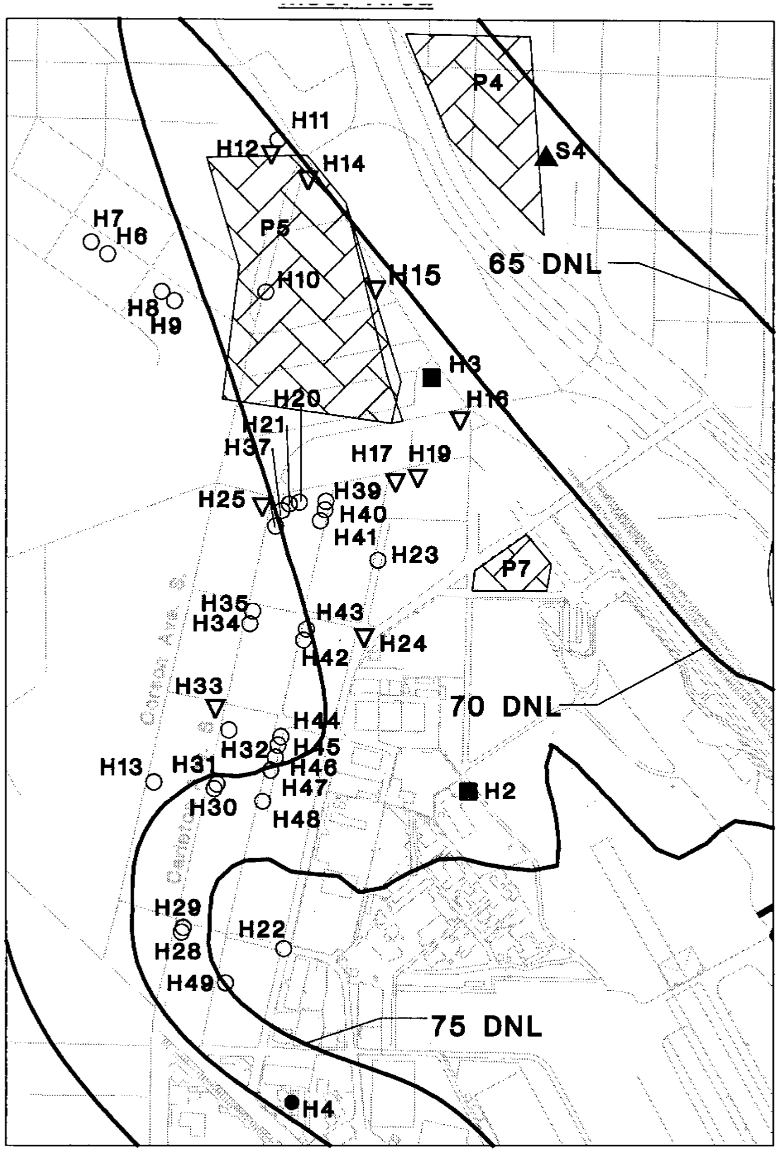
Significant features of the plant include its exterior appearance and detailing; views of the plant from a distance; the turbines and other equipment; the oil tank on the west side; the substation footing on the north side; and the river flume and pump station.

The steam plant was inactivated in 1977. It is currently owned by Seattle City Light and managed by the Georgetown Powerplant Museum as a museum and educational facility, with a broad variety of uses. It is used regularly for tours and training classes in boiler operation and related topics.

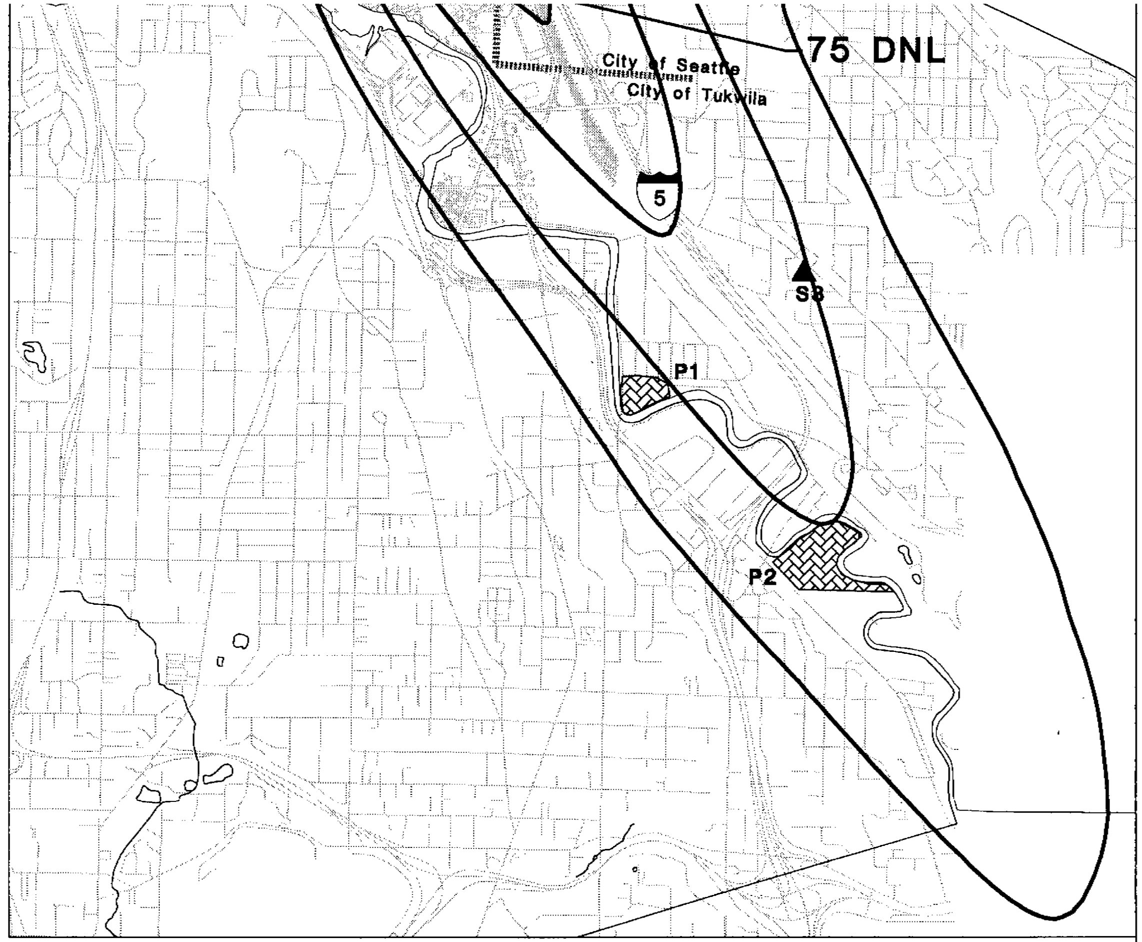
Description: The steam plant is a large reinforced concrete structure constructed in 1906 by the Seattle Electric Company, which operated Seattle's streetcars. Upon its completion, it was a state-of-the-art example of re-enforced concrete power plant construction, designed by Frank Gilbreth, one of the country's premier experts in this field. The plant contains three steam turbine generators, installed in 1907, 1908 and 1917. All remain operational and most of the ancillary equipment is still in place. The 3,000 kw (1907) and the 8,000 kw (1908) generators are vertical Curtis turbine generators in which the generator units positioned directly above the turbine drive. The third machine is a horizontal Curtis turbine.

The plant is roughly T-shaped in plan, with one wing measuring 76 feet by 153 and the other 79 feet by 64 feet with a 36-foot extension at the east end. The exterior is notable for such a large industrial structure, in a simplified version of the Neo-Classical Revival style. It features such characteristics as a cornice, belt course and water table. Masonry delineating the bays is proportioned to suggest pilasters. The grand entry west facade is topped by the construction date, 1906, in a monumental scale.

The plant interior is organized to maximize efficiency, allowing fuel and waste to be dumped from one floor to another without mechanical distribution. The longest wing, devoted to the production of steam, originally was four levels. Coal was brought in on a continuously moving belt on the top floor, dumped into eight bunkers below. Each bunker fueled a pair of immense water tube boilers. The sixteen boilers were on the second floor, arranged in two banks facing each other, across a corridor running the full length of the wing. On the ground floor an ash car ran on rails below each row of boilers to collect and remove ash.



Source:
Inital Review of Comprehensive Land Use Plans for Community Areas Within Sea-Tac Airport's Projected Noise Contour, Puget Sound Regional Council, February 1999, Thomas Guide, and Washington State Office of Archaeology and Historical Preservation.



Legend

- H18 Historical
- P1 Playground/Park
- S14 School

Scale in Feet: 0 — 4000

Notes:
1. Refer to Table 4.8-1 in text for full name of each facility.
2. Existing Conditions (2003)

Inset
- ○ Potential Residential Historical Site
- ▽ Potential Business Historical Site
- ■ Designated Historical Landmark

Source:
Bridgenet Consulting Services, 2003

Exhibit 4.8-1
Historic Sites

ANCHOR ENVIRONMENTAL, L.L.C.

TABLE 4.8-1 (page 3 of 3)
SITES OF HISTORICAL SIGNIFICANCE

Georgetown Steam Plant – Continued:

The plant's shorter wing, oriented across the north end of the boiler wing, was devoted to producing electricity. The engine room, open to the roof, contains the three generators, each with a circulating pump, a vacuum pump and a barometric condenser. Catwalks and ladders connect the generators. A fifty-ton crane runs on an overhead track to assist with maintenance. The north wall of this vast room is divided into a gallery with five levels. On the lower floor is a bank of transformers. Above it are the switchboard room and other control equipment.

The plant has undergone little modernization since the installation of the third generator in 1917. Most of the equipment is antique, dating from the 1907-1918 period, and much of it is unique. Besides the generators, this includes boilers, gauges, transformers, pumps, marble-faced electrical panels, cranes and hand-crank telephones. Between 1918 and 1946 it was converted from coal to oil, but the only alterations were the removal of the coal conveyor and ash cars. At a later date, the ash pits were removed. When the Airport was constructed in the mid-1930s, the tall exhaust stack was replaced by roof-mounted fans, for aviation safety. At about this same time, the Duwamish River, which provided cooling water and wastewater discharge, was diverted farther from the plant, requiring a new pumping station and longer discharge flume. Finally, the original barometric condensers for the two vertical generators were rebuilt in 1965 and 1969, duplicating the original installation.

TABLE 4.8-2
NOISE LEVELS AT HISTORIC SITES (DNL)

DNL at Closest Grid Site

				Year 2018		
Site ID	**Site Name**	**Closest Grid (250ft)***	**2003 Existing**	**(RSA A-5) Without Master Plan**	**With Full Use of Shifted Runway**	**With Shift & Special Area Use Procedures**
H1	Boeing Airplane Bldg.	271*	82.4	79.7	79.3	79.7
H2	Georgetown Steam Plant	SP*	71.7	70.8	**77.3**	71.9
H3	Old Georgetown City Hall	202	73.1	73.0	73.0	73.0
H4	Georgetown Poor Farm	86	71.2	70.8	70.9	70.8
H5	Maple Donation Claim	253	74.2	72.8	73.6	72.8
H6	738 S. Orcas Street	150	67.3	66.4	66.4	66.4
H7	718 S. Orcas Street	150	67.3	66.4	66.4	66.4
H8	817 S. Orcas Street	177	69.6	69.0	69.0	69.0
H9	819 S. Orcas Street	177	69.6	69.0	69.0	69.0
H10	5801 Corson Avenue S.	204	71.9	71.8	71.8	71.8
H11	5609 Corson Avenue S.	205	71.4	71.2	71.2	71.2
H12	5622 Corson Avenue S.	205	71.4	71.2	71.2	71.2
H13	6722 Corson Avenue S.	89	65.5	64.3	65.0	64.4
H14	5629 Airport Way S.	205	71.4	71.2	71.2	71.2
H15	5813 Airport Way S.	204	71.9	71.8	71.8	71.8
H16	6285 Airport Way S.	230	70.5	69.9	69.9	69.9
H17	1201 S. Vale Street	231	70.0	69.5	69.5	69.5
H18	6111 13th Avenue S.	230	70.5	69.9	69.9	69.9
H19	1210 S. Bailey Street	202	73.1	73.0	73.0	73.0
H20	1021 S. Bailey Street	174	70.6	69.6	70.0	70.0
H21	1015 S. Bailey Street	174	70.6	69.6	70.0	70.0
H22	6901 Ellis Avenue S.	86	71.2	70.8	70.9	70.8
H23	6286 Ellis Avenue S.	173	70.9	70.3	70.3	70.3
H24	1128 Albro Place s.	173	70.9	70.3	70.3	70.3
H25	6206 Carleton Avenue S.	174	70.6	69.6	70.0	70.0
H26	6212 Carleton Avenue S.	174	70.6	69.6	70.0	70.0
H27	6201 Carleton Avenue S.	174	70.6	69.6	70.0	70.0
H28	6906 Carleton Avenue S.	87	68.6	67.9	68.4	68.0
H29	6901 Carleton Avenue S.	87	68.6	67.9	68.4	68.0
H30	6709 Carleton Avenue S.	116	68.6	67.5	68.7	67.6
H31	6703 Carleton Avenue S.	116	68.6	67.5	68.7	67.6
H32	6625 Carleton Avenue S.	117	67.4	66.1	67.0	66.2
H33	6601 Carleton Avenue S.	117	67.4	66.1	67.0	66.2
H34	6426 Carleton Avenue S.	146	68.6	67.5	67.6	67.5
H35	6429 Carleton Avenue S.	146	68.6	67.5	67.6	67.5
H36	6402 Carleton Avenue S.	146	68.6	67.5	67.6	67.5
H37	6245 Carleton Avenue S.	146	68.6	67.5	67.6	67.5
H38	6245 Flora Avenue S.	174	70.6	69.6	70.0	70.0
H39	6247 Flora Avenue S.	174	70.6	69.6	70.0	70.0
H40	6256 Flora Avenue S.	174	70.6	69.6	70.0	70.0
H41	6266 Flora Avenue S.	174	70.6	69.6	70.0	70.0
H42	6417 Flora Avenue S.	145	68.9	67.8	68.6	67.9
H43	6433 Flora Avenue S.	145	68.9	67.8	68.6	67.9
H44	6611 Flora Avenue S.	144	69.5	68.4	**70.5**	68.6
H45	6616 Flora Avenue S.	144	69.5	68.4	**70.5**	68.6
H46	6622 Flora Avenue S.	144	69.5	68.4	**70.5**	68.6
H47	6657 Flora Avenue S.	116	68.6	67.5	68.7	67.6
H48	6709 Flora Avenue S.	116	68.6	67.5	68.7	67.6
H49	6942 Flora Avenue S.	86	71.2	70.8	70.9	70.8

Source: The SheridanGroup and Bridgenet Consulting Services, December 2003

Sound level information **bolded** reflect locations where this alternative would create a significant noise increase.

* All grid points are from Table C-11, except those noted with the *, which use the 1,000 ft grid in Table C-8.

(C) Future Conditions

The assessment of future impacts of the Master Plan recommendations included both direct and indirect impacts that are presented in this section. **Table 4.8-2** lists the noise exposure in the future at each historic site.

1. Without Master Plan (No Action)

Without the Master Plan recommendations, Airport facilities would be expected to remain unchanged and non-standard runway safety area would exist on the south end of the runway. As a result, no direct effects to historic properties would occur. Indirect effects would likely decrease in accordance with the reduction in aircraft noise. As was discussed in **Section 4.2** "Land Use", noise exposed facilities are expected to decrease in the future, regardless of implementation of the Master Plan recommendations. Without the runway shift, noise levels would generally be within 0.8 DNL or less of the existing levels. Noise levels would be reduced slightly at all of the historic sites in the future with the No Action in comparion to existing conditions.

2. With Master Plan Recommendations

The following subsections describe the likely impacts on historic, archaeological and cultural resources associated with the proposed Master Plan recommendations. None of the Master Plan alternatives would require the acquisition and/or demolition of any known historic sites of Federal, State, or local significance. Therefore, the impacts of the alternatives, as discussed in the following sections, could occur from indirect effects.

a) *With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)*

With this alternative, the runway would be shifted 880 feet to the north and all aircraft departures in south flow would begin their departure roll from this relocated threshold. As was discussed in **Section 4.2** "Land Use", noise exposed facilities are expected to decrease in the future, regardless of implementation of the Master Plan recommendations. With this alternative, however, noise exposure changes would be significant off the immediate ends of the north side of the runway. Noise levels would be reduced slightly at 1 site, while noise levels would increase at 32 sites. Noise levels would remain the same as the No Action levels at the other sites.

A significant noise increase (1.5 DNL or greater) would occur at four historic sites. The Georgetown Steam Plant would experience a 6.5 DNL increase in year 2018 with this full use alternative in comparison to the Without Master Plan. This alternative would increase aircraft noise at the Georgetown Steam Plant from the Without Master Plan at 70.8 DNL to 77.3 DNL. An increase of 2.1 DNL would occur at H44, H45, and H46 (a portion of a block of Flora Avenue S from about 6611 to 6622). For these residences, noise would increase from the No Build of 68.4 DNL to 70.5 DNL with the full use shifted runway.

b) *Preferred Alternative – Procedures for Use of Special Use Area (RSA Alternative A-3)*

As is noted in **Appendix G**, the proposed project is not expected to have an adverse direct effect on cultural resources. However, in the event that artifacts are discovered during construction activities, King County would immediately halt construction in such areas and the State Historic Preservation Officer (SHPO) and other proper authorities (including Native American tribes) would be contacted within 24 hours. This would be done so that the findings could be recorded and the level of significance determined. If findings of significance were made, mitigation measures would be developed through a draft Memorandum of Agreement among FAA, the SHPO, Advisory Council on Historic Preservation, and others.

The proposed Master Plan recommendations would have an effect on historic and cultural sites. **Table 4.8-2** lists the noise impacts at each site with the runway shift. None of the sites would experience a significant noise exposure change over the Without Master Plan condition. The Georgetown Steam Plant would likely experience the greatest increase in noise in the future over the Without Master Plan of 1.1 DNL (an increase to 70.8 from 71.9 DNL). Sound levels at all other sites would be the same as the Without Master Plan or would increase by 0.1 DNL. On an average annual basis, the Steam Plant experiences the greatest noise levels when flights depart to the north, and thus the maximum sound level that the site would experience would not change, as the project would not affect north flow operations.

At the request of City Light, the owner of the Georgetown Steam Plant, King County conducted a special vibration study of the potential effect of the runway shift on the Steam Plant. At the time that study was conducted, it was anticipated that only an 800 foot shift would be required; since that evaluation a survey was conducted of existing property and the need to shift the runway has changed to 880 feet. The purpose of the study was to evaluate the effect of vibration associated with the project on the Steam Plant. It was discovered that the greatest project effect would occur when the new pavement is being used by heavy aircraft (i.e., AWACS or B747 aircraft). The vibration study found, using conservative criteria, that the potential exists for the old window glass to be jarred from the windowpane and to break. **Appendix H** contains the vibration study and the draft Memorandum of Agreement to address the vibration issue.

During the Section 106 consultation, the State Historic Preservation Officer requested that an Archaeological Resource and Traditional Cultural Places Assessment be conducted for the construction disturbance area. Such an assessment was completed in July 2001 by Larson Anthropological Archaeological Services Limited (LAAS). Two areas were investigated: Area 1- the area of ground disturbance on the north end of the existing runway associated with the runway shift; and Area 2 – providing unrestricted access road to the Georgetown Steam Plant. The assessment consisted of archival and literature review, consultation with the Duwamish Tribe, Muckleshoot Indian Tribe, the Suquamish Tribe, and the Washington State Office of Archaeology and Historic Preservation, field reconnaissance of the project area, and preparation of a technical report. LAAS identified no probably significant hunter-fisher-gatherer or historic period archaeological resources during field reconnaissance. Shovel probes were unable to penetrate the fill deposits in Area 1 or Area 2. LAAS identified no traditional cultural places in consultation with the various parties.

The conclusion of the assessment was "Current proposed construction excavation ... would not penetrate fill deposits, and therefore would not disturb probably significant hunter-fisher-gatherer or historic period archaeological resources. However, if construction plans change to include excavation to depths expected to penetrate fill, LAAS recommends monitoring by a professional archaeologist."

c) *Other Facilities*

The proposed non-runway related projects are not expected to have an adverse effect on cultural resources. However, in the event that artifacts are discovered during construction activities, King County would immediately halt construction in such areas and the State Historic Preservation Officer (SHPO) and other proper authorities (including Native American tribes) would be contacted within 24 hours. This would be done so that the findings could be recorded and the level of significance determined. If findings of significance were made, mitigation measures would be developed through a Memorandum of Agreement among FAA, the SHPO, Advisory Council on Historic Preservation, and others.

(D) Cumulative Impacts

The cumulative effects of the Master Plan were also considered relative to other ongoing airport-related activities as discussed in the preceding sections. King County is currently working with Seattle Light to obtain its access interests to the Steam Plant through the secure Airport boundary. King County is developing a program of land exchange that would provide an improved driveway access to the Steam Plant from Ellis Avenue in exchange for release of its easement and ownership interests. This access change would be expected to improve public access to the Steam Plant. Thus, the cumulative impacts are beneficial. The change in access would be subject to a separate SEPA evaluation to be completed by King County upon identification of an agreeable access solution. Historic sites in the vicinity of the Airport would not be adversely affected when considered in concert with the effects of other known regional projects.

As is described in Section 3.2, an expansion of the Museum of Flight is proposed which would also improve public visibility of the history associated with aviation. **Table 4.8-2** shows that the noise levels with the proposed Master Plan improvements would be equal or less than the Without Master Plan or existing conditions. The cumulative impact at the Museum of Flight would not be adverse.

As is noted in Section 3.2, the Part 150 Study recommends several land use measures to address aircraft noise exposure. **Table 4.8-2** lists 34 residential properties in Georgetown that have local historical significance that are currently, and would in the future, be exposed to significant aircraft noise (65 DNL and greater sound levels). The Part 150 Study recommendations include "Provide variety of operations for people living in the 65 and 70 DNL KCIA contours including purchase of aviation (noise) easements, sound attenuation, and sales transaction assistance". As a result, it is expected that the Part 150 recommendations, if approved and implemented, could have an effect on these historic structures. The Part 150 recommendations, in combination with the Master Plan recommendations would be expected to lessen adverse impacts to historic sites.

(E) Mitigation Measures

As noted earlier, the proposed Master Plan is not expected to result in a significant adverse affect on historic, cultural or archaeological resources, with the exception of a potential vibration effect on the Georgetown Steam Plant. As a result, King County proposes a window mitigation program for the Steam Plant. Because a conservative criteria was used, and because the results of the vibration just met that conservative criteria, no further vibration analysis was warranted on other structures, as non-airport facilities are more than twice the distance from the end of the runway in comparison to the Steam Plant. To facilitate discussions with Seattle City Light, a draft Memorandum of Agreement (MOA) has been prepared (see **Appendix H**) to outline the process for ensuring that the historic integrity of the building is maintained through implementation of the proposed mitigation.

4.9 DOT 4(F) LANDS AND RECREATIONAL USES

The U.S. Department of Transportation Act of 1966, specifically Section 4(f), provides for the protection of certain publicly owned resources.[36] DOT Section 4(f) resources include public parks; recreational areas; wildlife and waterfowl refuges of Federal, State, or local significance; or any land from an historic site of Federal, State, or local significance. **Section 4.8** "Cultural, Historic, and Archaeological Resources", provides a description of the resources discussed in this section.

(A) Methodology

Programs or projects would not be approved by the federal government if they require the use of DOT Section 4(f) resources, unless there is no feasible and prudent alternative to the use of such land. In such a case, programs must include all possible planning to minimize harm resulting from the use.

Airport development can adversely impact Section 4(f) resources either directly or indirectly. A direct impact, or direct use, would involve acquisition of all or a portion of the resource. An indirect impact, or constructive use, may be created by adverse noise impacts, surface traffic impacts, air pollution impacts or others. Federal agency land use compatibility guidelines identify adverse incompatible noise impacts on most urban recreation resources as noise levels above 75 DNL, unless the resource contains a receptor of unusual noise sensitivity such as an auditorium or outdoor performing arts center, in which case the threshold could be a noise level of 65 DNL or greater.

Parks, recreational areas, wildlife and waterfowl refuges, and historic sites were inventoried and included in **Exhibit 3-2**. In total, nine (9) public parks, and various historic sites were identified within the area in the following jurisdictions: unincorporated King County, Seattle, and Tukwila.

(B) Existing Conditions

Table 4.9-1 lists the properties that would be considered DOT 4(f) lands within the vicinity of the Airport. Eight (8) of the properties are located within the 65 DNL and greater noise exposure contour. In reviewing the acceptability of aircraft noise with these facilities, the FAA's land use compatibility guidance (as shown in **Table 4.2-1**) were considered. In general, parks are compatible with aircraft noise up to 75 DNL, as long as the park resources do not contain noise sensitive uses, such as a bandshell. All of the park resources that receive 65 DNL or greater noise exposure from the Airport do not contain noise sensitive uses and thus are compatible with the noise exposure. According to the land use guidance, museums are compatible with aircraft noise from 65-75 DNL as long as they are appropriately insulated. In the case of the Museum of Flight, located on the west permieter of the airfield at KCIA, the facility is located within the 75 DNL and greater noise exposure contours, and would not be considered a compatible use. However, it is noted

[36] 49 USC Section 303.

that the Museum of Flight serves to preserve the history associated with aviation, especially commercial aviation. As a result, the facility houses one of the largest collections of aircraft in the country. For this reason, the facility is considered for purposes of this analysis as compatible with the aviation noise exposure from KCIA.

(C) Future Conditions *DOT Section 4(f) Evaluation (49 USC 303)*

The following sections summarize the impact in the future at each of these properties.

1. Without Master Plan Recommendations (No Action)

As is shown in **Table 4.9-1**, noise exposure is not expected to substantially change in the future. The same eight (8) properties are expected to remain affected by significant noise exposure (65 DNL and greater) under the Without Master Plan (No Action). Relative to existing conditions, noise exposure would increase slightly at seven (7) sites, decrease at six (6) and not change at one site.

2. With Master Plan Recommendations

The following sections discuss the impact of each of the With Master Plan options.

a) With Runway Safety Area Correction With Full Use of Runway Shift (RSA Alternative A-2)

Completion of the Runway Safety Area project would not require the acquisition or direct impact through displacement to any DOT 4(f) lands. However, indirect impacts could result, such as changes in aircraft noise exposure. As shown in **Table 4.9-1**, aircraft noise exposure would increase at five (5) DOT 4(f) properties with this alternative in comparison to the Without Master Plan, decrease at five (5) sites, and not change at the remaining four (4) sites.

To determine if a significant change in noise would occur, the FAA's threshold of significant noise change was used. FAA Order 5050.4A, Chapter 5, Paragraph 47e (1)(d)2 states: "FAA's threshold of significance has been determined to be a 1.5 Ldn increase in noise over any noise sensitive area located within the 65 Ldn contour". Only one (1) site would experience a significant increase in aircraft noise exposure over the No Build with the runway shift and full use – the Georgetown Stream Plant would experience a 6.5 DNL increase from 70.8 DNL to 77.3 DNL with the full use alternative. In addition, three (3) homes of historic significance would experience a significant noise increase as shown in **Table 4.8-2** (site H44, H45, and H46). As a result, an impact to four (4) potential DOT 4(f) lands would occur with this Alternative A-2 (shift with full use).

TABLE 4.9-1
DOT 4(F) LAND NOISE EXPOSURE

	Property (map site)		2003 Existing	2018 DNL at Closest Grid: RSA A-5 Without Master Plan	RSA A-2 With Full Use of Shifted Runway	RSA A-3 With Shift and Special Area Use Procedures
P1	Pea Patch Park	Tukwila	64.6	63.9	63.5	63.9
P2	Foster Golf Links	Tukwila	64.1	63.8	63.4	63.7
P3	Van Asselt Community Center	Seattle	59.1	58.8	58.7	58.8
P4	Cleveland Playground	Seattle	67.4	66.5	66.5	66.5
P5	Georgetown Play field	Seattle	72.5	72.3	72.3	72.3
P6	Maplewood Play field	Seattle	63.5	62.6	62.6	62.6
P7	Ruby Chow Park	King Co.	73.7	72.6	73.7	73.6
P8	First Avenue South Boat Ramp	Seattle	55.6	54.6	55.0	54.7
P9	Duwamish Waterway Park	Seattle	56.8	56.1	56.0	56.1
H1	Museum of Flight	Tukwila	82.4	79.7	79.3	79.7
H2	Georgetown Steam Plant	Seattle	71.7	70.8	**77.3**	71.9
H3	Old Georgetown City Hall	Seattle	73.1	73.0	73.0	73.0
H4	Georgetown Poor Farm Annex	Seattle	71.2	70.8	70.9	70.8
H5	Maple Donation Claim	Seattle	74.2	72.8	73.6	72.8

Source: Brigenet Consulting, December 2003.

b) *Preferred Alternative – Runway Shift with Special Area Use Procedures (RSA Alternative A-3)*

The Preferred Master Plan alternative would not require the acquisition or displacement of any DOT 4(f) land. Noise exposure at these properties would change slightly. **Table 4.9-1** shows that the Master Plan Preferred Alternative would not alter the conditions significantly at any DOT 4(f) land. Based on this evaluation, no DOT 4(f) lands would experience a significant (1.5 DNL) increase in noise exposure. Aircraft noise exposure would increase slightly at three (3) DOT 4(f) properties with this alternative in comparison to the Without Master Plan, decrease slightly at two (2) sites, and not change at nine (9) sites.

The greatest noise exposure effect would occur at the Georgetown Steam Plant, with a 1.1 DNL increase in noise due to the project relative to Without the Master Plan. This increase is less than the threshold of significance established by FAA guidance (1.5 DNL). As is noted in the preceding section, King County also undertook a vibration analysis study of the Steam Plant and found possible project related vibration effects (see **Appendix H**). Based on the vibration analysis and the use of conservative criteria, the County proposes to provide window mitigation to ensure that the aging window panes do not vibrate loose and break.

49 USC 303 (c) states "The Secretary may approve a transportation program or project requiring the use ... of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if- (1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting

from the use."

A "constructive use" impact on DOT 4(f) lands can occur when the proposed project does not require the physical use of the land, but where the project's proximity impacts adversely affects the protected features or attributes that qualify a resource for protection under section 4(f). According to FAA Order 5050.4A "When there is no physical taking but there is the possibility of use of or adverse impacts to section 4(f) land, the FAA must determine if the activity associated with the proposal conflicts with or is compatible with the normal activity associated with the land" (Paragraph 47e(7)4(b) of Order 5050.4A)

Therefore, the following issues must be addressed in a 4(f) evaluation:

1. ***Compatibility of Action with Historic Property Use***

The Georgetown Steam Plant characteristics are discussed in Chapter 4.8 "Historic, Cultural, and Archaeological Resources". This facility served as an industrial use producing power for the City of Seattle until steam was not longer practical. In recent years it has served as a museum whose purpose is to preserve the unique history associated with steam power production. As an industrial or industrial-related museum use, this facility is compatible with the noise and vibration effects from commercial aviation activity up to 75 DNL. However, because of the potential of the aged windows to vibrate loose, there is a possible safety implication to visitors of the proposed project.

2. ***Prudent or Feasible Alternatives Evaluation***

The purpose and need for the runway shift, which creates the potential vibration effect, is discussed in Chapter 1. Chapter 2 discusses the alternatives to correcting the runway safety area. As is shown, two alternatives were identified: A-2: shift the runway 880 feet with full use or A-3: as proposed, with special use area procedures. In addition, the No Action was considered, which would effectively leave the airfield as it is today, with non-standard runway safety areas. As is described in Chapter 2, another alternative was considered, which would shorten the runway. Shortening the runway would result in a loss of operating capability at the Airport, instead of the 10,000 feet of departure runway currently available, in a south flow, only 9,120 feet would be available. This loss of departure runway length capability could result in impacts to the maintenance and testing of the AWACS aircraft, as well as to the delivery and testing functions associated with the B737 and B757 aircraft of The Boeing Company.

As is discussed in Chapter 2, shortening the runway is not a prudent alternative. In addition to the vibration effect, shifting the runway with full use (RSA Alternative A-2) would create a significant noise exposure impact by increasing the noise levels from 70.8 without the Master Plan to 77.3 DNL (6.5 DNL increase). In contrast, this noise impact would be avoided with the Preferred Alternative as noise would only increase to 71.9 DNL (1.1 DNL increase).

The No Action alternative would not provide an equal level of safety and therefore was rejected as the preferred alternative. The No Action alternative would retain the current configuration of the airfield, such that non-standard safety areas would exist on the south end of the runway. This option is not prudent given the potential safety issues associated with aircraft that would either overshoot or undershoot the runway. As was shown in Chapter 2, such conditions can result in loss of life and damage to the aircraft.

3. Measures are available to minimize impacts to the 4(f) properties.

King County proposes to implement a window mitigation program for purposes of addressing the potential window vibration impact of the proposed project. Because a conservative criteria was used, and because the results of the vibration just met that conservative criteria, no further vibration analysis was warranted on other structures, as non-airport facilities are more than twice the distance from the end of the runway in comparison to the Steam Plant. To facilitate discussions with Seattle City Light, a draft Memorandum of Agreement (MOA) has been prepared (see **Appendix H**) to outline the process for ensuring that the historic integrity of the building is maintained through implementation of the proposed mitigation.

c) *Other Facilities*

The proposed other terminal and landside facilities associated with the Master Plan do not require acquisition of any properties nor do they directly or indirectly affect any DOT 4(f) lands. Future analysis of specific development proposals for these facilities would identify effects to 4(f) lands.

(D) Cumulative Impacts

The cumulative effects of the Master Plan were also considered relative to other ongoing airport activities as discussed in the preceding sections. King County is currently working with Seattle Light to obtain its access interests to the Steam Plant through the secure Airport boundary. King County is developing a program of land exchange that would provide improved direct access to the Steam Plant from Ellis Avenue in exchange for release of its easement and ownership interests. This access change, coupled with the Master Plan would affect the Steam Plant. However, the change in access would be subject to a separate SEPA evaluation to be completed by King County upon identification of an agreeable access solution. Historic sites in the vicinity of the Airport would not be adversely affected when considered in concert with the effects of other regional projects.

As is described in Section 3.2, an expansion of the Museum of Flight is proposed which would also improve public visibility of the history associated with aviation. **Table 4.8-2** shows that the noise levels with the proposed Master Plan improvements would be equal or less than the Without Master Plan or existing conditions. The cumulative impact at the Museum of Flight would not be adverse.

As is noted in Section 3.2, the Part 150 Study recommends several land use measures to address aircraft noise exposure. **Table 4.8-2** lists 34 residential properties in Georgetown that have local historical significance that are currently, and would in the future, be exposed to significant aircraft noise (65 DNL and greater sound levels). The Part 150 Study recommendations include "Provide variety of operations for people living in the 65 and 70 DNL KCIA contours including purchase of aviation (noise) easements, sound attenuation, and sales transaction assistance". As a result, it is expected that the Part 150 could have an effect on these historic structures. The Part 150 recommendations, in combination with the Master Plan recommendations would be expected to lessen adverse impacts to historic sites.

(E) Mitigation Measures

As is noted earlier, the proposed Master Plan is not expected to result in a significant adverse effect on historic, cultural or archaeological resources, with the exception of a potential vibration effect on the Georgetown Steam Plant. As a result, King County proposes to replace all of the windows in the Steam Plant with new windows. Because a conservative criteria was used, and because the results of the vibration just met that conservative criteria, no further vibration analysis was warranted on other structures, as non-airport facilities are more than twice the distance from the end of the runway in comparison to the Steam Plant. To facilitate our discussions with Seattle City Light, a draft Memorandum of Agreement (MOA) has been prepared (see **Appendix H**) to outline the process for ensuring that the historic integrity of the building is maintained through implementation of the proposed mitigation.

4.10 PLANTS AND ANIMALS/BIOTIC COMMUNITIES AND ENDANGERED SPECIES

KCIA is a highly developed site with little habitat value. In a relative sense, the Airport's largest influence on habitat is through the outfalls that direct airport stormwater runoff to the Duwamish Waterway. Implementation of any of the proposed alternatives is not expected to create significantly adverse impacts to biotic communities, including threatened and endangered plant or animal species.

(A) Methodology

Information for the threatened and endangered plant species analysis was derived from the Natural Heritage Database, which is maintained in Washington by the Washington Department of Natural Resources (DNR). The Priority Habitat and Species Database provided information on threatened and endangered animal species. The Washington Department of Fish and Wildlife (WDFW) maintains this database. The data requests were made and answered in July 2000. Under Section 7 of the Endangered Species Act, a Biological Assessment has been prepared for the project, which provides additional information on the presence of habitat that supports threatened and endangered species in the project area and is presented in **Appendix F**. The Biological Assessment was prepared and coordinated during 2002. Additional consultation was initiated in late January 2004 to update the list of species.

(B) Existing Conditions

KCIA is a highly developed site, with a large amount of pavement and impervious surface. Vegetation around the runways consists mainly of mowed grass that is managed carefully to discourage wildlife use. A review of the Natural Heritage Database[37/] and the Priority Habitat and Species Database[38/] indicates that no threatened or endangered plant or animal species are found on the Airport.

The Duwamish Waterway, located approximately ½ mile west of KCIA, is the receiving waterbody for the Airport's surface water runoff. The shoreline of the lower Duwamish is largely lined by bulkheads and rip-rap. Much of the intertidal areas have been dredged for

---

37/ Letter from Sandy Swope Moody, DNR to Margaret McCauley, Anchor Environmental dated July 7, 2000.

38/ Washington Department of Fish and Wildlife Service response to request from Kathleen Stephanick of Anchor Environmental for database material. Response dated August 18, 1999.

navigation or filled for upland use. Despite the reduction in habitat, numerous species still use the Duwamish for feeding and resting.

The National Marine Fisheries Service has identified chinook salmon (*Oncorhynchus tshawytscha*), a threatened species, and coho salmon (*O. kisutch*), a candidate species, as potentially occurring in the project vicinity. Chinook, coho, sockeye, and chum salmon all migrate to and from the Green-Duwamish Basin. Pink salmon historically used the Duwamish also, but were extirpated by the 1930's.[39] Adult chinook and coho principally return in the autumn (fall-run). All of these species prefer cold freshwater streams with loose, clean gravel for spawning and rearing. There are chinook, coho, chum, and steelhead hatcheries along the Green-Duwamish system.

The U.S. Fish and Wildlife Service (USFWS) has identified the coastal population of bull trout (*Salvelinus confluentus*) and bald eagle (*Haliaeetus leucocephalus*), both threatened species, as potentially occurring in the vicinity of the project area. There is little to no information on the presence, abundance, distribution, or life history of bull trout populations in the Duwamish River basin. Bald eagles are occasionally seen near the Airport, but there are no bald eagle nests within a mile of the project site.

King County also considered species of fish present near the project site that are candidates for listing as threatened or endangered. Under the Endangered Species Act (ESA), candidate species are "taxa considered for possible addition to the List of Threatened Species." Joint NMFS and USFWS regulations define a candidate species as any species being considered by NMFS or USFWS for listing, but not yet the subject of a proposed rule. 50 CFR §424.02. Section 7 of the ESA does not require Federal agencies to evaluate effects of agency actions on candidate species. No candidate species managed by USFWS were identified as occurring in the project area. Puget Sound coho salmon (*Oncorhynchus kisutch*) were identified by NMFS as a candidate species for listing under ESA in September 1999. Since coho salmon is a candidate for listing under ESA, they were not required to be evaluated in the Biological Assessment.

Coho salmon are protected under the Magnuson-Stevens Fishery Conservation and Management Act (also known as the Magnuson-Stevens Act). The Magnuson-Stevens Act, as re-authorized in 1996, mandates that Federal agencies consult with the Secretary of Commerce on all activities or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." In addition to species listed as threatened or endangered, EFH consultations are required for non-listed, Federally-managed fishery species, which include Puget Sound coho and pink salmon populations. Pink salmon historically used the Duwamish River, but were extirpated by the 1930's (WDF 1975). The effects of the project on the coho salmon Essential Fish Habitat were evaluated in the Biological Assessment.

The Migratory Bird Treaty Act makes it illegal to pursue, hunt, take, capture, kill, attempt to take, capture or kill any migratory bird or "any part, nest, or egg of any such bird... by any means or in any manner," except as allowed by permit. Migratory birds that occur in King County include all birds except house sparrows, starlings, feral pigeons (rock doves), pheasant, quail, and domestic ducks, geese, and other exotic birds.

[39] *A catalog of Washington Streams and Salmon Utilization, Volume 1: Puget Sound Region.* Williams, R. W., R. M. Laramie, and J. J. Ames. Washington Department of Fisheries. 1975. Olympia, Washington.

(C) Future Conditions

Future conditions with and without the proposed Master Plan were evaluated.

1. Without Master Plan (No Action)

There would be no impacts to biotic communities or endangered species under the Without Master Plan alternative.

2. With Master Plan Recommendations

There are no differences in impacts on biotic communities/plants and animals, or threatened or endangered species between the two runway safety area alternatives (RSA Alternative A-2 or A-3). Potential short-term direct effects associated with constructing the runway safety area correction include: (1) increased sedimentation into the Duwamish River during construction, and (2) potential risk of accidental spills from construction equipment. The potential for increased sedimentation would be minimized or avoided through implementation of Best Management Practices (BMPs) contained in the King County Stormwater Pollution Control Manual. Examples of BMPs that would be implemented for this project include a combination of silt fences, check dams, and straw bales around construction areas.

Potential indirect effects of the runway safety area runway shift project include increased runoff into the Duwamish River due to 6.5 acres of new impervious surface at the project site. A Stormwater Pollution Prevention Plan is used to provide operation source control and treatment BMPs, which eliminate or reduce the level of pollution entering the stormwater. The increased runoff created by the new impervious surface would be routed through the existing storm drain system to outfalls on the Duwamish. The small net increase in impervious surface created by this project, approximately one percent of total impervious surface at the Airport, would not increase peak flows above the existing capacity of the stormwater system. The addition of 1.65 cfs generated during a 10-year storm event is about 0.01% of the 12,000 cfs 10-year flood as measured at the closest gaging station in Auburn. The volume of the river at the Airport outfalls would be greater than at Auburn, given the additional land area drained and the tidal flux, so the influence of the extra stormwater would be diluted. The additional stormwater would be insignificant compared to the natural seasonal and annual variations in flow of the Duwamish.

Through the use of BMPs outlined in the Stormwater Pollution Prevention Plan (KCIA 1993), the stormwater from the Airport and the impervious services added in the proposed project are not expected to adversely affect the quality of habitat conditions for salmonids in the Duwamish River. The combination of the partial treatment system at the Airport, the low application rates of chemicals, and use of environmentally-responsible chemical products eliminate or minimize the introduction of potentially harmful chemicals to the river. Sediment and associated debris from airport surfaces are addressed through frequent sweeping of the runway surfaces.[40/] The temperature of the stormwater entering the Duwamish River is not expected to vary from ambient temperatures. In an effort to further reduce potential temperature increases, a white concrete surface is used for the runway surfaces, as opposed to black asphalt.

40/ Personal communication from Rick Renaud, KCIA, to Paul Schlenger, Anchor Environmental in phone conversation September 2000.

The runway shift and associated Master Plan improvements at the Airport would not adversely affect salmon in the Duwamish River because:

- The proposed project is more than 1,800 feet from the Duwamish River and would not modify salmon habitat;
- The stormwater collection and treatment system in place at the Airport can handle the added volume created by the increased impervious area created. The BMPs and operational source controls outlined in the Airport's Stormwater Pollution Prevention Plan eliminate or reduce the level of contaminants entering the stormwater;
- BMPs, including water quality protection measures such as silt fences, check dams, and straw bales, would be fully implemented to avoid or minimize all potential short-term adverse effects of construction activities;
- The project does not include any in-water work; and
- The project does not reduce riparian habitat and requires no tree removal.

The Duwamish River corridor near the Airport provides relatively low-quality wildlife habitat, as it generally lacks undisturbed native vegetation buffers and it contains a substantial amount of human disturbance. The proposed runway shift Preferred Alternative and Master Plan recommendations at King County International Airport would not affect existing habitat for migratory birds, and none of the proposed actions under this project would increase the risk of death to migratory species.

(D) Cumulative Impacts

Every addition of impervious surface in a watershed contributes to a potential cumulative impact to aquatic plants and animals. However, runoff from the proposed surface would be relatively clean and the relative contribution of surface water runoff would be relatively small. It is anticipated that the cumulative effects would be negligible.

(E) Mitigation

As no significant adverse impacts have been identified, no mitigation is required.

4.11 WETLANDS AND FLOODPLAINS

The critical area maps for Tukwila and Seattle were reviewed to determine the presence of wetlands and floodplains, along with other critical areas. There are no wetlands or floodplains at KCIA, thus these features of the natural environment would not be affected by implementation of any of the alternatives. The nearest wetlands are on either side of Boeing Access Road. The City of Tukwila considers these wetlands Class 1, 2, and 3. These wetlands are approximately 0.5 miles south of the southern end of KCIA.

Soil liquefaction is prominent throughout the entire area. Liquefaction is the process by which soil stability is decreased, usually by shaking as in an earthquake, and the ability of the soil to support structures is reduced. Construction of the runway safety area projects would not affect the degree of soil liquefaction in the area.

4.12 COASTAL ZONE MANAGEMENT, COASTAL BARRIERS, AND WILD AND SCENIC RIVERS

All coastal counties within the State of Washington are subject to the Coastal Zone Management Program. Local shoreline master programs are enforceable policies of the State's Coastal Zone Management Program. Local shoreline master programs are approved and adopted by the State, which ensures consistency with the Coastal Zone Management Act. The Washington State Department of Ecology (Ecology) determines the consistency of a proposed development with the Coastal Zone Management Act and the Washington Coastal Zone Management Program.

The proposed Master Plan alternatives would result in development within King County in the cities of Seattle and Tukwila. Within the Airport vicinity, the Duwamish Waterway is the only water body under the jurisdiction of a local Shoreline Master Program and it would not be affected by any of the alternatives. Therefore, the proposal is consistent with the Coastal Zone Management Program.

Wild or scenic rivers would not be affected by the Master Plan recommendations, nor would any coastal barriers.

4.13 FARMLAND

The proposed actions do not include the conversion of farmland to a non-agricultural use. Therefore, there would be no impacts to farmlands under any of the alternatives.

4.14 ENERGY AND NATURAL RESOURCES

Energy in the form of electricity, natural gas, aviation fuel, diesel fuel, and gasoline is consumed through the operation of the Airport facilities, aircraft, and associated support equipment. Increased levels of activity at the Airport would place an increasing demand for sources of energy, which would occur regardless of whether or not the proposed Master Plan recommendations are implemented. A comparison of the energy consumption with the Master Plan versus the Without Master Plan indicates that a slight increase in energy consumption would occur with the proposed projects. Sufficient supplies exist to meet the anticipated demand.

(A) Methodology

In evaluating the impact of the proposed Master Plan alternatives on energy use, the existing energy consumption at the Airport was first identified. Based on anticipated activity, the existing levels were increased in proportion to the anticipated demand associated with each alternative. With Project levels were further increased in proportion to the increased spatial demands associated with the proposed facilities.

(B) Existing Conditions

Two primary forms of energy are used at the Airport: energy to power facilities (primarily through electrical usage for lighting), and energy necessary to power aircraft and ground vehicles. The following summarizes the providers and use of these energy sources.

Aircraft and Surface Vehicle Fuel: Four types of fuel are used at the Airport to power aircraft and ground vehicles (av gas, Jet A fuel, gas, and diesel). In 1999, Airport uses consumed about 13 million gallons of these types of fuel. The primary suppliers of fuels for these surface and aircraft vehicles are Texaco, AvFuel, and Valley Oil.

Electrical Power: Puget Sound Energy and Seattle City Light provide electrical power to the Airport and airport facilities. In 1999, the combined metered use of electricity at the Airport was approximately 877,000 kilowatt hours.

(C) Future Conditions

Table 4.14-1 compares the future Without Master Plan and With Project (Master Plan) energy consumption. Based on the projected increases in activity discussed in Chapter 1 and the associated changes in Airport facilities, changes in vehicle and electrical demands were estimated. It should be noted that the increase in electrical demands were estimated based on worst-case assumptions which could be reduced substantially through the incorporation of energy savings activities. However, such energy savings activities could also be implemented with the Without Master Plan. To present worst-case conditions, the non-energy savings scenario was evaluated.

As is shown in **Table 4.14-1,** vehicle energy usage is not expected to be materially different with the project in comparison to the Without Master Plan; the amount of vehicle energy consumption is not expected to be materially different (about 8,000 gallons to 11,000 gallons of JetA fuel). The addition of Airport buildings associated with the non-project component of the Master Plan would also likely result in an increase in demand for electricity relative to the Without Master Plan. However, should the Master Plan result in the demolition and reconstruction of buildings, it would be expected that the electrical usage noted in the table would be overstated – that new facilities would likely include electrical saving devices and that electrical consumption would likely be less than projected.

(D) Cumulative Impacts

In general, energy consumption has increased nationwide over the decade of the 1990s. The cumulative impact of the Master Plan and other regional projects are not expected to induce additional energy demands, but rather are consistent with the anticipated increases in energy projected region-wide due to increases in population and economic activity. During late 2000 and 2001, a renewed interest in energy conservation for electrical and gasoline vehicles has occurred with the skyrocketing price increases for electricity and gasoline. It is anticipated that as fuel costs remain high that financial incentives would exist for various parties to reduce reliance on various forms of energy.

(E) Mitigation

As sufficient supplies exist to meet the projected demand, although at possibly increased costs, no mitigation is required.

TABLE 4.14-1
ENERGY CONSUMPTION

Scenario	Existing	Without Master Plan	With Master Plan
1999			
Aircraft & Vehicle Fuel	13,064,000	NA	NA
Electrical	877,000	NA	NA
2003 estimated			
Aircraft & Vehicle Fuel	11,970,000	NA	NA
Electrical	880,000	NA	NA
2005			
Aircraft & Vehicle Fuel	NA	15,583,000	15,591,000
Electrical	NA	1,047,000	1,195,000
2010			
Vehicle Fuel	NA	16,707,000	16,717,000
Electrical	NA	1,123,000	1,334,000
2015			
Vehicle Fuel	NA	17,832,000	17,843,000
Electrical	NA	1,198,000	1,479,000

Slight differences would likely result between the Full Use of the Shifted Runway (A-2) and the Shift with Special Area Use Procedures (A-3). However, the With Project noted in this table reflects the Preferred Alternative (Shift with Special Area Use Procedures A-3). Full use of the shifted runway would likely increase aircraft and vehicle fuel by 5% over that shown above.

4.15 PUBLIC SERVICES AND UTILITIES (INCLUDING SOLID WASTE AND HAZARDOUS WASTE)

KCIA enjoys a full suite of public services and utilities. Implementation of any of the Master Plan alternatives would not affect this situation.

(A) Methodology

Existing documentation regarding utility service in the project area was reviewed. Airport staff was contacted to confirm information.

(B) Existing Conditions

Electricity, water, wastewater, natural gas, telephone service, and emergency services are available at KCIA. **Table 4.15-1** lists the utility and service providers.

TABLE 4.15-1
UTILITY/SERVICE PROVIDERS AT KCIA

Utility/Service	Provider
Electricity	Seattle City Light
Water	Seattle Public Utilities/City of Tukwila
Wastewater	City of Tukwila/King County (Metro)
Natural Gas	Puget Sound Energy
Telephone	Qwest
Fire/Police	King County Airport Police/Air Rescue and Fire Fighting (ARFF)

Aviation fuel is brought to KCIA via truck by a variety of vendors.

Solid waste includes garbage, rubbish, metal, paper, plastic, and wood, which are generated at KCIA by a variety of sources including tenant and general airport operations.

(C) Future Conditions

Implementation of any of the alternatives would not have a likely significant adverse impact on public services and utilities. The additional runway pavement would require a reconfiguration of the storm drainage piping system, however no new outfalls would be necessary. There would not be an increased need for any of the utilities or services. Implementation of any of the alternatives would not change the general land uses at KCIA. There would be no significant adverse impact to solid or hazardous waste generation and/or disposal.

(D) Cumulative Impacts

There would be no cumulative impacts with implementation of any of the alternatives.

(E) Mitigation

As no potentially significant adverse impacts have been identified, no mitigation measures are proposed.

4.16 LIGHT EMISSIONS

Lighting systems at the Airport supply the airfield, terminal buildings, access roadways, parking and other on-airport buildings. Light emissions from the Airport are expected to remain about the same as current conditions with the Master Plan recommendations.

The proposed runway shift would not result in notable changes in airfield lighting except with the Special Use Area. The declared distance alternative would not affect airport lighting.

The reconfiguration of Airport facilities to accommodate changing users and growth in activity would alter lighting conditions. As specific development proposals have not been prepared, it is not possible to identify light emission impacts. It is possible that light emissions could be reduced through improved layout of Airport facilities. However, the increased quantity of hangars and other support facilities would likely result in an increase in lighting. The nearest residence to the Airport is about 300 feet from the perimeter of the Airport. If additional lighting were to be placed in close vicinity of residential areas, King County would implement lighting baffles to ensure that light emissions do not represent an annoyance to residential areas.

4.17 AESTHETICS

The following section discusses the effects that the Master Plan would have on the design, art and architectural applications within the construction area associated with the alternatives.

(A) Methodology

KCIA's aesthetic character was assessed during several site visits.

(B) Existing Conditions

KCIA is located in a heavily industrialized area. The visual character of the Airport fits well with its surroundings. The airfield provides a large area of open space in a relatively densely developed area.

The Terminal Building is centrally located on the eastside of the Airport. The Terminal Building is a two-story structure, containing approximately 28,000 square feet floor area. The building was originally constructed in 1930 and has undergone considerable renovation over the years, as the original air carrier function has been largely replaced by other uses. A $5 million renovation project was completed in 2003 for the terminal, which continues to function as the Airport's passenger processing terminal. There are a number of other buildings in the general area, including the 7300 Building, which houses airport tenants. The rest of the east side of KCIA consists of hangars and various tenant facilities.

The northwest corner of KCIA is dominated by The Boeing Company's former headquarters building. Large hangars, two and three stories high, are found here. Farther south is the Museum of Flight, a large glass and steel structure.

(C) Future Conditions

The following describe the effect of Without the Master Plan and With the Master Plan improvements.

1. Without Master Plan (No Action)

Implementation of the Without Master Plan alternative would not affect the aesthetic character of KCIA.

2. With Master Plan Recommendations

Implementation of the Master Plan recommendations would not significantly affect the aesthetic character of KCIA. The runway shift would add more pavement but would not extend the Airport boundaries. The shifted runway would result in aircraft being about 880 feet closer to the northern Airport perimeter and thus more visible to the residents of Georgetown. Such effect would occur under either shifted runway option, although with the Preferred Alternative (with Special Area Use Procedures), less aircraft would be using the shifted runway pavement.

Implementation of the proposed Master Plan would involve some movement of tenants and land uses within the existing Airport boundary. This could involve eventual demolition of existing structures and construction of new ones. While this would affect the specific view of that section of the Airport, it would not affect the overall aesthetic character of KCIA.

(D) Cumulative Impacts

Comprehensive plans for Seattle and Tukwila anticipate maintaining the industrial nature of the area around KCIA. There would be no cumulative aesthetic impacts associated with implementation of any of the alternatives.

(E) Mitigation

As tenants relocate and construct new facilities, King County could review building designs to ensure a general aesthetic consistency.

4.18 CONSTRUCTION

Construction activities would cause specific impacts resulting solely from construction, but would be limited to the construction period for each construction project. The effects are distinct in that they are temporary in nature and their degree of adversity generally diminishes as work concludes.

During construction of the shifted runway and the other Master Plan projects, the County would follow all applicable State and Federal requirements, including FAA Advisory Circular 150/5370-10A, "Standards for Specifying Construction of Airports", and would work to keep the impacts of construction activities to a minimum.

The specific impacts expected and associated mitigation are described here in greater detail.

(A) Construction Phasing

Construction of the projects needed to bring the airfield into compliance with Runway Safety Area (RSA) standards are expected to be completed in early 2005. Completion of the runway shift would likely be completed within an 8-month period. Projects not completed in 2004 could be completed during 2005. Completion of these projects would be conducted to minimize the effect on aircraft operations and surrounding facility operation.

Completion of the facilities necessary to accommodate future changes in Airport activity levels are expected to be undertaken in direct response to a specific need. Thus, appropriate environmental documentation would be prepared before completion of the project. The construction activity would be dependent on the type of facility to be developed.

(B) Noise

As a result of construction, there would be periods of truck and equipment noise at the Airport and in the vicinity. The typical noise levels associated with construction equipment generally range from 68 to 98 dBA at 50 feet, according to studies performed by the U.S. EPA. **Table 4.18-1** lists the general range of noise from various types of equipment.

As noted, the sound levels listed in **Table 4.18-1** identify sound when the equipment is in use at a receiver of the sound that is 50 feet from the source. Noise levels would be reduced by at least 6 dBA for every doubling of distance beyond the 50-foot distance values shown. Thus, at 100 feet and 200 feet, the resulting sound levels would be at least 6 and 12 dBA lower respectively.

Because of the general industrial and commercial character of the Airport area, as well as aircraft operating noise levels, construction noise levels are not anticipated to be significant. Aircraft noise levels within the Airport perimeter range from 70 DNL (Day-Night Average Level) to 80 DNL. Residential areas in close proximity to the Airport, such as in Georgetown, may periodically experience sound levels in excess of the noise levels presented in **Section 4.1 "Aircraft Noise"**. However, such construction related noise levels would be limited to the duration of the construction project. For the runway shift project, this would be expected to be limited to daytime hours.

TABLE 4.18-1
NOISE FROM CONSTRUCTION EQUIPMENT
(From a distance of 50 feet)

Activity/Equipment	dBA	Activity/Equipment	dBA
Backhoe	72-93	Jack Hammer	81-98
Bulldozer	80	Paver	86-88
Concrete Mixer	75-85	Pumps	68-73
Crane w/ Ball	75-87	Roller	80-93
Dump Truck	83-94	Scraper	70-93
Front Loader	72-84	Tamper	74-77
Generators	72-83	Truck	83-94
Grader	80-93		

Source: *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*, NTIS 300.2, U.S. EPA, December 1971

(C) Erosion Controls, Chemicals and Spills

During construction, vegetation and paved areas within the construction site would be disturbed. Once construction is completed, the unpaved areas would be restored to their original state. Increased sediment loads in runoff would be the principal change in water quality caused by construction. Clearing, grading, and disturbance of soils promote erosion by water, which then carries the soil (sediment) to receiving waters.

The amount of sediment leaving a site is a function of the following factors

- Amount and erosive force of precipitation
- Susceptibility of the soil type to erosion
- Type of land cover (vegetation or other)
- Distance and length of slope to a receiving water
- Steepness of terrain
- Sediment and erosion controls used

Also, the amount of soil being cleared, graded or otherwise disturbed determines the amount of soil available for erosion.

King County erosion control practices would be implemented with each construction project to ensure that erosion is minimized.

Heavy construction equipment is prone to minor spills and leaks of oils and fuels. The most critical area of concern with these spills would be runoff from any on-site refueling or fuel storage. King County would implement best management practices to minimize spills and ensure appropriate clean up of any such spills.

Fertilizers and pesticides would be used during any landscaping activity. These chemical applications can contaminate surface waters through storm water runoff. Usually ground covers and landscape plants are fertilized at the time of installation. However, modern fertilizers tend to release nutrients slowly over a period of months, making it less likely to heavily contaminate storm water runoff during the initial application.

(D) Air Quality

Construction would have a short-term impact on local air quality. Air pollution levels during the construction period would be a consequence of one or more of the following activities:

- Vehicular activity in support of construction;
- Wind erosion of soils;
- The movement of construction vehicles;
- Excavation; and
- Cement and aggregate handling.

Air pollution impacts would be most pronounced at the individual construction sites. **Section 4.5 "Air Quality"** discusses the peak year of construction emissions.

During completion of the runway shift project, site preparation would result in the movement of as much as 100,000 cubic yards of soil. Heavy construction operations at the construction sites, in addition to the movement of soil, have the potential to result in fugitive dust emissions. In general, fugitive dust would be generated by two physical occurrences:

- Pulverization and abrasion of surface materials by application of mechanical force.
- Entrainment of dust particles by the action of turbulent air currents. Airborne dust could be generated independently by wind erosion.

The air pollution impact potential of fugitive dust sources would depend on the quantity and drift potential of the dust injected into the atmosphere. While the climate of the Region results in frequent rain, dry spells can result in the generation of fugitive dust.

To estimate the quantity of fugitive dust that could result from heavy construction operations at the fill borrow sites and on-airport construction activity, emissions factors were obtained from the EPA's "*Compilation of Air Pollutant Emission Factors*". These factors (1.2 tons per acre disturbed per construction month) were then applied to the area disturbed and the estimated construction duration.

The following fugitive dust emissions were estimated:

Alternative	Total Fugitive Dust Emissions (Tons per year)
Without Master Plan/No-Build	0
"With Project"	
Declared Distances	0
Runway Shift Construction	24
Runway Shift Operation	NA
Facilities to accommodate Growth (Max year 10 acres-10 months)	130

To minimize the fugitive dust transport, unpaved roads and inactive portions of the construction site would be either watered (achieving a 50% reduction in dust) or chemically stabilized (achieving an 80% reduction) during dry periods. Development of construction plans would include identification of a fugitive dust plan. Construction contractor(s) would be required to comply with the Puget Sound Clean Air Agency's (PSCAA) Regulation 1 Section 9.15, requiring reasonable precautions to be taken to avoid dust emissions. This may include applying water or suppressants during dry weather, and taking other measures to prevent the transport of dirt and dust from the construction site onto area roads and neighborhoods. Fugitive dust impacts would be limited both in area and duration, as discussed previously.

Construction equipment, material hauling, and construction activity can affect traffic flow in the area near a project, especially when construction on existing roads delays established traffic flows. None of the projects included in the Master Plan are expected to result in high levels of truck traffic (no more than 30 truck trips during the peak hour would be expected). If airport-related construction significantly reduces average travel speeds in the Airport area, emissions from general traffic would increase.

Construction would require the use of heavy trucks and smaller equipment, such as generators and compressors. These engines would emit air pollution that would contribute slightly to air pollution in the area, but emissions from existing traffic (such as nearby I-5, and Airport Way or East Marginal Way) would likely exceed construction equipment emissions. If asphalt paving is used, hydrocarbon emissions from the hot asphalt would be released during paving.

(E) <u>Solid Waste</u>

King County contracts with two private firms, Waste Management, Inc. and Regional Disposal Company (Rabanco), to provide receiving facilities for non-recyclable construction, demolition and land clearing (CDL) wastes generated in King County. Contracts negotiated with Waste Management, Inc. and Rabanco include an agreement that King County no longer accept CDL wastes, except in incidental quantities. Waste-handling services provided by Waste Management, Inc. and Rabanco include transfer of mixed loads of CDL wastes, removal of recyclable materials, and collection and disposal of CDL wastes. The CDL waste collected at transfer facilities is disposed of in landfills owned and operated by these companies.

Limited recycling of CDL materials is provided at the vendor facilities. King County also offers technical assistance to encourage recycling of CDL wastes. A CDL Material Management Resource Guide, published by the King County Solid Waste Division, lists local CDL recycling facilities.

The amount of construction and demolition waste associated with the proposed improvements at KCIA cannot be quantified at this time. For the runway shift, minimal waste would be generated. For the other Master Plan recommendations, demolition and construction waste could be generated. The majority of the waste material would result from site building, road, and associated infrastructure demolition, as well as building activities.

PAGE INTENTIONALLY LEFT BLANK

Chapter 5
ENVIRONMENTAL CONSEQUENCES – OTHER CONSIDERATIONS

5.1 CONSISTENCY WITH FEDERAL, STATE AND LOCAL PLANS AND POLICIES

The King County Council is expected to consider the information contained in this State Environmental Impact Statement (EIS) and NEPA EA before determining that the Master Plan is consistent with local plans and policies. The FAA would then review the Master Plan and consider final approval of the Runway Safety Area project; the FAA has provided conditional approval of the Airport Layout Plan, subject to compliance with requisite environmental processes. Completion of this NEPA process would enable FAA to provide final approval for the RSA, removing this condition. It is anticipated that all parties would find that the proposed Master Plan Preferred Alternative is consistent with Federal, State, and local plans and policies.

5.2 ADVERSE ENVIRONMENTAL IMPACTS AND MITIGATION COMMITMENTS

As is noted earlier, the proposed Master Plan (Preferred Alternative with the special use area procedures and shifted runway) is not expected to result in a significant adverse effect on any resource or facility with the exception of the possible vibration effect on the Georgetown Steam Plant, as discussed in Chapter 4.9 "Historic, Cultural, and Archaeological Resources". The impact on this facility is expected to consist of a potential vibration that could affect the aging windows of that facility. As a result, King County proposes a window mitigation program for the Steam Plant. Because a conservative criteria was used, and because the results of the vibration just met that conservative criteria, no further vibration analysis was warranted on other structures, as non-airport facilities are more than twice the distance from the end of the runway in comparison to the Steam Plant. To facilitate discussions with Seattle City Light, a draft Memorandum of Agreement (MOA) has been prepared (see **Appendix H**) to outline the process for ensuring that the historic integrity of the building is maintained through implementation of the proposed mitigation.

5.3 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed Master Plan recommendations addressed in this SEPA EIS/NEPA EA are both short-term and long-term in nature. Because the majority of the area proposed for future airport development has been significantly altered by humans due to the industrial/manufacturing nature of the immediate Airport environs, there would not be a loss of natural environment through implementation of the recommendations. There would be no long-term loss of productivity.

As noted in the energy supply and natural resources section, implementation of the proposed recommendations would result in a slight increase in fuel usage due to the runway shift and the need for additional taxi distance for aircraft using the shifted runway. However, the fuel usage is not in short supply, nor are the materials that would be used for construction of the altered Airport facilities to accommodate changes in users or facilities. Thus, there would be no irreversible and irretrievable commitments of resources.

PAGE INTENTIONALLY LEFT BLANK

CHAPTER 6
LIST OF PREPARERS, INDEX, GLOSSARY, TABLE OF CONTENTS

6.1 LIST OF PREPARERS

This environmental document was prepared under the direction of King County. The purpose of the environmental document is to assess the impacts associated with the Master Plan recommendations in accordance with the Washington State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA).

The following individuals contributed to the preparation of the EIS:

Name	Expertise	Professional Expertise/Experience
King County Intn'l Airport Gary Molyneaux	Airport Planning Manager	Ph.D Geography/Urban Planning. 26 years transportation and land use planning.
Synergy Consultants, Inc: Mary Vigilante	Airport environmental planning	BS Math. 25 Years of airport environmental documentation, specialty in noise and air quality.
Bridgenet International: Paul Dunholter, P.E.	Airport noise and air quality evaluation	BS, Environmental Engineering. 23 years of airport noise and air quality modeling and analysis.
Anchor Environmental, LLC: Kathleen Stephanick	Natural resource impact analysis	MA, Geography; 14 years environmental impact evaluation, specializing in Clean Water Act.
Jon Boyce	Land use planning and impact analysis	MA, Geography, 22 years planning experience.
Ann Costanza	Environmental justice and impact analysis	MFR, Forest Resources, 14 years planning experience.
Barnard Dunkelberg & Co Mark McFarland	Airport Master Planning	BS, Landscape Architecture; MA, Urban Studies; 16 years experience with airport master planning.
Sheridan Group: Mimi Sheridan	Section 106 consultation, historic preservation	MUP; Historic Preservation, 7 years historic resource assessment.
Greenbusch Group Julie Weibusch	Vibration analysis	

6.2 LIST OF ABBREVIATIONS AND ACRONYMS

AAIA	Airport & Airway Improvement Act
AADT	Annual Average Daily Traffic
ADP	Airport Development Plan
AF	Airway Facilities Division, FAA
AGL	Above Ground Level
ALP	Airport Layout Plan
ALS	Approach Light System
ALSF-2	High Intensity Approach Lighting System with Sequenced Flashers
ANCA	Airport Noise and Capacity Act
AP	Airports Division, FAA
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASV	Annual Service Volume
AT	Air Traffic Division, FAA
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
AWAC	Airborne Warning and Control System aircraft
CAB	Civil Aeronautics Board
CATI	Category I Instrument Landing System (uses MALSR)
CATII	Category II Instrument Landing System (uses ALSF-2)
CATIII	Category III Instrument Landing System (uses ALSF-2)
CDL	Construction, demolition, and land clearing waste
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CEQ Regulations	Council on Environmental Quality Regulations Implementing The National Environment Policy Act
CFR	Code of Federal Regulations
CMSA	Consolidated Metropolitan Statistical Area
db	Decibels
dBA	Decibels A-weighted
DEIS	Draft Environmental Impact Statement
DNL or Ldn	Day-Night Average Sound Level
DNR	Washington Department of Natural Resources
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FEIS	Final Environmental Impact Statement
FICON	Federal Inter-agency Committee on Noise
FICAN	Federal Inter-agency Committee on Aircraft Noise
FIS	Federal Inspection Services
FMS	Flight Management System

FONSI	Finding of No Significant Impact
FR	Federal Register
FS	Flight Standards Division, FAA
ft.	Feet
FTA	Federal Transit Administration, U.S. Department of Transportation
GA	General Aviation
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HIRL	High Intensity Runway Lights
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INM	Integrated Noise Model
Ldn or DNL	Day-Night Equivalent Sound Level
LdnT	Day-Night Equivalent Sound Level-Total (including non-aircraft related sounds)
Leq	Equivalent Sound Level
LF	Linear Footage
MALS	Medium Intensity Approach Lighting System
MALSF	Medium Intensity Approach Lighting System with Sequential Flashing Lights
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lighting System
MIC	Manufacturing Industrial Center
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MLS	Microwave Landing System
MSL	Mean Sea Level
N/A or n/a	Not Applicable
NAS Plan	National Airports System Plan
NEPA	National Environmental Policy Act
NLR	Noise Level Reduction
NPIAS	National Plan of Integrated Airport Systems
NPS	National Park Service
OFA	Object Free Area
ORDER 1050.1D	Policies and Procedures for Considering Environmental Impacts
ORDER 5050.4A	Airport Environmental Handbook
PAPI	Precision Approach Path Indicator System
Part 150	FAR Part 150 Noise Compatibility Planning Process
PRM	Precision Runway Monitors
R/W	Runway
RAILS	Runway Alignment Indicator Lighting System
RASP	Regional Airport System Plan
REIL	Runway End Identifier Lights
ROD	Record of Decision
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone (once called a Clear Zone)
RSA	Runway Safety Area
RT/R	Remote Transmitter/Receiver
RVR	Runway Visual Range
SEL	Sound Exposure Level

SEPA	Washington State Environmental Policy Act
SF	Square Feet
SHPO	State Historic Preservation Officer
SR	State Route
TA	Time-Above
TAF	Terminal Area Forecast
TCA	Terminal Control Area
TRACON	Terminal Radar Approach Control
USC	U.S. Code
USCOE or COE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VOR	Very High Frequency Omni-directional Range
VORTAC	VHF Omni-directional Range with Tactical Air Navigation
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

6.3 INDEX

6.4. Glossary of Terms

A-Weighted Sound (dBA) - A measurement representing a sound generally as the human ear hears it by filtering out as much as 20 to 40 decibels of sound below 100 hertz (Hz). Used for aircraft noise evaluations.

Airport Elevations - The highest point on an airport's usable runways expressed in feet above mean sea level (MSL).

Airport Improvement Program (AIP) - A Federal funding program for airport improvements. Funds are derived from sources such as airline tickets, aviation fuel, etc.

Airport Layout Plan - An airport plan (ALP) is a scaled drawing of existing and proposed land and facilities necessary for the operation and development of the Airport. Any airport would benefit from a carefully developed plan that reflects current FAA design standards and planning criteria. The ALP shows boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes, the location and nature of existing and proposed airport facilities and structures, and the location on the Airport of existing and proposed non-aviation areas and improvements thereon.

Airport Operations - The total number of movements in landings (arrivals) plus takeoffs (departures) from an airport.

Airport Surveillance Radar (ASR) - A radar system, which allows air traffic controllers to identity an arriving or departing aircraft's distance and direction from an Airport.

Annual Service Volume (ASV) - A planning term which describes the number of annual aircraft operations, which is possible at an airport with an acceptable amount of delay. The measure is specific to individual airports because it is derived from their own particular capacity characteristics.

Automated Radar Terminal System (ARTS) - Computer-aided radar display sub-systems capable of associating alphanumeric data with radar returns.

Building Restriction Line (BRL) - A line that identifies suitable building area locations on airports. The BRL encompasses the runway protection zones, the runway visibility zone areas required for airport traffic control tower clear line of sight, and all airport areas with less than 35 foot (10.5m) clearance under the FAR Part 77 surfaces.

Capacity - The number of aircraft operations possible at a particular airport. When a continuous demand of activity is assumed, regardless of delay, it is described as ultimate capacity. When a limit on the number of operations is considered based on an acceptable level of delay, it is described as practical capacity.

Commuter Aircraft - Commuters are those carriers that provide regularly scheduled passenger or cargo service or aircraft predominantly seating fewer than 66 passengers or holding cargo with 18,000 pounds of payload or less. A typical commuter flight operates over a trip distance of 100 to 300 miles and is flown at lower altitudes than those operated by the long-haul carriers.

Constructive Use - Refers to the possible indirect impacts to DOT Section 4(f) properties such as parks. Constructive use is considered to occur when a transportation project does not incorporate land from a Section 4(f) resource but the project's proximity impacts are so severe that the protected activities, features or attributes that qualify a resource for protection under section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features or attributes of the resource are substantially diminished. For example, a substantial increase in noise levels at a park due to transportation project may represent a constructive use, even though the park is not directly affected through acquisition or development.

Day-Night Equivalent Sound Level (DNL)- A noise measure used to describe the average aircraft noise levels over a 24-hour period, typically an average day over the course of a year. DNL/Ldn considers aircraft operations that occur between the hours of 10 p.m. and 7 a.m. to be 10 decibels louder than they actually are to account for increased annoyance. DNL/Ldn may be determined for individual locations or expressed contours. DNL/Ldn is currently the accepted measure for aircraft noise analysis. See Appendix 4.

Decibel (dB) - A unit of noise level representing a relative quantity. This reference value is a sound pressure of 20 micro-newtons per square meter.

Enplanements - Domestic, territorial, and international revenue passenger enplanements in scheduled and nonscheduled service of aircraft in intrastate, interstate, and foreign commerce.

Environmental Assessment (EA) - An environmental assessment is a concise document that assesses the environment impacts of a proposed Federal action. This document discusses the need for, and environmental impacts of, the proposed action and alternatives. A listing of agencies and persons consulted is also included. An environmental assessment should provide sufficient evidence and analysis for a Federal determination whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

Environmental Impact Statement (EIS) – a detailed examination of the environmental consequences of a project. SEPA provides guidance on actions that require an EIS and the required contents of an EIS. Similarly, FAA guidance in Order 5050.4A also provides similar guidance under the requirements of the National Environmental Policy Act.

Equivalent Level (Leq) - The equivalent steady noise level which in a stated period of time would contain the same noise energy as the time-varying noise during the same period. The Leq can be for any defined period, unlike the DNL.

FAR - Federal Aviation Regulation.

Federal Aviation Administration - The FAA constructs, operates, and maintains the National Airspace System and the facilities which are a part of the system; allocates and regulates the use of the airspace; ensures adequate separation between aircraft operating in controlled airspace; and through research and development programs, provides new systems and equipment to improve utilization of the nation's airspace.

Federal Aviation Regulation (FAR) Part 150 - Established by Congress under the Aviation Safety and Noise Abatement Act of 1979 for the purpose of developing a balanced and cost effective program to reduce the effects of aircraft noise on local communities.

Finding of No Significant Impact - Following the preparation of an environmental assessment, the Federal Agency determines whether to prepare an EIS or FONSI. If the proposed project is determined not to result in any significant environmental impact, a finding (FONSI) is made by the Federal Agency.

Grid Analysis - A type of aircraft noise analysis that evaluates the noise levels at individual points rather than generate noise contours.

Instrument Meteorological Conditions (IMC) - Meteorological conditions expressed in terms of visibility, distance from cloud and ceiling which are less than the minimums specified for visual meteorological conditions.

Integrated Noise Model (INM) - A computer model developed and maintained by the FAA to predict the noise impacts generated by aircraft operations.

Land Use Compatibility - The ability of land uses surrounding the Airport to coexist with airport-related activities with minimum conflict.

Loudness - The subjective intensity of sound.

Master Plan Update - An update to the long-range airport development requirements. These plans are typically updated every 5-7 years.

Missed Approach - A prescribed procedure to be followed by aircraft that cannot complete an attempted landing at an airport.

Mitigation - The avoidance or minimization of an adverse impact.

Mitigation Measure - An action taken to alleviate adverse impacts.

Navaid - Any facility used for guiding or controlling flight in the air or during the landing and takeoff of aircraft.

NEPA - The National Environmental Policy Act of 1969 (NEPA) is the original legislation establishing the environmental review process.

Noise - Unwanted Sound.

Noise Abatement - a procedure of the operation of aircraft at an airport that minimizes the impact of noise on the environs of an airport.

Noise Contour Map - A map representing average annual noise levels summarized by lines connecting points of equal noise exposure.

Noise Exposure Map (NEM) - A map of an airport and its environs which identifies the area impacted by various aircraft noise levels. The FAA has specified criteria for presentation of Part 150 Noise Exposure Maps.

Noise Level Reduction (NLR) - The amount of noise level reduction achieved through incorporation of noise attenuation (between outdoor and indoor levels) in the design and construction of a facility.

Operation - An aircraft arrival at or departure from an airport.

Primary Runway - the runway on which the majority of operations take place. At large, busy airports, there may be two or more parallel primary runways.

Public Use Airport - Any public airport, any privately-owned reliever airport, or any privately-owned airport which is determined to enplane annually 2,500 or more passengers and receive scheduled passenger service of aircraft, and which is used or to be used for public purposes.

Reliever Airport - An airport which, when certain criteria are met, relieves the aeronautical demand on a busier air carrier airport.

Runway - A defined rectangular area on an airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees, e.g., Runway 14, Runway 32.

Runway Protection Zone (RPZ) - An area (formally the clear zone) trapezoidal in shape and centered about the extended runway centerline, is used to enhance the safety of aircraft operations. It begins 200 feet (60m) beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the design aircraft, type of operation, and visibility minimums.

Runway Safety Area (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk or damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Sound - Sound is the result of a sound source vibration in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source in the same way as ripples do on water after a stone is thrown into it. The result of the movement is fluctuation in the normal atmospheric pressure or sound waves.

Sound Exposure Level (SEL) - The constant sound level that has the same amount of energy in one second as the original sound event.

Stage 2 Aircraft - Aircraft that meet the noise levels prescribed by FAR Part 36 and are less stringent than those established for the quieter designation (Stage 3). The Airport Noise and Capacity Act requires the phase-out of all Stage 2 aircraft by 1999, with case-by-case exceptions through the year 2003.

Stage 3 Aircraft - Aircraft that meet the most stringent noise levels set in FAR Part 36.

Taxiway - A defined path established for the taxiing of aircraft from one part of an airport to another.

Threshold - the beginning of that portion of the runway usable for landing.

Time Above (TA) - Time above indicates the time in minutes that a given dB(A) level is exceeded during a 24-hour period.

Very High Frequency Omni-range Station - A ground-based radio (electronic) navigation aid transmitting radials in all directions in the VOR frequency spectrum; provides azimuth guidance to pilots by reception of electronic signals.

Visual Approach - An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

Visual flight Rules (VFR) - Rules that govern the procedures for conducting flight under visual conditions. In addition, it is used by pilots and controllers to indicate type of flight plan.

Visual Meteorological Conditions (VMC) - Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specific minimum. Typically, these conditions occur whenever the cloud ceiling is at least 1,000 feet above ground level, distance to cloud is 1 statue mile, and the visibility is at least 3 statue miles.

Mayor Greg Nickels
City of Seattle
1200 Municipal Building
610 Third Avenue
Seattle, WA 1

Ceclie Hansen
SEPA Representative
Duwamish Tribal Office
4717 W. Marginal Way SW
Seattle, WA 1

Katherine McKee
King County Dept of Metro Services
821 Second Avenue
MS-120
Seattle, Washington 1

Ron Sims
King County Executive
400 King County Courthouse
516 Third Ave
Seattle, WA 1

Julie Koler
King County Office of Historic Preservation
516 Third Avenue
Room 550
Seattle, WA 1

SEPA Review
King County Water and Land Resource Division
201 S. Jackson Street
Suite 701
Seattle, WA 1

Planning Department
Muckleshoot Indian Tribe
2402 Auburn Way South
Auburn, WA 1

Information Center
Puget Sound Regionl Council
1011 Western Ave
Seattle, WA 1

Michelle Dewey
Seattle City Light
Natural Resources & Envir. Planing Unit
700 Fifth Avenue Suite 3300
Seattle, WA 1

Kendra Dahlen
Seattle Planning Commission
700 Third Avenue
Floor 19
Seattle, WA 1

Liz Anderson
Seattle Public Utilities
700 Fifth Avenue
Suite 4900
Seattle, WA 1

Mayor Steven Mullet
City of Tukwila
City Hall
6200 SouthCenter Blvd
Tukwila, WA 1

SEPA Review
King County Department of Development and Environ. Services
900 Oakesdale Avenue SW
Renton, Washington 1

SEPA Review
King County Department of Transportation
201 S. Jackson St.
KSC-TR-0815
Seattle, WA 1

Linda Fredricks
King County Libraries
Documents Department
1111 - 110th Ave
Bellevue, WA 6

Rodney Hansen
King County Solid Waste Division
201 S. Jackson Street
Suite 701
Seattle, WA 1

Allison Brooks
Office of Archaeology & Historic Preservation
State Historic Preservation Officer
P.O. Box 48343
Olympia, Washington 1

Dennis McLaren
Puget Sound Air Pollution Control Agency
110 Union Street
Room 500
Seattle, WA 1

Laurie Geissinger
Seattle City Light
Environmental and Safety Division
700 Fifth Avenue Suite 3100
Seattle, WA 1

Karen Gordon
Seattle Department of Neighborhoods
700 Third Avenue
Seattle, WA 1

Librarian
Seattle Public Libraries
Documents Department
1000 - 4th Avenue
Seattle, WA 6

Carl Osaki
Seattle/King County Department of Health
Attn: Mr. Carl Osaki
999 – 3rd Avenue Suite 700
Seattle, WA 1

Zack Hudgins
State Representative – Dist 11
317 John L. O'Brien Building
Olympia, WA 1

Margarita Prentice
State Senator - Dist. 11th
P.O. Box 40411
Olympia, WA 1

Librarian
University of Washington
Suzallo Library
Government Publications
Seattle, WA 1

Washington Department of Ecology
Environmental Review Section
P.O. Box 47703
Olympia, WA 1

Director
Washington Department of Fisheries
115 General Admin Bldg
MS AX-11
Olympia, WA 1

SEPA Review Representative
Washington Department of Natural Resources
SEPA Center
P.O. Box 4701S
Olympia, WA 1

SEPA Review
Washington Department of Social and Health Services
Legislative and Community Relations
MS OB-44R
Olympia, WA 1

John Sibold
Washington Department of Transportation
Director -Aviation Division
3704 – 172nd Street NE Suite K2
Arlington, WA 1

SEPA Representative
Washington Environmental Council
615 Second Avenue
Suite 380
Seattle, WA 1

Director
Advisory Council on Historic Preservation
1100 Pennsylvania Avenue NW
Suite 809
Washington, DC 1

Velma Rosete Veloria
State Representative – Dist 11
330 John L. O'Brien Building
Olympia, WA 1

Regional Administrator
U.S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, WA 1

SEPA Review Representative
Washington Department of Community Development
Office of Archaeology and Historic Preservation
P.O. Box 48343
Olympia, Washington 1

Director
Washington Department of Ecology
Northwest Regional Office
3190 - 160th Ave SE
Bellevue, WA 1

Washington Department of Natural Resources
Division of Aquatic Lands
P. O. Box 47027
Olympia, WA 1

SEPA Review
Washington Department of Natural Resources Natural Heritage Program
Division of Land and Water Conservation
Mail Stop EX-13
Olympia, WA 1

Director
Washington Department of Trade and Economic Development
9th and Columbia Building
MS GH-51
Olympia, WA 1

Section Director
Washington Department of Wildlife
Environmental Review Section
16018 Mill Creek Blvd
Mill Creek, WA 1

Washington Parks and Recreation Commission
7150 Cleanwater Lane – KY-11
P. O. Box 42650
Olympia, WA 1

Cayla Morgan
Federal Aviation Administration
Seattle Airports District Office
1601 Lind Avenue SW
Renton, WA 3

APPENDICIES

PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

PUBLIC AND AGENCY COORDINATION

PAGE INTENTIONALLY LEFT BLANK

APPENDIX A
PUBLIC AND AGENCY COORDINATION

1. Agency Coordination

A number of Federal, State and local agencies were contacted during preparation of this document. Coordination with agencies was conducted as part of scoping, data collection and in certain cases, analysis of the impact of the Master Plan recommendations.

Scoping:

Two scoping meetings were conducted before initiating the environmental impact analysis. A public scoping meeting was conducted from 5 p.m. to 8 p.m. on November 10, 1998 in the Arrivals Hall of the Terminal Building at King County International Airport. Approximately 20 individuals attended the meeting, which was conducted in a workshop format. This format enables attendees to talk one-on-one with County and technical consulting staff concerning the Master Plan recommendations and the environmental review process.

In addition to the public scoping meeting, a separate meeting was conducted for interested Federal, State and Local agencies. This meeting was conducted on November 10, 1998 at KCIA from 1:30 p.m. until 3:30 p.m. in the Terminal conference room. This meeting was attended by one or more representatives of the City of Seattle, King County, Washington Department of Ecology, and Federal Aviation Administration.

Comments were received from 22 individuals and organizations. Comments received focused on the following issues:

- General environmental review process, requesting that adequate information be provided to enable an understanding of the project and its effects;
- Clarification as to the need for the runway shift, with a justification of the need;
- All alternatives should be considered, and the consideration should be given to the community alternative;
- Concerns with aircraft noise and its measurement. Residents requested presentation of vibration impacts, and noise as defined by SEL, CNEL, DNL, Time Above, A and C weighted noise, etc;
- Concern with impacts on quality of life, schools, neighborhoods, property values, environmental justice, safety, etc;
- Concerns with air pollution and the associated health related effects; and
- Concerns with the impact of the runway shift on the Georgetown Steam Plant and the ability to preserve the National Historic Landmark.

To the extent that industry accepted methodologies exist, this environmental document has attempted to address these concerns.

General Coordination

Throughout preparation of this environmental document, coordination was conducted with various agencies to obtain information about the characteristics of the Airport environs. In addition to data collection efforts, King County initiated monthly coordination with interested agencies during the late spring of 1999. While the intent was to meet monthly, meetings were scheduled as needed to address local concerns and to discuss the progress of the study. Agencies invited to these coordination meetings included:

- King County
- City of Seattle
- City of Tukwila
- Washington Department of Ecology
- Washington Department of Community and Economic Development, State Historic Preservation Office
- Washington Department of Transportation
- Puget Sound Clean Air Agency (formerly Puget Sound Air Pollution Control Agency)
- Puget Sound Regional Council
- Federal Aviation Administration
- U.S. Environmental Protection Agency
- National Park Service

2. Public Involvement

The Master Plan was initiated in 1997 by King County. At that time, the primary public involvement effort was coordination with the Roundtable. The Roundtable was formed in September 1997 for the purpose of advising the County on airport issues, including those associated with the Master Plan and noise impacts. The group consists of 16 official members, representing:

- Georgetown
- West Seattle
- Unincorporated King County
- Magnolia/North Seattle
- Tukwila
- Renton/Kent/South King County
- Beacon Hill/Rainier Valley
- Community-at-large
- Business indirect users
- Pilots Association
- Corporate Operators
- Small General Aviation Operators
- Cargo Operators
- Boeing Company
- Labor (2)

A representative from the FAA serves as ex-officio member, and the Roundtable is supported by King County Airport staff.

3. Public Hearing

King County will conduct a Public Hearing concerning the proposed Master Plan recommendations and the associated environmental effects identified in this document. This public hearing will be conducted on April 5, 2004 in the Terminal at King County International Airport between the hours of 4:30 pm and 7:30 p.m. This hearing will be conducted in two formats. One room will contain materials in a workshop/open-house format, where residents can become familiar with the recommendations and the environmental consequences in order to prepare their testimony. A second room will be available for residents to provide oral testimony before a hearing officer. No presentations will be given. Additionally comments may be provided in writing at the locations listed in the Fact Sheet at the beginning of this report. All comments are to be submitted before close of business on April 9, 2004.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

August 9, 2002

Cayla Morgan
Airports Division Environmental Specialist
U.S. Department of Transportation
1601 Lind Avenue S.W. Suite 250
Renton, Washington 98055-4056

AUG 1 9 2002

Re: Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Runway Realignment and Upgrade for King County International Airport, Duwamish Waterway, Seattle, Washington (NOAA Fisheries No. WSB-01-405)

Dear Ms Morgan:

This correspondence is in response to your request for consultation under the Endangered Species Act (ESA). Additionally, this letter serves to meet the requirements for consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSA §305(b)).

Endangered Species Act

The National Marine Fisheries Service (NOAA Fisheries) has reviewed your September 14, 2001, request for concurrence with your findings of "may affect, not likely to adversely affect" for Puget Sound (PS) chinook salmon *(Oncorhynchus tshawytscha)* for the above referenced project. This consultation with the Federal Aviation Administration (FAA) is conducted under section 7(a)(2) of the ESA, and its implementing regulations, 50 C.F.R. Part 402.

According to the Biological Assessment (BA) and additional reference material, the King County International Airport proposes to construct a standard Runway Safety Area for Runway 13R/31L. This is one of the most urgent projects outlined in the King County International Airport Master Plan which will also include the relocation of several essential facilities and the construction of an engine run-up enclosure. To complete the runway, an area of 15 acres will be initially disturbed; 9.5 acres of grass will be paved and 3 acres of pavement will be removed and planted with grass. A net increase of 6.5 acres of impervious surface will be created approximately 1,800 feet from the Duwamish Waterway. Stormwater runoff is directed through four existing storm drains that outfall into the Duwamish Waterway.

NOAA Fisheries concurs with your findings of "may affect, not likely to adversely affect," to the Puget Sound chinook salmon or their habitat, because of the reasons provided in the BA and subsequent correspondence: 1) the project will be constructed upland of the Duwamish Waterway; and 2) Best Management Practices (BMPs) will be employed to minimize the potential for construction and operation related activities to affect aquatic species and their habitat.

This concludes informal consultation on this proposed action in accordance with 50 C.F.R. 402.14(b)(1). The FAA must re-analyze this ESA consultation if: (1) new information reveals effects of the action that may affect listed species in a way not previously considered:(2) new information reveals the action causes an effect to listed species that was not previously considered; or (3) a new species is listed or critical habitat designated that may be affected by the identified actions.

Magnuson-Stevens Fishery Conservation and Management Act

Federal agencies are required, under §305(b)(20) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 C.F.R. 600 Subpart K), to consult with NOAA Fisheries regarding actions that are authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH). The MSA (§3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." If an action would adversely affect EFH, NOAA Fisheries is required to provide the Federal action agency with EFH conservation recommendations (MSA §305(b)(4)(A)). This consultation is based, in part, on the information provided by the Federal agency and descriptions of EFH for Pacific salmon contained in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (August 1999) developed by the Pacific Fishery Management Council and approved by the Secretary of commerce (September 27, 2000).

The proposed action and action area are described in the Biological Assessment submitted by the FAA. The project area includes habitat which has been designated as EFH for various life stages of PS chinook and coho (*O. kisutch*).

EFH Conservation Recommendations: Because the habitat requirements (*i.e.*, EFH) for the MSA-managed species in the project area are similar to that of the ESA-listed species, and because the conservation measures that the FAA included as part of the proposed action to address ESA concerns are also adequate to avoid, minimize, or otherwise offset potential adverse effects to designated EFH, conservation recommendations pursuant to MSA (§305(b)(4)(A)) are not necessary. Since NOAA Fisheries is not providing conservation recommendations at this time, no 30-day response from the FAA is required (MSA §305(b)(4)(B)).

This concludes consultation under the MSA. If the proposed action is modified in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations, the FAA will need to reinitiate EFH consultation with NOAA Fisheries in accordance with NOAA Fisheries implementing regulations for EFH at 50 C.F.R. 600.920(k).

The efforts by the FAA and King County International Airport to design this project to minimize environmental impacts are appreciated. If you have any questions, please contact Shandra O'Haleck, of my staff, at (360) 753-9533.

Sincerely,

D. Robert Lohn
Regional Administrator

File Copy

U.S. Department
of Transportation
Federal Aviation Administration

Idaho, Oregon, Washington

**Airports Division
Northwest Mountain Region
Seattle Airports District Office**
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

September 14, 2001

Gerry Jackson
United States Fish and Wildlife Service
North Pacific Coast Ecoregion
Western Washington Office
510 Desmond Drive, S.E., Suite 102
Lacey, Washington 98503

Dear Mr. Jackson:

King County International Airport
Biological Assessment (BA) – Determination of Effect

The King County International Airport (KCIA) has prepared the aforementioned document to evaluate the potential impacts on the Puget Sound chinook salmon *(Oncorhynchus tshawytscha),* Bull Trout *(Salvenlinus confluentus)* and the Bald Eagle (*Haliaeetus leucocephalus)*, as a result of actions proposed in the Airport Master Plan Update, the most immediate of which is a Runway Safety Area project on the north end of the main runway.

In accordance with Section 7(c) of the Endangered Species Act (ESA), we hereby request your written concurrence with our Determination of Effect which is enclosed along with the BA.

Please do not hesitate to contact me at (425) 227-2653 should you have any questions or wish to discuss anything in more detail.

Sincerely,

Cayla D. Morgan
Airport Planner/Environmental Specialist

Cc: Gary Molyneaux, King County International Airport

File Copy

U.S. Department
of Transportation
Federal Aviation
Administration

Idaho, Oregon,
Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

September 14, 2001

Steve Landino
National Marine Fisheries Service
510 Desmond Drive, S.E., Suite 103
Lacey, Washington 98503

Dear Mr. Landino:

King County International Airport
Biological Assessment (BA) – Determination of Effect

The King County International Airport has prepared the aforementioned document to evaluate the potential impacts on the Puget Sound chinook salmon *(Oncorhynchus tshawytscha)*, Bull Trout *(Salvenlinus confluentus)* and the Bald Eagle *(Haliaeetus leucocephalus)*, as a result of actions proposed in the Airport Master Plan Update, the most immediate of which is a Runway Safety Area project on the north end of the main runway.

In accordance with Section 7(c) of the Endangered Species Act (ESA), we hereby request your written concurrence with our Determination of Effect which is enclosed along with the BA. We also request your concurrence with our Determination of Effect on Essential Fish Habitat under the Magnuson-Stevens Act.

Please do not hesitate to contact me at (425) 227-2653 should you have any questions or wish to discuss anything in more detail.

Sincerely,

Cayla D. Morgan
Airport Planner/Environmental Specialist

Cc: Gary Molyneaux, King County International Airport

Department of Transportation
Federal Aviation Administration

Determination of Effect
King County International Airport (KCIA) - Proposed Master Plan Improvements
Seattle, Washington

Proposed Action: King County International Airport (KCIA) has completed a Master Plan and Airport Layout Plan. The most imminent proposal outlined in the plan is the construction of a standard Runway Safety Area for Runway 13R/31L. Other elements that are treated in a more general nature include a layout of general aviation and cargo facilities, the relocation of a fuel farm, relocation of helicopter landing pads, and construction of an engine run-up enclosure. Accordingly, a project level State Environmental Policy (SEPA) and a National Environmental Policy Act (NEPA) analysis is being conducted for the Runway Safety Area project, and a programmatic level of analysis is being done for the other recommended projects.

Biological Assessment: In accordance with Section 7 of the Endangered Species Act, a Biological Assessment was prepared to determine the effect of the project(s) on the following species under the Endangered Species Act, of 1973 as amended.

- Chinook Salmon (*Oncorhynchus tshawytscha*)
- Bull Trout (*Salvelinus confluentus*)
- Bald Eagle (*Haliaeetus leucocephalus*)

As with the SEPA/NEPA analysis, the BA analyzes the Runway Safety Area project in detail and treats the other elements at a program level. The BA also contains an evaluation of the potential project effects on Essential Fish Habitat (EFH) pursuant to Section 303(a)(7) of the Magnuson-Stevens Act.

Coordination: The BA was prepared to satisfy the requirements of Section 7(c) of the Endangered Species Act of 1973, as amended and Section 303 (a)(7) of the Magnuson-Stevens Act. This Determination of Effect is being forwarded to the National Marine Fisheries Service and United States Fish and Wildlife Service for their concurrence.

Biological Impacts: The proposed project will have no effect on bald eagle. The proposed project may affect, but is not likely to adversely affect, the Chinook Salmon (*O. tshawytscha*) and Bull Trout (*Salvelinus confluentus*) and their EFH.

With the assumption that proposed conservation measures would be implemented as specified, we conclude that the proposed actions "*may affect but are not likely to adversely affect*" the species listed above.

Relative to project impact to EFH, the non-listed species that are federally managed include the Puget Sound Coho and pink salmon populations. We concur with the finding in the BA that the proposed projects may affect, but are not likely to adversely affect such species.

Prepared by: Cayla Morgan, Environmental Specialist, Seattle Airports District Office, Federal Aviation Administration. September 14, 2001.

CM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 753-9518

OCT 1 1 2002

In Reply Refer To:
1-3-01-I-2313

OCT 0 8 2002

Cayla D. Morgan
Federal Aviation Administration
Airports Division
1601 Lind Avenue S.W., Suite 250
Renton, Washington 98055-4056

Dear Ms. Morgan:

This letter is in response to your request for informal consultation on the King County International Airport Proposed Master Plan Improvements proposal for Boeing Field in Seattle, King County, Washington. Your letter, with the attached biological assessment (BA), was dated September 14, 2001, and received in this office on September 19, 2001. The BA analyzed the Runway Safety Area project in detail as an immediate project, and addressed other aspects of the Master Plan at a programmatic level.

You requested U.S. Fish and Wildlife Service concurrence with determinations of "no effect" for bald eagles (*Haliaeetus leucocephalus*) and "not likely to adversely affect" for the Coastal/Puget Sound population of bull trout (*Salvelinus confluentus*), in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act)(16 U.S.C. 1531 et seq.). Sufficient detail was provided on the components and potential effects of the Runway Safety project for the U.S. Fish and Wildlife Service to concur on these effect determinations. Other potential projects under the Master Plan were addressed in a more general manner, including a layout of general aviation and cargo facilities, the relocation of a fuel farm, relocation of helicopter landing pads, and construction of an engine run-up enclosure. These, and other elements of the proposed Master Plan, are anticipated to add only an insignificant amount of impervious surface.

Our concurrence with your effect determinations is based on two factors: 1) the implementation of the best management practices and conservation measures described in the BA and your recent letter; and 2) the stated commitment by King County to comply with the most stringent applicable stormwater treatment requirements, as indicated in their letter to you dated July 16, 2002. We encourage King County to continue removing as much impervious surface as possible during the implementation of all projects.

This concludes informal consultation pursuant to the regulations implementing the Act (50 CFR 402.13). This project should be re-analyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; and/or if a new species is listed or critical habitat is designated that may be affected by this project.

If you have further questions about this letter or your responsibilities under the Act, please contact Carolyn Scafidi at (360) 753-4068.

Sincerely,

for

Ken S. Berg, Manager
Western Washington Fish and Wildlife Office

cc:
NMFS, Lacey (O'Hallock)
WDFW, Region 4

King County
International Airport
Maintenance Section
Department of Transportation
P.O. Box 80245
Seattle, WA 98108

(206) 296-7390

(206) 296-7385 FAX

July 16, 2002

Ms. Cayla Morgan
FAA -- SEA 635
1601 Lind Avenue, SW, Suite 250
Renton, WA 98055-4056

Dear Cayla:

King County International Airport Compliance with Stormwater Requirements for Master Plan Projects.

This letter provides some additional explanation of the stormwater management requirements related to the projects proposed within the King County International Airport (KCIA) Master Plan. Both the Washington State Department of Ecology (Ecology) and the King County Surface Water Program regulate stormwater discharges.

The design of stormwater treatment facilities are incorporated into the design of each project. The King County Surface Water Program reviews the design of each project and specifies the required stormwater treatment to meet specific water quality requirements. The Department of Ecology also requires treatment of stormwater for specific types of activities. The types of treatment will largely depend on the nature of each project. It is the Airport's intention to comply with the most stringent applicable treatment requirements for each of the proposed project.

In addition, both Ecology and the King County Surface Water Management Program require the use of Best Management Practices (BMPs) for specific activities. Each required BMP is specific to the activity associated with the stormwater runoff. The Airport currently has a program to address the BMPs required for the current Airport operations. The Airport intends to modify the current program, as necessary, to include any addition BMPs that maybe required through the implementation of Master Plan projects.

I hope this addresses your questions. If you have any additional questions (206) 296-7427.

Sincerely,

Rick Renaud
Senior Engineer
King County International Airport

cc: Gary Molyneaux – KCIA

PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

COMMUNITY ALTERNATIVE

PAGE INTENTIONALLY LEFT BLANK

APPENDIX B
COMMUNITY ALTERNATIVE

During the King County Master Plan process, a Roundtable forum was conducted for the purpose of receiving input to the study from interested citizens, agencies, and interest groups. In May 1998, a minority report was submitted as consideration of a preferred Master Plan concept was underway. The minority report was submitted based on "our concerns stem from two distinct perspectives: (1) balance of quality of life in Seattle vs. inappropriate growth; and (2) the very real health and safety concerns both at KCIA and in the neighborhoods." Based on the concerns of a group, they " ... present(ed) a community developed Community Alternative, Revision II, as another viable conceptual plan to put before an EIS and take forward as a viable option as a preferred Master Plan. Its main features are a 9200 feet runway, reduction of larger, noisier low-flying jet operations over Seattle neighborhoods, permanent air quality, noise and vibration monitoring, and a noise reduction menu."

The purpose of this appendix is to present the probable consequences of the Community Alternative on the environs of King County International Airport (KCIA).

B.1 Recommendations of the Community Alternative

The following actions were recommended by members of the Roundtable for consideration:

- **9,200-feet runway** – The community alternative recommends shortening the runway.
- **Moratorium on new leases** until after Part 150 and 161 studies have been completed and a final Master Plan adopted;
- De-emphasized use of cargo and passenger operators.

Based on the minority report recommendations, further consideration was given to defining a community alternative to enable identification of the environmental consequences of this alternative. Relative to each of the needs identified in Chapter 1, the following alternative was defined:

- *Achieve Compliance with the Runway Safety Area by providing a 9,200-foot runway* – to achieve the RSA compliance, the community alternative would shorten the runway and use declared distances. As a result, the length of the runway would be 9,200 feet for departures. This is the same as the "Without Master Plan" or Do-Nothing alternative considered in Chapter 4.
- *Achieve Compliance with the Runway Protection Zone* – This issue was not specifically referenced in the minority report. It would be necessary to relocate the fuel facilities to comply. However, it is presumed that this alternative would not achieve lower minimums in approaches to Runway 31L. Therefore, the existing RPZ would be maintained, but with relocation of the fuel facilities to the location proposed by the Master Plan.
- *Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner* – This specific need was not addressed in the minority report. Therefore, estimates based on alternative goals articulated in the minority report were used to determine what actions would address future needs:

- *Lease moratorium* – the minority report states "Lifting the moratorium on leases would lock in land use and immediately create a de facto Master Plan.... leaving the citizens of King County concerned with the noise and environmental effects of noisier, bigger jets..." Thus, it appears that accommodating growth in facility demand would not be an objective of the Community Alternative. Keeping the Airport as it exists today would be the objective or other objectives (such as de-emphasized cargo or passenger activity). However, keeping the Airport as it exists today would not reduce the level or growth of activity nor would it result in smaller, quieter aircraft during the planning horizon. As is shown in Chapters 1 and 2, activity is expected to grow at KCIA regardless of whether or not additional or renovated facilities are developed at the Airport. As has been shown at virtually all airports in the country, a constraint in facilities at airports does not limit growth. In fact, if demand for air travel exists in a region, it would overburden facilities resulting in tremendous operational inefficiencies.

- *Aggressively pursue, complete and implement FAR Part 150 and 161 studies to perform noise evaluations and to restrict nighttime and other excessive noise impacts.* – King County initiated a Part 150 Study for KCIA in July 1999. This study was to be completed in early 2002. The purpose of a Part 150 Study, as defined by FAA guidance, is to develop a balanced and cost-effective program for reducing existing and future noise exposure. King County included in the scope of work for that study consideration of a Part 161 effort. The minority report notes that it does not wish to focus on one type of operator, ".. but to actually address all users of the larger, noisier aircraft with the lower, more penetrating and disturbing noise frequency levels Whenever(Sic) they occur." Specific items identified were the following:

    1. <u>Cargo Service de-emphasized</u> - "Phase out current leases for cargo operators using larger noisier jets, by not renewing them when they are due to expire or at an earlier mutually agreeable time, pursuant to a Part 161 Study. Provide incentives for current cargo operator leases to be terminated. ... Reallocate property, as it becomes available, to a mix of operations such as GA, low noise corporate operations, aircraft sales and delivery facilities, aircraft maintenance facilities, and non-operational aviation facilities."

    2. Totally enclosed <u>engine run-up facility</u> (hush house) with air scrubbers- this element was included by King County in its overall airport noise work program. It has been included in the Master Plan environmental evaluation at a programmatic level, as a site has not been identified for such a facility. A totally enclosed facility is not technically feasible due to engine airflow requirements. A three-sided facility might be feasible and will be evaluated in a subsequent feasibility study. The Part 150 Study has recommended that an engine run-up facility be considered further by conducting a siting feasibility study.

    3. <u>FAR Part 150 Noise Study</u> - Elements 3 and 4 (Part 150 and 161 studies) have been commissioned by King County and the Part 150 phase was completed in early 2002. That study developed a comprehensive noise mitigation plan that is discussed in Chapter 4.1 *Noise*. During scoping, comments were received that these studies should be completed before the Master Plan and that the Master Plan environmental evaluation should reflect the combined recommendations of both studies. King County disagrees with that approach, as the Master Plan is focusing on long-range development needs (development through the 2018 planning horizon). The environmental evaluation then considers the impacts caused by the project (the difference between future "With Master Plan" and "Without Master Plan"). Conversely, the Part 150 study process is required to examine existing conditions, and conditions 5–years in to the future (through 2006). The focus of the Part 150 study is reduction of existing and future noise. Because of the different emphases of these studies and the need to correct the RSA, these studies were conducted with a slight overlap (the Part 150 was initiated as soon as the consultant was

selected and funding could be appropriated for the conduct of the study). As a result, the Part 150 Study responded to *element 11*.

4. FAR Part 161 Stage 3 nighttime restriction (aircraft >75,000 lbs).

5. Revised landing fees – "everyone pays market price" – no further definition of this element was provided.

6. Permanent air monitoring system - Elements 6 and 7 (permanent air, noise and vibration monitoring) – King County has agreed to conduct an air pollution study with participation from the Department of Ecology and Puget Sound Clean Air Agency. King County currently operates a permanent noise monitoring system to measure noise. Specialized vibration analysis was conducted for this environmental evaluation. No additional monitoring is warranted. While measurement programs would provide additional data to define existing conditions, it would not change the conclusions concerning the environmental consequences of the alternatives addressed in Chapter 4 or that presented in this appendix.

7. Permanent noise and vibration monitoring system – see above.

8. Pilot education program for noise reduction - King County has implemented a pilot awareness program, as discussed in Section 4.1. Implementation of such a program is improving pilot understanding of local noise concerns. Improvements in the pilot awareness program were recommended by the Part 150 Study, which recommended a Fly Quiet program. It would not alter the analysis/conclusions in Chapter 4 or this appendix.

9. Support Power Plant and Museum of Flight is defined as "KCIA to provide priority land use consideration for these facilities." It is presumed to do so would achieve the RSA compliance through shortening the runway and providing additional lands as needed to these facilities.

10. Passenger service de-emphasized "by not issuing new leases for passenger operators, phase out current leases for passenger operators by not renewing them when they are due to expire, or at an earlier mutually agreeable time, pursuant to a Part 161 study. Provide current incentives for current Passenger operator leases to be terminated early. ... Reallocate property, as it becomes available, to a mix of operations such as GA, low noise, corporate operations, aircraft sales and delivery facilities, aircraft maintenance facilities, and non operational aviation facilities."

11. Noise reduction menu – see above.

B.2 Assumptions Associated with the Community Alternative

To evaluate the consequences of the Community Alternative, specific operational and development assumptions had to be developed. As was noted during the Master Plan, this alternative is not feasible. The only vehicle available to achieve the reduction and eventual discontinuation of activity by cargo and passenger operators would be through natural forces or a voluntary program (per FAR Part 161). During the Roundtable discussion, operators did not volunteer to discontinue their operations at KCIA, thus this is not a realistic option. However, because of the community support for this alternative, it was given consideration in this environmental document.

The following assumptions have been established to enable the preparation of forecasts of aircraft operational activity that would likely result from the implementation of the Community Alternative. These forecasts were utilized to formulate a proposed land use plan for the Airport in recognition of predicted demands associated with the Community Alternative scenario. The resulting aviation activity forecast operational assumptions are:

Military Activity - The Community Alternative includes the recommendation to shorten the runway to 9,120 feet. The majority of the military operational activity at KCIA is associated with maintenance work being conducted by the Boeing Company. Because the Boeing Company cannot consistently utilize a 9,120-foot runway for its AWACs work, its military maintenance program would be relocated to another airport. The assumption is that with the implementation of the Community Alternative, military operations at KCIA would no longer take place. Based on the Updated forecasts prepared in 2003, this would affect 3,000 annual operations, or about 8 operations on an average day.

Air Cargo - Because of the nighttime curfew, air cargo carriers would choose not to operate large aircraft (over 60,000 pounds) at KCIA. Airport staff estimates indicate that it would be reasonable to expect a decrease of 21 aircraft operations a day by air cargo operators.

Aerospace- Because the Community Alternative includes the recommendation to shorten the runway to 9,120 feet, the Boeing Company would not be able to consistently operate its aircraft testing program at KCIA. The assumption is that with the implementation of the Community Alternative, all aerospace operational activity would be relocated to another airport.

Passenger Activity - Commercial passenger service activity would remain at the calendar year 2000 levels.

General Aviation and Air Taxi Activity - The recommendations of the Community Alternative do not specify operational changes for the Airport that would negatively impact the ability to operate general aviation aircraft at the Airport. As a result of the relocation of the Boeing Company's aerospace activity, along with the relocation of the large aircraft cargo activity to other airports, additional land would be available at KCIA for other aviation users. It is anticipated that general aviation operators (including corporate users) and air taxi operators would be able to build necessary facilities (hangars, etc.) to accommodate the unconstrained forecast operational activity levels indicated in the Master Plan.

Table B-1 shows the resulting forecast assumptions that were used in assessing the impact of this alternative.

TABLE B-1

COMPARISON OF COMMUNITY ALTERNATIVE TO MASTER PLAN FORECAST

	Updated Master Plan Forecast		Community Alternative	
Operations:	2008	2018	2008	2018
Air Carrier	10,970	14,090	2,980	3,200
Air Taxi	57,230	70,050	57,230	70,050
Military	3,000	3,000	0	0
General Aviation	251,400	284,650	251,400	284,650
Total	322,600	371,790	311,610	357,980
Enplaned Passengers	13,220	22,800	13,000	13,000

Source: Barnard Dunkelberg, rounded to nearest 10.

B.3 Probable Environmental Consequences

The following briefly summarizes the likely environmental impact associated with the Community Alternative. A detailed assessment of this alternative was performed, despite that this alternative is not prudent or feasible. However, to respond to comments and questions that were raised by the public concerning this alternative, King County prepared a comparative evaluation.

1. Noise and Land Use Compatibility

Based on the assumed operational conditions associated with KCIA operating under the Community Alternative discussed in the preceding sections, noise exposure contours were developed using the Integrated Noise Model. **Table B-2** shows the area impact information for this alternative in year 2015 in comparison to the 2015 Do-Nothing and 2015 Preferred Alternative (Master Plan recommendations):

TABLE B-2
Area Affected By Aircraft Noise (Square Miles)

	2018		
Noise Impact	Without Master Plan	Community Alternative	With Master Plan Shifted Runway Special Use Procedures
60-65 DNL	5.52 sm	1.66 sm	5.52 sm
65-70 DNL	2.43	0.54	2.43
70-75 DNL	0.87	0.24	0.86
75-80 DNL	0.31	0.32	0.31
80+ DNL	0.41	0.19	0.42
65 DNL and Greater*	4.02	1.11	4.02
60 DNL and Greater	9.54	2.77	9.54

Source: BridgeNet International, January 2004.

Exhibit B-1 shows the noise contours for this alternative, which are substantially smaller than the Without Master Plan or the With Master Plan Preferred Alternative. The 65 DNL noise exposure contour would decrease with this alternative by about 72% over the Without Master Plan or the Preferred Alternative in the year 2015. The 65 DNL noise exposure contour would extend to S. Doris Street on the north to the Associated Grocers Building north of the Boeing Access Road.

Based on the noise exposure contours, the population and housing unit impacts associated with this alternative were then calculated. **Table B-3** shows these impacts:

TABLE B-3
Population and Housing Affected by Aircraft Noise

	Year 2018					
	Without Master Plan		Community Alternative		With Master Plan Preferred Alt.	
	Population	Housing	Population	Housing	Population	Housing
60-65 DNL	11,550	4,360	1,780	680	11,560	4,260
65-70 DNL	3,270	1,350	90	90	3,270	1,350
70-75 DNL	570	280	0	0	570	280
75 DNL	10	10	0	0	10	10
80+ DNL	0	0	0	0	0	0
65 DNL & Greater	3,850	1,640	90	90	3,850	1,640

Source: Barnard Dunkelberg & Co, January 2004 using 2000 Census data.

With the reduction in air cargo and passenger activity, and elimination of the military and aerospace activities at KCIA, the Community Alternative would result in lower noise exposure related to aircraft (See **Exhibit B-1**). As is shown in **Table B-4**, the population affected by 65 DNL would decrease from 3,850 (No Build) to 90 with this alternative, a 98% reduction in impact. No people/residences would be affected by 75 DNL or greater sound levels. Impacts associated with 60-65 DNL would decrease from 11,550 (No Build) to 1,780 people, or a 85% reduction.

The reduction in noise associated with the Community Alternative would benefit the residential areas around KCIA. Land use on the west side of the Airport would likely change to other airport-related uses due to the relocation of aerospace and military activities to an offsite location. It is possible that many small new airport-related developments would be constructed on the west side of the Airport rather than a few large ones. With the loss of aerospace and military testing at KCIA, it is possible there would also be indirect land use impacts to the area west of East Marginal Way South near the Airport. Boeing may move more of its operations away from KCIA and existing Boeing property might be sold to create new developments. As specific development proposals have not been prepared, it is not possible to identify the compatibility between those new land uses and noise from the Airport.

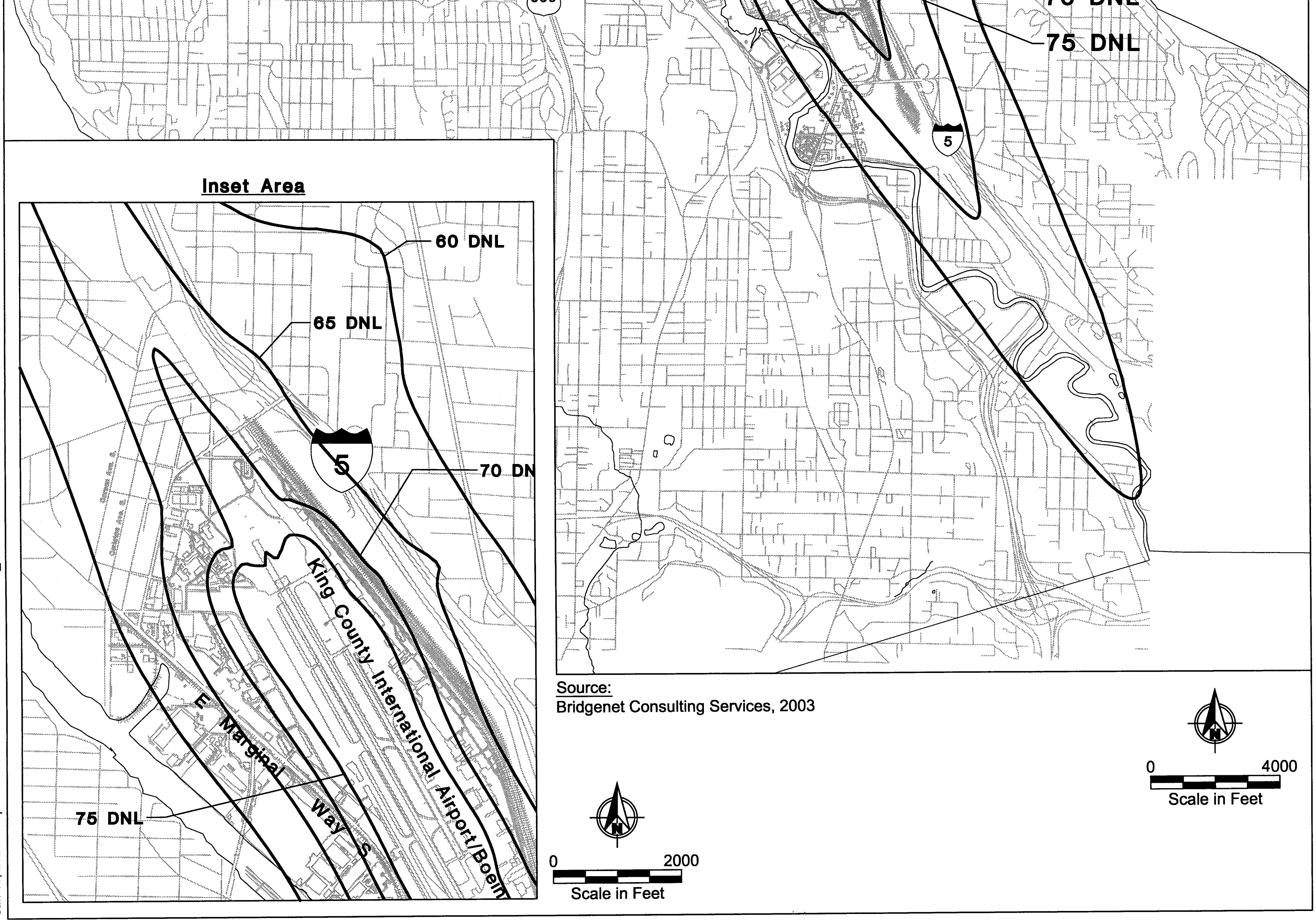
2. Social Impacts

Environmental Justice: Due to the predicted reduction in noise exposure, environmental justice populations would not be adversely impacted by noise under the Community Alternative. As noted earlier, the population affected by significant aircraft noise (65 DNL and greater noise levels) would decrease significantly with this alternative. As a result, no environmental justice impacts would be expected.

As stated above, implementation of the Community Alternative would likely change the land-use patterns on the west side of KCIA. As the nature of changing land uses is not currently known, it is not possible to predict what affect these changes may have on the community.

Surface transportation: The extent of differences in the level of impact between the Master Plan recommendations and the Community Alternative is unknown. The Master Plan forecasts an increase in passenger and air cargo activity at KCIA relative to existing levels.

Jan 16, 2004 1:24pm cdavidson K:\Jobs\040031-BOEING_FIELD\04003101\04003101-10.dwg Exhibit B-1



Source:
Bridgenet Consulting Services, 2003

Exhibit B-1
2018 Community Alternative

ANCHOR ENVIRONMENTAL, L.L.C.

The Community Alternative de-emphasizes passenger use and air cargo activity at KCIA, so there would be a reduction in the number of vehicles traveling to the Airport under the Community Alternative.

The Community Alternative results in an elimination of aerospace and military activity at KCIA. As stated above, the relocation of Boeing aerospace and military activities from the west side of the runway to other offsite locations would lead to land use changes on the west side of KCIA. It is likely that other airport-related uses would move into the space vacated by Boeing, but it is unknown what type of uses would occur and their level of impact on local traffic. In addition to the land use change on Airport property, under the Community Alternative there could be an indirect effect of land use change on the east side of East Marginal Way South near KCIA. This potential change in land use could also have an effect on local traffic. Construction activity related to new land uses on the west side of KCIA would have a short-term impact on local traffic.

3. Induced Socio-Economic Impact

The Community Alternative, as discussed earlier, would result in the loss of the Boeing Company (aerospace activity), and military operations, as well as large jet cargo traffic. The loss of these users from the Airport would have a substantial impact on the regional economic influence of the Airport. **Table B-4** lists the estimated economic impact.

TABLE B-4
Economic Impact of Community Alternative

Economic Impact	2015 Without Master Plan	2015 Community Alternative	2015 With Master Plan – Cumulative Impacts
Employment	5,526	3,450	7,151
Labor Income	$398,302,611	$145,688,417	$468,591,306
Output	$1,575,064,677	$795,342,179	$1,853,017,267
Total	$1,965,525,288	$941,030,596	$2,321,608,574

Source: Synergy Consultants, Inc. based on King County's 2000 Economic Impact Study.

As the table above shows, the Community Alternative would result in a 52% reduction in total economic value – a loss of $1.0 billion in total value and a loss of 2,076 jobs in comparison to the Without Master Plan.

4. Air Quality

Using the EDMS, an emissions inventory was prepared for the Community Alternative in order to assess the level of emissions that would be associated with this alternative. **Table B-5** shows the emissions for each of the criteria pollutants. As would be expected, the reduced level of aircraft operations would result in less aircraft and ground support emissions. Relative to the Without Master Plan scenario, the Community Alternative would reduce emissions of all pollutants with reductions of: CO by 14%, VOC by 14%, NOx by 66%, SOx by 56%, and PM10 by 33%.

TABLE B-5

Future Emissions
King County International Airport (Tons/Year)

	Year 2018		
Pollutant	**Without Master Plan**	**Community Alternative**	**With Special Area Use Procedures**
Carbon Monoxide	2,538	2,185	2,543
Volatile Organic Compounds	183	157	184
Nitrogen Oxides	205	70	205
Sulfur Oxides	18	8	18
Particulate Matter (PM10)	3	2	3

Source: Bridgenet Consulting Services, January 2004.

5. Water Quality

The Community Alternative would not result in the runway shift and, therefore, it is unknown what additional pavement would be added with this alternative. Because the Master Plan recommendations include a net gain of 6.5 acres of new impervious surface for the runway shift, the Community Alternative would have less impact on water quality due to greater infiltration of rainwater to the groundwater, and a reduction of stormwater flow rates and volumes. The reduction of large air cargo aircraft at night and the elimination of both military and aerospace operations at KCIA under the Community Alternative could lead to a reduction in the need to deice aircraft; thereby reducing the amount of deicing chemicals used at KCIA.

6. Human Health and Safety

As discussed in this appendix, the Community Alternative (relative to the Without Master Plan or With Master Plan) would reduce the noise, air quality, and water quality impacts of the Airport. As noise, air, and water related issues would be equal or less to the Without Master Plan, the human health and safety related impacts would also be equal or less. Because the runway length and thresholds would not change with the Community Alternative, no change in location over the ground or altitude would be expected with this alternative.

7. Historic, Architectural, Archaeological and Cultural Resources

Neither the Master Plan recommendations or the Community Alternative would require acquisition or displacement of historic, architectural, archaeological or cultural resources. As was noted earlier, the Community Alternative would reduce aircraft noise exposure such that sites identified in Chapter 4 would be exposed to sound levels substantially less than the Without Master Plan. For example, sites listed on the National Historic Register located north of the Airport, are currently located within 70 DNL or greater noise levels, as noted in **Table 4.8-2**. With the Community Alternative, these same sites would be located on or outside the 65 DNL noise exposure contour. The locally significant historic sites in Georgetown would be exposed to sound less then 65 DNL, except within the approach path to Runway 13R.

As the runway shift would not occur, the Community Alternative would not warrant the completion of the Memorandum of Agreement concerning the possible window vibration, as this alternative would not alter the location at which aircraft either land or takeoff.

8. DOT 4(f) Lands

Neither the Master Plan recommendations or the Community Alternative would require acquisition or displacement of any 4(f) properties. While the Master Plan recommendations would not have a significant effect on 4(f) properties, the Community Alternative would reduce noise exposure on 4(f) properties below existing conditions, and would reduce noise exposure below those anticipated under the Master Plan recommendations.

As the runway shift would not occur, the Community Alternative would not warrant the completion of the Memorandum of Agreement concerning the possible window vibration, as this alternative would not alter the location at which aircraft either land or takeoff.

9. Biotic Communities and Endangered Species (Plants and Animals)

The land at KCIA is highly developed and of little habitat value. Both the Master Plan recommendations and the Community Alternative would have little impact on biotic communities, or threatened or endangered species.

10. Wetlands and Floodplains

As is noted in Chapter 4.11, no wetlands or floodplains are present at KCIA. Similar to the Master Plan recommendations, the Community Alternative would not affect wetlands or floodplains.

11. Coastal Zone Management, Coastal Barriers and Wild and Scenic Rivers

Similar to the Master Plan recommendations, the Community Alternative would not affect the Duwamish Waterway, the only water body under the jurisdiction of the Shoreline Master Program. Therefore, no coastal zone management issues would result. No coastal barriers would be affected and no wild or scenic rivers would be affected by this alternative.

12. Farmland

Similar to the Master Plan recommendations, the Community Alternative would not convert any farmland to non-agriculture use, and therefore no farmland impacts would result from this alternative.

13. Energy Supply and Natural Resources

Neither the Community Alternative or the Master Plan recommendations would have a significant effect on energy supply or natural resources. The Community Alternative de-emphasizes air cargo and passenger activity, and eliminates the aerospace and military activity at KCIA. This may lead to less fuel consumption at the Airport.

14. Public Services and Utilities

Due to the land use change on the west side of the Airport after the aerospace and military activities have relocated, the Community Alternative would probably have a different set of utility needs than the Master Plan recommendations. The Community Alternative would not have an impact on public services or utilities available at KCIA.

15. Light Emissions

The Community Alternative would not affect airfield lighting. The reconfiguration of airport facilities on the west side of KCIA under the Community Alternative would alter lighting conditions. The amount of light emissions could increase under the Community Alternative if numerous small airport-related businesses or small hangars replace the existing, large hangar/buildings on the west side of the Airport. As specific development proposals have not been prepared, it is not possible to identify light emission impacts.

16. Aesthetics and Visual Resources

The primary change to aesthetics from the Community Alternative would be on the west side of KCIA. The west side of KCIA, now dominated by large hangars, might be replaced with numerous smaller buildings. If the existing hangars were replaced with small buildings, the view of Airport activities would open up to those traveling on East Marginal Way South.

17. Construction

The Community Alternative may have construction impacts, but it is not possible to quantify the relative amount of impacts compared to the Master Plan recommendations. While the Master Plan recommendations include construction of new pavement, the Community Alternative may include construction of new businesses on the west side of KCIA when existing Boeing military and aerospace operations are relocated offsite and new airport-related land uses move into the area.

APPENDIX C
NOISE METHODOLOGY

PAGE INTENTIONALLY LEFT BLANK

KING COUNTY INTERNATIONAL AIRPORT

NOISE ANALYSIS

FOR THE MASTER PLAN ENVIRONMENTAL ASSESSMENT

December 31, 2003
Report #99-129c

Prepared by:

BridgeNet International
3151 Airway Avenue, Bldg. I-2
Costa Mesa, CA 92626
(714) 540-3120

Table of Contents

1.0 Introduction

1.1 Project Description

King County International Airport, commonly known as Boeing Field (KCIA or BFI) serves a variety of aviation users, including the Boeing Company, air cargo operators, air taxi service, corporate business jets, and general aviation aircraft. Airport facilities include two runways, 13R/31L and 13L/31R. Runway 13R/31L is the primary runway which accommodates the large and heavy aircraft and is 10,000 feet in length. Runway 13L/31R is the secondary runway, which services the general aviation aircraft and is 3,700 feet in length.

The County has completed a Master Plan that includes a number of recommended airport projects. This study assesses the potential noise impacts associated with the Master Plan development. The Master Plan "With Project" alternative includes a Runway Shift that would relocate the runway 880 feet to the northwest for the purpose of bringing the runway safety areas into compliance.

1.2 Outline of Noise Analysis

This report is presented in five major sections including this introduction. Section 2 presents background information on sound, noise, and how noise affects people. Section 3 describes the methodology used for this study. Section 4 describes the existing noise setting in the environs of King County International Airport. Section 5 presents a description of potential impacts due to implementation of the proposed project.

2.0 Background Information on Sound

2.1 Introduction

The purpose of this section is to present background information on the characteristics of noise as it relates to King County International Airport and to summarize the methodologies that were used to study the noise environment. This section is intended to give the reader a greater understanding of the noise metrics and methodologies used to assess noise impacts. This section is divided into the following sub-sections:

- Characteristics of Sound
- Factors Influencing Human Response to Sound
- Health Effects of Sound
- Sound Rating Scales
- Noise/Land Use Compatibility Guidelines

2.2 Characteristics of Sound

Sound Level and Frequency. Sound can be described in terms of the sound pressure (amplitude) and frequency (similar to pitch). Sound pressure is a direct measure of the magnitude of a sound without consideration for other factors that may influence its perception.

The range of sound pressures that occur in the environment is so large that it is convenient to express these pressures as sound pressure levels on a logarithmic scale. The standard unit of measurement of sound is the "Decibel" or abbreviated as dB. The sound pressure level in decibels describes the pressure of a sound relative to a reference pressure. The logarithmic scale compresses the wide range in sound pressures to a more usable range of numbers.

The frequency of a sound is expressed as Hertz (Hz) or cycles per second. The normal audible frequency range for young adults is 20 Hz to 20,000 Hz. The prominent frequency range for community noise, including aircraft and motor vehicles, is between 50 Hz and 5,000 Hz. The human ear is not equally sensitive to all frequencies, but some frequencies are judged to be louder for a given signal than others. As a result of this, various methods of frequency weighting have been developed. The most common weighting is the A-weighted noise curve (dBA). The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. In the A-weighted decibel, every-day sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Most community noise analyses are based upon the A-weighted decibel scale. Examples of various sound environments, expressed in dBA, are presented in **Figure C1**.

Propagation of Noise. Outdoor sound levels decrease as a function of distance from the source, and as a result of wave divergence, atmospheric absorption, and ground attenuation. If sound is radiated from a source in a homogeneous and undisturbed manner, the sound travels as spherical waves. As the sound wave travels away from the source, the sound energy is dispersed over a greater area dispersing the sound power of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of 6 dB per doubling of the distance.

Atmospheric absorption also influences the levels that are received by the observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1000 feet. The degree of absorption is a function of the frequency of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest at high humidity and higher temperatures. Turbulence and gradients of wind, temperature and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can also result in higher noise levels than would result from spherical spreading as a result of channeling or focusing the sound waves.

Absorption effects in the atmosphere vary with frequency. The higher frequencies are more readily absorbed than the lower frequencies. Over large distances, the lower frequencies become the dominant sound as the higher frequencies are attenuated.

Duration of Sound. The annoyance from a noise event increases with increased duration of the noise event, i.e., the longer the noise event lasts the more annoying it is. The "effective duration" of a sound is the time between when a sound rises above the background sound level until it drops back below the background level. Psycho-acoustic studies have determined a relationship between duration and annoyance. These studies determined the amount a sound must be reduced to be judged equally annoying for increased duration. Duration is an important factor in describing sound in a community setting.

The relationship between duration and noise level is the basis of the equivalent energy principal of sound exposure. Reducing the acoustic energy of a sound by one half results in a 3 dB reduction. Doubling the duration of the sound increases the total energy of the event by 3 dB. This equivalent energy principal is based upon the premise that the potential for a noise to impact a person is dependent on the total acoustical energy content of the noise [1]. DNL, LEQ and SEL are all based upon the equal energy principle and defined in subsequent sections of this study.

Figure C1

EXAMPLES OF VARIOUS A-WEIGHTED SOUND ENVIRONMENTS

King County International Airport

EXAMPLES OF VARIOUS A-WEIGHTED DECIBEL SOUND ENVIRONMENTS

dB(A)	OVER-ALL LEVEL Sound Pressure Level Approx. 0.0002 Microbar	COMMUNITY (Outdoor)	HOME or INDUSTRY	LOUDNESS Human Judgement of Different Sound Levels
130		Military Jet Aircraft Takeoff with Afterburner from Aircraft Carrier @ 50 ft. (130)	Oxygen Torch (121)	120 dB(A) 32 Times as Loud
120 110	UNCOMFORTABLY LOUD	Concorde Takeoff (113)	Riveting Machine (110) Rock and Roll Band (108-114)	110 dB(A) 16 Times as Loud
100		Boeing 747-200 Takeoff (101)		100 dB(A) 8 Times as Loud
90	VERY LOUD	Power Mower (96) DC-10-30 Takeoff (96)	Newspaper Press (97)	90 dB(A) 4 Times as Loud
80		Car Wash @ 20 ft. (89) Boeing 727 Hushkit Takeoff (89)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80 dB(A) 2 Times as Loud
70	MODERATELY LOUD	High Urban Ambient Sound (80) Passenger Car, 65 mph @ 25 ft. (77) Boeing 757 Takeoff (76)	Living Room Music (76) TV-Audio, Vacumn Cleaner	70 dB(A)
60		Propeller Airplane Takeoff (67) Air Conditioning Unit @ 100 ft. (60)	Cash Register @ 10 ft. (65-70) Electric Typewriter @ 10 ft. (64) Conversation (60)	60 dB(A) 1/2 Times as Loud
50	QUIET	Large Transformers @ 100 ft. (50)		50 dB(A) 1/4 Times as Loud
40		Bird Calls (44) Low Urban Ambient Sound (40)		40 dB(A) 1/8 Times as Loud

"Aircraft takeoff noise measured 6,500 meters from beginning of takeoff roll
(Source: Advisory Circular AC-36-3G)"

Change in Noise. The concept of change in ambient sound levels can be understood with an explanation of the hearing mechanism's reaction to sound. The human ear is a far better detector of relative differences in sound levels than absolute values of levels. Under controlled laboratory conditions, listening to a steady unwavering pure tone sound that can be changed to slightly different sound levels, a person can just barely detect a sound level change of approximately one decibel for sounds in the mid-frequency region. When ordinary noises are heard, a young healthy ear can detect changes of two to three decibels. A five-decibel change is readily noticeable while a 10-decibel change is judged by most people as a doubling or a halving of the loudness of the sound.

Recruitment of Loudness. Recruitment describes the perception of loudness in situations where the threshold of hearing of a sound is elevated by masking from a background sound. A listener's judgment of the loudness of a sound will vary with different levels of background noise. In low-level background situations that are near the threshold of hearing, the loudness level of a sound increases gradually. In these situations, a desired sound, such as music that is a level of 40 to 60 dB above the background, would be judged as comfortable. In loud background settings, a sound that is approximately 20 dB above the masking threshold will be perceived as the same loudness as the sound would have been if no masking sound was present.

Masking Effect. A characteristic of sound is the ability of a sound to interfere with the ability of a listener to hear another sound. This is defined as the masking effect. The presence of one sound effectively raises the threshold of audibility for the hearing of a second sound. For a signal to be heard, it must exceed the threshold of hearing for that particular individual and exceed the masking threshold for the background noise.

The masking characteristics of sound is dependent upon many factors, including the spectral (frequency) characteristics of the two sounds, the sound pressure levels and the relative start time of the sounds. The masking affect is greatest when the masking frequency is closest to the frequency of the signal. Low frequency sounds can mask higher frequency sounds, however, the reverse is not true

2.3 Factors Influencing Human Response to Sound

Many factors influence how a sound is perceived and whether or not it is considered annoying to the listener. This includes not only physical characteristics of the sound but also secondary influences such as sociological and external factors. Molino, in the *Handbook of Noise Control* [2] describes human response to sound in terms of both acoustic and non-acoustic factors. These factors are summarized in Table C1.

Sound rating scales are developed to account for the factors that affect human response to sound. Nearly all of these factors are relevant in describing how sounds are perceived in the community. Many of the non-acoustic parameters play a prominent role in affecting individual response to noise. Background sound, an additional acoustic factor not specifically listed, is also important in describing sound in rural settings. Fields [4], in his analysis of the effects of personal and situational variables on noise annoyance, has identified a clear association of reported annoyance and fear of an accident. In particular, Fields has stated there is therefore firm evidence that noise annoyance is associated with: (1) the fear of an aircraft crashing or of danger from nearby surface transportation; (2) the belief that aircraft noise could be prevented or reduced by designers, pilots or authorities related to airlines; and (3) an expressed sensitivity to noise generally. Thus, it is important to recognize that non-acoustic factors such as the ones described above as well as acoustic factors contribute to human response to noise.

Table C1
FACTORS THAT AFFECT INDIVIDUAL ANNOYANCE TO NOISE
King County International Airport

Primary Acoustic Factors	
	Sound Level
	Frequency
	Duration
Secondary Acoustic Factors	
	Spectral Complexity
	Fluctuations in Sound Level
	Fluctuations in Frequency
	Rise-time of the Noise
	Localization of Noise Source
Non-acoustic Factors	
	Physiology
	Adaptation and Past Experience
	How the Listener's Activity Affects Annoyance
	Predictability of When a Noise will Occur
	Is the Noise Necessary?
	Individual Differences and Personality

Source: C. Harris, 1979

2.4 Health Effects of Noise

Noise, often described as unwanted sound, is known to have several adverse effects on people. From these known adverse effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise on people such as hearing loss, communication interference, sleep interference, physiological responses and annoyance. Each of these potential noise impacts on people are briefly discussed in the following narrative:

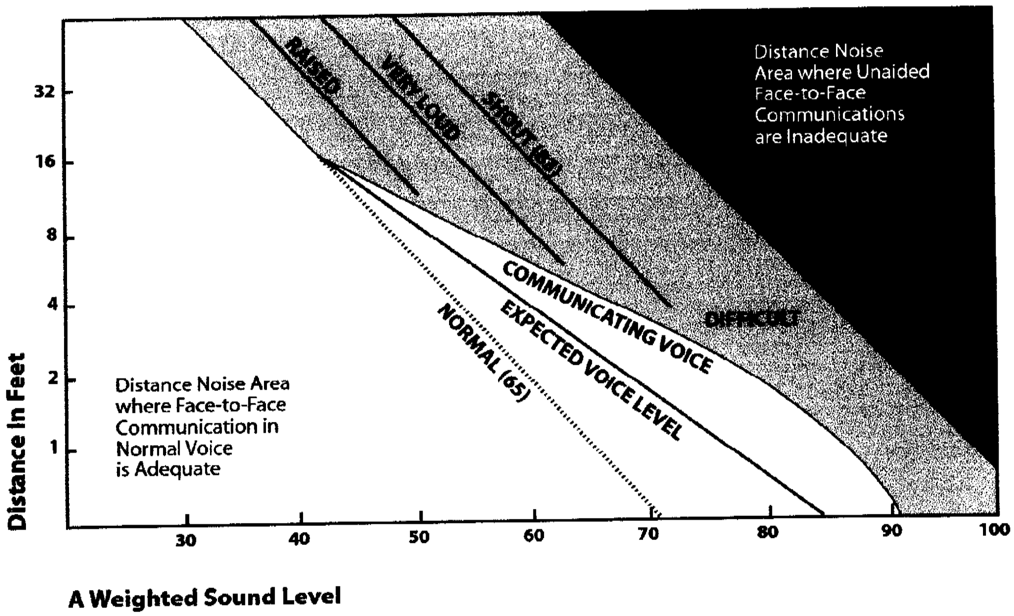
- *Hearing Loss* is generally not a concern in community/aircraft noise situations, even close to a major airport or a freeway. The potential for noise induced hearing loss is more commonly associated with occupational noise exposures in heavy industry, very noisy work environments with long-term, sometimes close-proximity exposure, or certain very loud recreational activities such as target shooting, motorcycle or car racing, etc. The Occupational Safety and Health Administration (OSHA) identifies a noise exposure limit of 90 dBA for 8 hours per day to protect from hearing loss (higher limits are allowed for shorter duration exposures). Noise levels in neighborhoods, even in very noisy neighborhoods, do not exceed this standard and are not sufficiently loud to cause hearing loss.

- *Communication Interference* is one of the primary concerns with aircraft noise. Communication interference includes interference with hearing, speech, or other forms of communication, such as watching television and talking on the telephone. Normal conversational speech produces sound levels in the range of 60 to 65 dBA and any noise in this range or louder may interfere with the ability of another individual to hear or understand what is spoken. There are specific methods for describing speech interference as a function of the distance between speaker, listener and voice level. **Figure C2** shows the relationship between the quality of speech communication and distance between talker and listener.

Figure C2

QUALITY OF SPEECH COMMUNICATION IN RELATION TO DISTANCE BETWEEN THE TALKER AND THE LISTENER

King County International Airport



- *Sleep Interference* is a major noise concern in noise assessment and, of course, is most critical during nighttime hours when the majority of the population is sleeping. Sleep disturbance is one of the major causes of annoyance due to community noise. Noise can make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages, and cause awakening. Noise may even cause awakening that a person may or may not be able to recall.

  Extensive research has been conducted on the effect of noise on sleep disturbance. Recommended values for desired sound levels in residential bedroom space range from 25 to 45 dBA with 35 to 40 dBA being the norm. The National Association of Noise Control Officials [3] have published data on the probability of sleep disturbance with various single event noise levels. Based on experimental sleep data as related to noise exposure, a 75 dBA interior noise level event will cause noise induced awakening in 30 percent of the cases.

  Recent research from England [4] and the USAF has shown that the probability for sleep disturbance is less than what had been reported in earlier research. This research showed that once a person was asleep, it is much more unlikely that they will be awakened by a noise. The significant difference in the recent study is the use of actual in-home sleep disturbance patterns as opposed to laboratory data that had been the historic basis for predicting sleep disturbance. The results of such research are presented in **Figure C3**.

- *Sleep Interference*, particularly during nighttime hours, is one of the major causes of annoyance due to noise. Noise makes it difficult to fall asleep, creates momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages and may cause awakenings that a person may not be able to recall.

  Extensive research has been conducted on the effect of noise on sleep disturbance. In 1981, the National Association of Noise Control Officials [3] published data on the probability of sleep disturbance with various single event noise levels. Based on laboratory experiments conducted in the 1970's, this data indicated that noise exposure at 75 dBA interior noise level event will cause noise induced awakening in 30 percent of the cases.

  However, newer research conducted in the 1990's in England [4] shows that the probability for sleep disturbance is less than that reported in earlier research. Newer, more sophisticated field techniques indicate that awakenings can be expected in a much lower percentage of people than had been expected based on earlier laboratory studies. The significant difference in the more recent English study is the use of actual in-home sleep disturbance patterns as opposed to laboratory data that had been the historic basis for predicting sleep disturbance.

  This research showed that once a person was asleep in their own home, it is much more unlikely that they will be awakened by a noise. Some of this research has been criticized because it was conducted in areas where subjects had become accustomed to aircraft noise. On the other hand, some of the earlier laboratory sleep studies had been criticized because of the extremely small sample sizes of most laboratory studies and because the laboratory was not necessarily a representative sleep environment.

  This English field study assessed the effects of nighttime aircraft noise on sleep in 400 people (211 women and 189 men; 20-70 years of age; one per household) living at eight sites adjacent to four U.K. airports, with different levels of night flying. The main finding was that only a minority of aircraft noise events affected sleep, and, for most subjects, that domestic and other non-aircraft factors had much greater effects. As shown in the **Figure C3** aircraft noise was a minor contributor among a host of other factors that lead to awakening response.

Likewise, the Federal Interagency Committee on Noise (FICON) in an earlier 1992 document entitled Federal Interagency Review of Selected Airport Noise Analysis Issues recommended an interim dose-response curve for sleep disturbance based on laboratory studies of sleep disturbance. This was updated in June of 1997, when the Federal Interagency Committee on Aviation Noise (FICAN) replaced the FICON recommendation with an updated curve based on the more recent in-home sleep disturbance studies. The FICAN recommended a curve based on the upper limit of the data presented and therefore considers the curve to represent the "maximum percent of the exposed population expected to be behaviorally awakened," or the "maximum awakened."

The FICAN recommendation is shown on **Figure C4**. This is a very conservative approach. A more common statistical curve for the data points is also reflected in **Figure C4**. The differences indicate, for example, a 10% awakening rate at a level of approximately 100 dB SEL, while the "maximum awakened" curve prescribed by FICAN shows the 10% awakening rate being reached at 80 dB SEL. (The full FICAN report can be found on the internet at www.fican.org.) Sleep interference continues to be a major concern to the public and an area of debate among researchers.

- *Physiological Responses* reflect measurable changes in pulse rate, blood pressure etc. Generally, physiological responses reflect a reaction to a loud short-term noise, such as a rifle shot or a very loud jet over flight. While such effects can be induced and observed, the extent to which these physiological responses cause harm is not known.

- *Annoyance* is the most difficult of all noise responses to describe. Annoyance is an individual characteristic and can vary widely from person to person. What one person considers tolerable may be unbearable to another of equal hearing capability. The level of annoyance also depends on the characteristics of the noise (i.e.; loudness, frequency, time, and duration), and how much activity interference (e.g. speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10 percent of the population is highly susceptible to annoyance from noise not of their own making, while approximately 20 percent are unaffected by noise. Attitudes are affected by the relationship between the listener and the noise source. (Is it our dog barking or the neighbor's dog?) Whether we believe that someone is trying to abate the noise will also affect our level of annoyance.

Figure C3
CAUSES OF REPORTED AWAKENINGS
King County International Airport

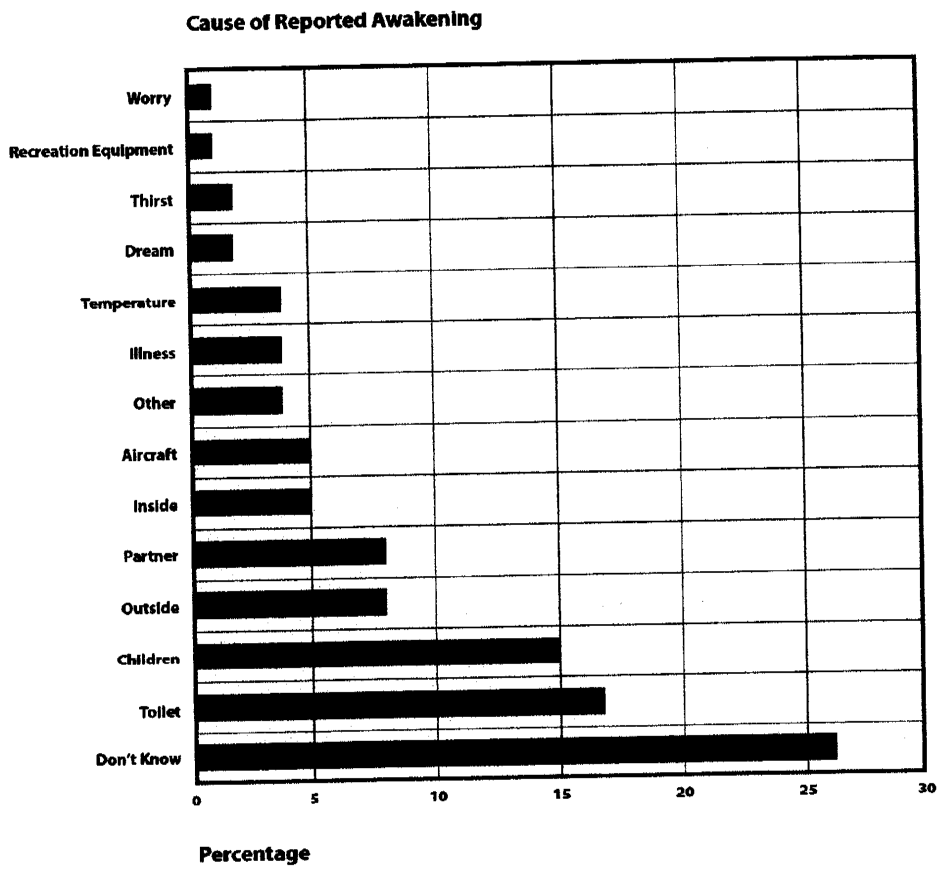
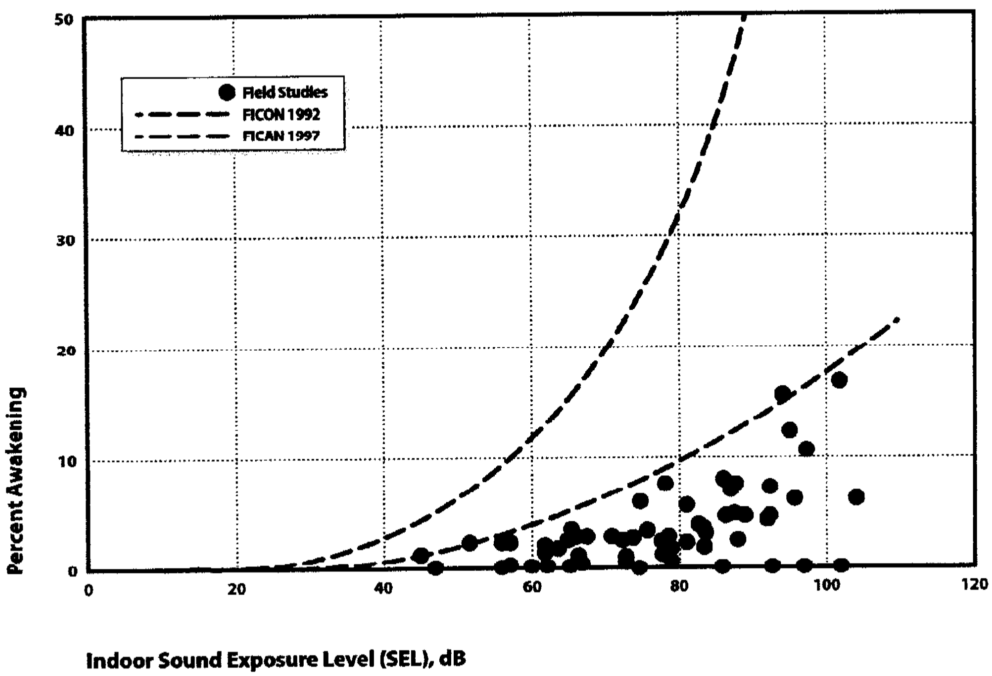


Figure C4
RECOMMENDED SLEEP DISTURBANCE DOSE-RESPONSE RELATIONSHIP
PERCENT OF AWAKENINGS PER SEL
King County International Airport



2.5 Sound Rating Scales

The description, analysis, and reporting of community sound levels is made difficult by the complexity of human response to sound and the myriad of sound-rating scales and metrics that have been developed for describing acoustic effects. Various rating scales have been devised to approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters such as duration and cumulative effect of multiple events.

Noise metrics can be categorized as single event metrics and cumulative metrics. Single event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day. Noise metrics used in this study are summarized below:

2.5.1 Single Event Metrics

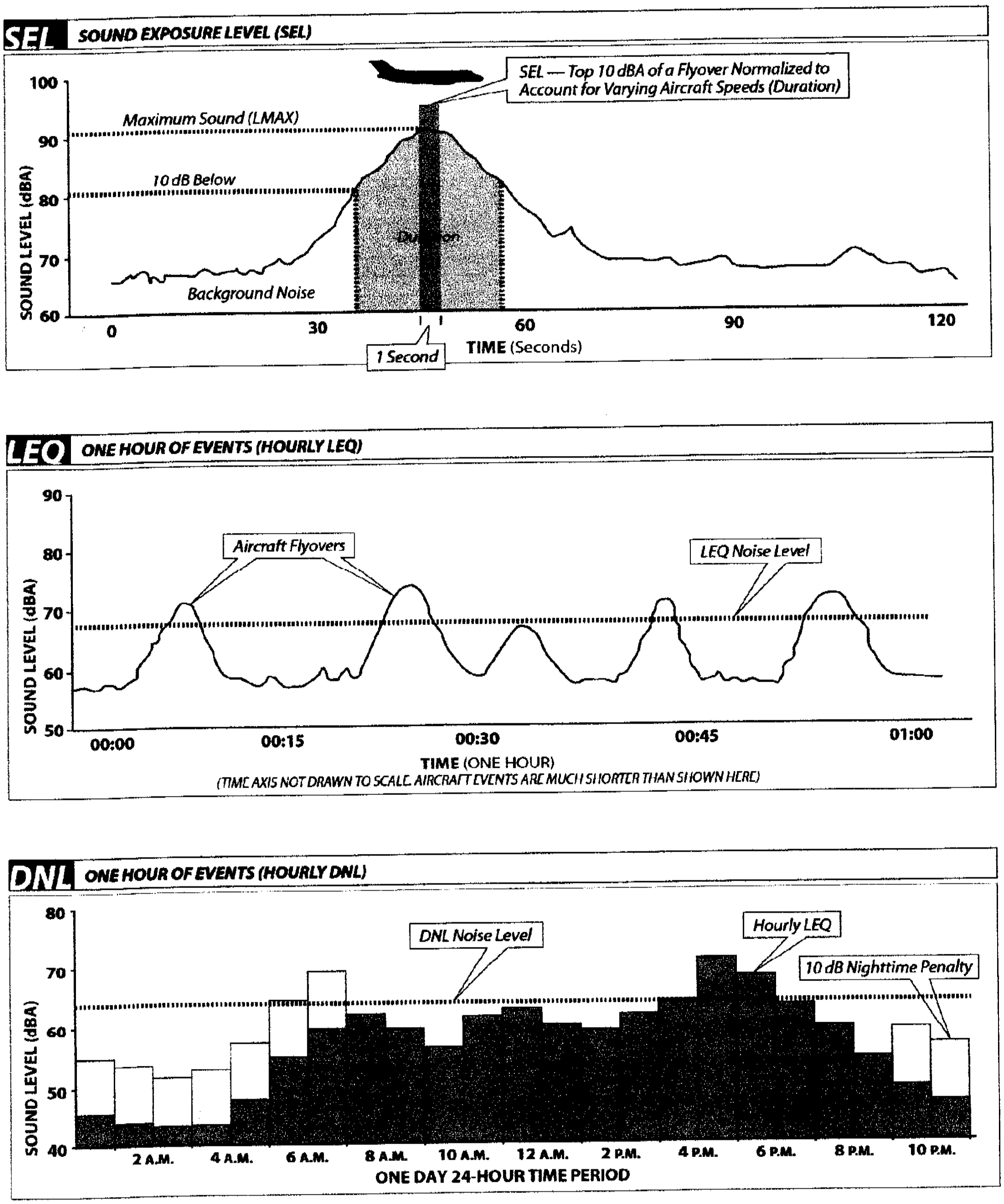
- *Frequency Weighted Metrics (dBA).* In order to simplify the measurement and computation of sound loudness levels, frequency weighted networks have obtained wide acceptance. The A-weighting (dBA) scale has become the most prominent of these scales and is widely used in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured. The metrics used in this study are all based upon the dBA scale.

- *Maximum Noise Level.* The highest noise level reached during a noise event is called the "Maximum Noise Level," or Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets, the louder it is, until the aircraft is at its closest point directly overhead. Then as the aircraft passes, the noise level decreases until the sound level again settles to ambient levels. Such a history of a flyover is plotted at the top of **Figure C5**. It is this metric to which people generally instantaneously respond when an aircraft flyover occurs.

- *Sound Exposure Level (SEL).* Another metric that is reported for aircraft flyovers is the Sound Exposure Level (SEL) metric. It is computed from dBA sound levels. Referring again to the top of **Figure C5** the shaded area, or the area within 10 dB of the maximum noise level, is the area from which the SEL is computed. The SEL value is the integration of all the acoustic energy contained within the event. Speech and sleep interference research can be assessed relative to SEL data.

This metric takes into account the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is typically about 10 dBA higher than the maximum noise level. Single event metrics are a convenient method for describing noise from individual aircraft events. This metric is useful in that airport noise models contain aircraft noise curve data based upon the SEL metric. In addition, cumulative noise metrics such as LEQ and DNL can be computed from SEL data.

Figure C5
EXAMPLES OF LMAX, SEL, LEQ, AND DNL NOISE LEVELS
King County International Airport



2.5.2 Cumulative Metrics

Cumulative noise metrics have been developed to assess community response to noise. They are useful because these scales attempt to include the loudness of the noise, the duration of the noise, the total number of noise events and the time of day these events occur into one single number rating scale. They are designed to account for the known health effects of noise on people described earlier.

- *Equivalent Noise Level (LEQ).* LEQ is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. LEQ is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. It is the energy sum of all the sound that occurs during a specified time period. This is graphically illustrated in the middle graph of **Figure C5**. LEQ can be measured for any time period, but is typically measured for 15 minutes, 1 hour or 24-hours. Leqs are developed based on aircraft event SELs for the daytime, evening, and nighttime to develop the Day Night Noise Level (DNL) values for aircraft operations.

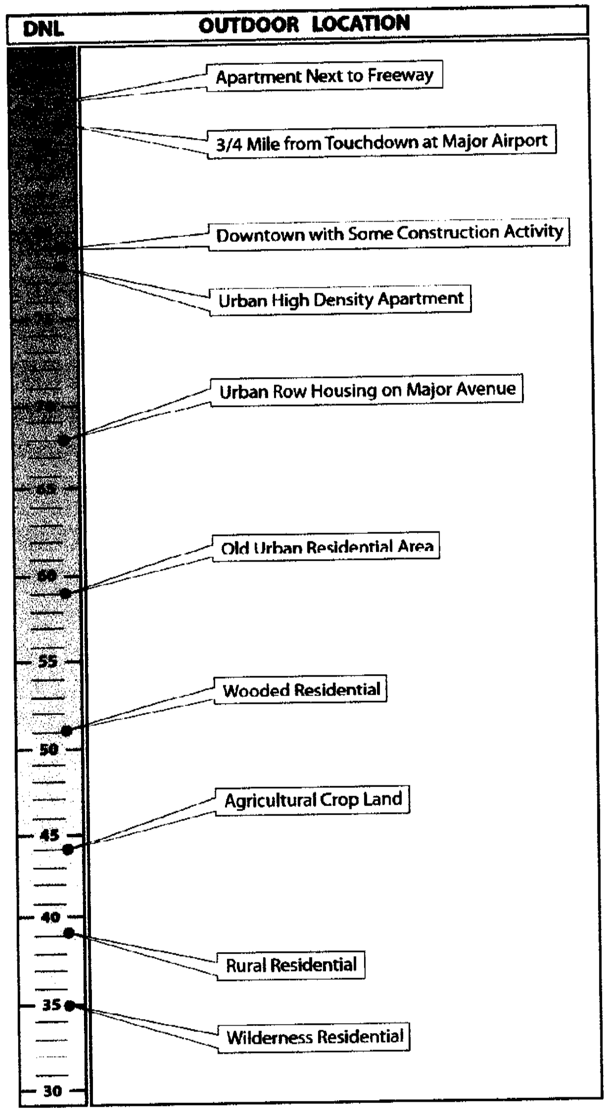
- *Day Night Noise Level (DNL).* The DNL index is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The time-weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. In the DNL scale, noise occurring between the hours of 10 p.m. to 7 a.m. is penalized by 10 dB. This penalty was selected to attempt to account for the higher sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occur in the nighttime. DNL is specified by the FAA for airport noise assessment, and the Environmental Protection Agency (EPA) specifies DNL for community noise and airport noise assessment. DNL, also referred to also as Ldn, is graphically illustrated in the bottom of **Figure C5**. Examples of various noise environments in terms of DNL are presented in **Figure C6**.

2.5.3 Supplemental Metrics

- *Time Above (TA).* The FAA has developed the Time Above metric as a second metric for assessing impacts of aircraft noise around airports. The Time Above index refers to the total time in seconds or minutes that aircraft noise exceeds certain dBA noise levels in a 24-hour period. It is typically expressed as Time Above 75 and 85 dBA sound levels. While this index is not widely used, it may be used by the FAA in environmental assessments of airport projects that show a significant increase in noise levels. There are no noise/land use standards in terms of the Time Above index.

- *Percent Noise Level (LN).* To account for intermittent or fluctuating noise, another method to characterize noise is the Percent Noise Level (LN). The Percent Noise Level is the level exceeded n% of the time during the measurement period. It is usually measured in the A-weighted decibel, but can be an expression of any noise rating scale. Percent Noise Levels are another method of characterizing ambient noise where, for example, L90 is the noise level exceeded 90 percent of the time, L50 is the level exceeded 50 percent, and L10 is the level exceeded 10 percent of the time. L90 represents the background or minimum noise level; L50 represents the median noise level, and L10 the peak or intrusive noise levels. Percent noise level is commonly used in community noise ordinances that regulate noise from mechanical equipment, entertainment noise sources, and the like. It is not normally used for transportation noise regulation (although the FHWA LEQ criteria for roadways were originally stated as an L10 criterion).

Figure C6
TYPICAL OUTDOOR NOISE LEVELS IN DNL
King County International Airport



2.6 Noise/Land Use Compatibility Guidelines and Other Regulations

The use of noise metrics is an attempt to relate aircraft noise exposure with community/citizen reaction to the existing or anticipated sound levels. The public reaction to various aircraft noise conditions has been estimated from extensive research on human responses to exposure of different levels of aircraft noise. **Figure C7** relates community reaction to various DNL noise levels based on one of these surveys.

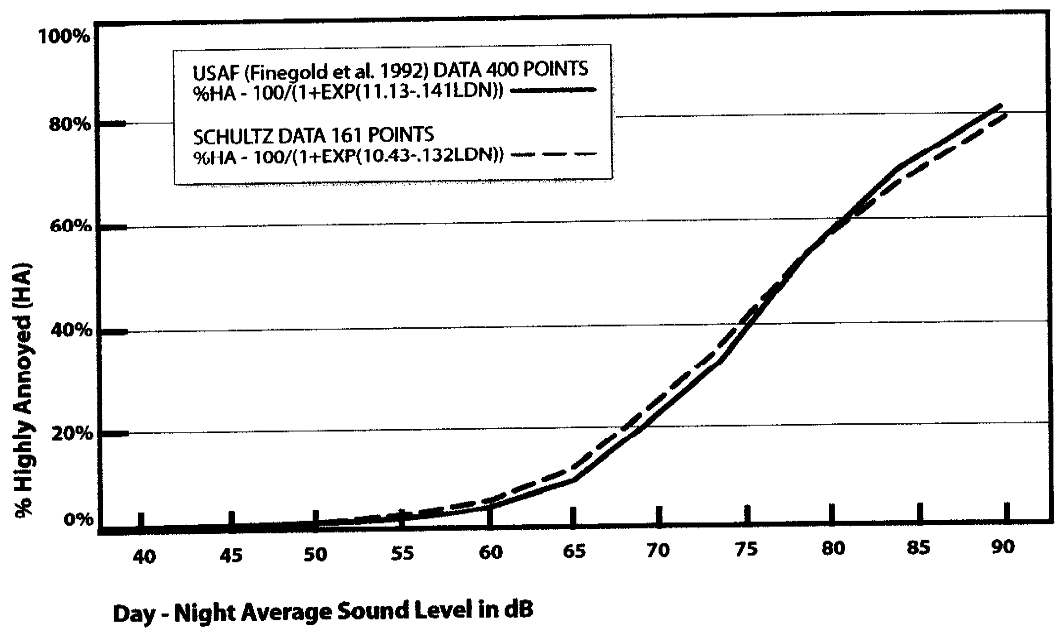
The most common noise/land use compatibility guideline used is 65 dB DNL for residential land use with outdoor activity areas – this guideline suggests that residential uses are acceptable when sound levels are less than 65 DNL. At 65 DNL, the Schultz curve predicts approximately 14% of the exposed population to be highly annoyed. At 60 DNL this decreases to approximately 8% of the population highly annoyed. It should be further pointed out that the data upon which the Schultz curve and the more recent updates are based include a very wide range of scatter among the data with communities near some airports reporting a much higher percentage of the population highly annoyed at these noise exposure levels.

A summary of some of the more pertinent regulations and guidelines are presented in the following paragraphs.

- *Federal Aviation Regulations, Part 36, "Noise Standards: Aircraft Type and Airworthiness Certification".*

  Originally adopted in 1960, FAR Part 36 prescribes noise standards for issuance of new aircraft type certificates; it also limited noise levels for certification of new types of propeller-driven, small airplanes as well as for transport category, large airplanes. Subsequent amendments extended the standards to certain newly produced aircraft of older type designs. Other amendments extended the required compliance dates. Aircraft may be certificated as Stage 1, Stage 2, or Stage 3 aircraft based on their noise level, weight, number of engines and in some cases, number of passengers. Stage 1 aircraft over 75,000 pounds are no longer permitted to operate in the U.S. Stage 2 aircraft over 75,000 pounds were phased out of the U.S. fleet as discussed below under Airport Noise and Capacity Act of 1990. Although aircraft meeting Part 36 standards are noticeably quieter than many of the older aircraft, the regulations make no determination that such aircraft are acceptably quiet for operation at any given airport.

Figure C7
COMMUNITY REACTION TO NOISE
King County International Airport



USAF	0.40	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81.00

CALCULATED % HIGHLY ANNOYED (HA) POINTS

- *Federal Aviation Regulations, Part 150, "Airport Noise Compatibility Planning".*

  As a means of implementing the Aviation Safety and Noise Abatement Act (ASNA), the FAA adopted Regulations on Airport Noise Compatibility Planning Programs. These regulations are spelled out in FAR Part 150. As part of the FAR Part 150 Noise Control program, the FAA published noise and land use compatibility charts to be used for land use planning with respect to aircraft noise. An expanded version of this chart appears in Aviation Circular 150/5020-1 (dated August 5, 1983) and is reproduced in **Figure C8**. These guidelines represent recommendations to local authorities for determining acceptability and permissibility of land uses. The guidelines specify a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that will be considered acceptable or compatible to people in living and working areas.

  These noise levels are derived from case histories involving aircraft noise problems at civilian and military airports and the resultant community response. Note that residential land use is deemed acceptable for noise exposures up to 65 DNL. Recreational areas are also considered acceptable for noise levels above 65 DNL (with certain exceptions for amphitheaters that are recommended not to exceed 65 DNL). Several important notes appear for the FAA guidelines including one that indicates that ultimately "the responsibility for determining the acceptability and permissible land uses remains with the local authorities."

- *Federal Aviation Order 5050.4 and Directive 1050.1 for Environmental Analysis of Aircraft Noise Around Airports.*

  The FAA has developed guidelines (Order 5050.4D) for the environmental analysis of airports. Federal requirements now dictate that increases in noise levels in noise sensitive land uses of over 1.5 DNL within the 65 DNL contour are considered significant (1050.1A Directive 12.21.83). The FAA only considers noise impacts that occur at the 65 DNL or greater. No analysis is required beyond the 65 DNL.

- *Airport Noise and Capacity Act of 1990*

  The Airport Noise and Capacity Act of 1990 (PL 101-508, 104 Stat. 1388), also known as ANCA or the Noise Act, established two broad directives for the FAA: (1) establish a method to review aircraft noise, and airport use or access restriction, imposed by airport proprietors, and (2) institute a program to phase-out Stage 2 aircraft over 75,000 pounds by December 31, 1999. (Stage 2 aircraft are older, noisier aircraft (B-737-200, B-727 and DC-9); Stage 3 aircraft are newer, quieter aircraft (B-737-300, B-757, MD-80/90).) To implement ANCA, FAA amended Part 91 to address the phase-out of large Stage 2 aircraft and the phase-in of Stage 3 aircraft. In addition, Part 91 states that all Stage 2 aircraft over 75,000 pounds, were to be removed from the domestic fleet or modified to meet Stage 3 by December 31, 1999. There are a few exceptions but only Stage 3 aircraft greater than 75,000 pounds are now in the domestic fleet. The airlines have phased out Stage 2 aircraft, and the mainland domestic fleet is now all Stage 3 aircraft. Stage 2 aircraft less than 75,000 pounds include the F28 and various older corporate jet aircraft such as Lear 25s and Gulfstream IIs.

  Furthermore, FAR Part 161 was adopted to institute a highly stringent review and approval process for implementing use or access restrictions by airport proprietors. Part 161 sets out the requirements and procedures for implementing new airport use and access restrictions by airport proprietors. They must use the DNL metric to measure noise effects, and the Part 150 land use guideline table, including 65 DNL as the threshold contour to determine compatibility.

Figure C8

FAA FAR PART 150 NOISE COMPATIBILITY GUIDELINES

King County International Airport

LAND USE	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBELS					
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to NOTES.

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

TABLE KEY

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land Use and related structures compatible without restrictions.
N(No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

NOTES

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Part 161 identifies three types of use restrictions and treats each one differently: negotiated restrictions, Stage 2 aircraft restrictions and Stage 3 aircraft restrictions. Generally speaking, any use restriction that affects the number or times of aircraft operations will be considered an access restriction. Even though the Part 91 phase-out does not apply to aircraft under 75,000 pounds, FAA has determined that Part 161 limitations on proprietors' authority also apply to smaller aircraft.

Negotiated restrictions are more favorable from the FAA's standpoint, but still require complex procedures for approval and implementation. Voluntary restrictions must be agreed upon by all airlines, and public notice must be given.

Stage 2 restrictions are more difficult, as one of the major reasons for ANCA was to discourage local restrictions more stringent that the ANCA's 1999 phase-out. To comply with the regulation and institute a new Stage 2 restriction, the proprietor must prepare a cost/benefit analysis of the proposed restriction and give proper notice. The cost/benefit analysis is extensive and entails considerable evaluation. Stage 2 restrictions do not require approval by the FAA.

Stage 3 restrictions are especially difficult to implement. A Stage 3 restriction involves considerable additional analysis, justification, evaluation and financial discussion. In addition, a Stage 3 restriction must result in a decrease in noise exposure of the 65 DNL to noise sensitive land uses (residences, schools, churches, parks). The regulation requires both public notice and FAA approval.

ANCA applies to all local noise restrictions that are proposed after October 1990, and to amendments to existing restrictions proposed after October 1990. The FAA has approved only one completed Part 161 Study to date (for restricting Stage 2 corporate jets), although they are still evaluating the possibility of the subject restriction violating airport grant assurances.

- *Federal Interagency Committee on Noise (FICON) Report of 1992 [13]*

  The use of the DNL metric and the 65 dB CNEL criteria has been subject to criticism from various interest groups concerning its usefulness in assessing aircraft noise impacts. As a result, at the direction of the EPA and the FAA, the Federal Interagency Committee On Noise (FICON) was formed to review specific elements of the assessment of airport noise impacts and to make recommendations regarding potential improvements. FICON is composed of representatives from the Departments of Transportation, Defense, Justice, Veterans Affairs, Housing and Urban Development, the Environmental Protection Agency, and the Council on Environmental Quality.

  FICON was formed to review Federal policies that are used in the assessment of airport noise impacts. The FICON review focused primarily on the manner in which noise impacts are determined, including whether aircraft noise impacts are fundamentally different from other transportation noise impacts; the manner in which noise impacts are described; and the extent of impacts outside of Day-Night Average A-Weighted Sound Level (DNL) 65 decibels (dB) that should be reviewed in a National Environmental Policy Act (NEPA) document.

  The committee determined that there are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric. The methodology employing DNL as the noise exposure metric and appropriate dose-response relationships to determine noise impact is considered the proper one for civil and military aviation scenarios in the general vicinity of airports. The report does support agency discretion in the use of supplemental noise analysis. The report does recommend improvement in public understanding of the DNL, supplemental methodologies and aircraft noise impacts.

  If screening analysis shows that noise-sensitive areas that will be at or above DNL 65 would have an increase of 1.5 DNL or more, further analysis should be conducted of noise sensitive areas between DNL 60-65 having an increase of DNL 3 or more due to the proposed airport noise exposure.

3.0 Methodology

3.1 Background

The methods used here for describing the existing and future noise environment rely heavily computer noise modeling. The noise environment is commonly depicted in terms of lines of equal noise levels, or noise contours. These noise contours are supplemented here with calculated noise levels for selected points on the ground. The computer noise models are described in the following section.

3.2 Computer Modeling

Generating accurate noise contours is largely dependent on the use of a reliable, validated, and updated noise model. . The computer model can then be used to predict the changes to the noise environment as a result of any of the development alternatives under consideration.

The FAA's Integrated Noise Model (INM) Version 6.1 was used to model civilian and military operations at King County International Airport. The INM has an extensive database of civilian aircraft noise characteristics and this most recent version of INM incorporates the advanced plotting features that are part of the Air Forces Noisemap computer model.

Airport noise contours were generated in this study using the INM Version 6.1 [19]. The original INM was released in 1977. The latest version, INM Version 6, was released for use in 1999 and is the state-of-the-art in airport noise modeling. The INM is a large computer program developed to plot noise contours for airports. The program is provided with standard aircraft noise and performance data for over 100 aircraft types that can be tailored to the characteristics of the airport in question. This version includes an updated database that includes some newer aircraft, the ability to include run-ups in the computations, the ability to include topography in the computations, and provision to vary aircraft profiles in an automated fashion. It also includes the more comprehensive and flexible contour plotting routines.

One of the most important factors in generating accurate noise contours is the collection of accurate operational data. The INM and Noisemap programs require the input of the physical and operational characteristics of the airport. Physical characteristics include runway coordinates, airport altitude, and temperature and optionally, topographical data. Operational characteristics include various types of aircraft data. This includes not only the aircraft types and flight tracks, but also departure procedures, arrival procedures and stage lengths that are specific to the operations at the airport. Aircraft data needed to generate noise contours include:

- Number of aircraft operations by type
- Types of aircraft
- Day/Evening/Night time distribution by type
- Flight tracks
- Flight track utilization by type
- Flight profiles
- Typical operational procedures
- Average Meteorological Conditions

4.0 Existing Noise Environment

4.1 Existing 2002/03 Operations Data

Operations at King County International Airport have decreased in recent years. Total arrival and departure operations for July 1, 2002 through June 30, 2003 at King County International Airport were 298,462. These operations are broken down in the following categories: general aviation, military, air cargo, aerospace, passenger and air taxi. Of the more than 298,462 takeoffs and landings, 236,258 operations (79.2%) were general aviation aircraft, 50,456 operations (16.9%) were air taxi aircraft, 4,802, operations (1.6%) were large air cargo flights, and the remaining 6,946 operations (2.3%) were fairly evenly distributed between aerospace operations, military flights, and passenger aircraft. The average daily operations and the annual operations for each aircraft category are summarized below in **Table C2.**

Table C2
2002/3 OPERATIONS BY AIRCRAFT CATEGORY
King County International Airport

Category	Average Daily Operations	Annual Operations	Annual Percentage
General Aviation - SE	388.4	141,755	47.5%
General Aviation - ME & Helicopter	161.8	59,065	19.8%
General Aviation – Corporate Jet	97.1	35,439	11.9%
Air Cargo < 60,000	21.6	7,880	2.6%
Air Cargo > 60,000	13.2	4,802	1.6%
Boeing Company Aerospace	6.6	2,410	0.8%
Passenger	4.9	1,770	0.6%
Air Taxi	116.7	42,576	14.3%
Military	7.6	2,766	0.9%
Totals	**817.7**	**298,463**	**100.0%**

4.2 Aircraft Fleet Mix and Time of Day

The fleet mix of aircraft operating from King County International Airport in 2002/3 was about 79% general aviation aircraft, about 1.6% air cargo flights, and about 17% air taxi operations. The general aviation and air taxi operations included mostly single and multi-engine propeller driven aircraft with the remaining flights consisting primarily of corporate jets and turboprop aircraft. A detailed breakdown of the aircraft used to model the flight operations by INM aircraft type at Boeing Field is presented in **Table C3**.

The number of operations per time of day was also determined. 84% of all aircraft operations were modeled as occurring during the daytime hours (7:00 a.m. to 10:00 p.m.) while the remaining 16% were modeled during nighttime hours (10:00 p.m. to 7:00 a.m.). A detailed breakdown of these hours by aircraft type was presented in **Table C3.**

Table C 3
2002/3 OPERATIONS FLEET MIX
King County International Airport

INM Type	Daily Arrivals Day	Daily Arrivals Night	Daily Departures Day	Daily Departures Night	Daily Operations Arrivals	Daily Operations Departures	Daily Operations Total	Annual Operations
GASEPF	82.53	14.56	82.53	14.56	97.09	97.09	194.18	70,877
GASEPV	82.53	14.56	82.53	14.56	97.09	97.09	194.18	70,877
BEC58P	34.03	4.81	34.03	4.81	38.84	38.84	77.67	28,351
CNA441	14.03	2.15	14.03	2.15	16.18	16.18	32.36	11,813
CIT3	8.28	1.43	8.28	1.43	9.71	9.71	19.42	7,088
LEAR25	4.14	0.71	4.14	0.71	4.85	4.85	9.71	3,544
SABR80	4.14	0.71	4.14	0.71	4.85	4.85	9.71	3,544
GIV	4.14	0.71	4.14	0.71	4.85	4.85	9.71	3,544
GIIB	4.14	0.71	4.14	0.71	4.85	4.85	9.71	3,544
LEAR35	12.42	2.14	12.42	2.14	14.56	14.56	29.13	10,632
MU3001	4.14	0.71	4.14	0.71	4.85	4.85	9.71	3,544
CVR580	0.37	0.26	0.37	0.26	0.63	0.63	1.27	463
DHC6	1.50	1.04	1.50	1.04	2.54	2.54	5.08	1,853
LEAR25	0.97	0.67	0.97	0.67	1.64	1.64	3.27	1,194
LEAR35	3.53	2.45	3.53	2.45	5.98	5.98	11.97	4,369
DHC6	22.09	3.80	22.09	3.80	25.89	25.89	51.78	18,901
727EM2	0.75	0.64	0.75	0.64	1.39	1.39	2.78	1,016
74720B	0.29	0.25	0.29	0.25	0.54	0.54	1.08	396
757RR	1.09	0.91	1.09	0.91	2.00	2.00	4.00	1,459
A30062	0.71	0.60	0.71	0.60	1.32	1.32	2.63	961
DC870	0.36	0.30	0.36	0.30	0.66	0.66	1.32	480
A310	0.16	0.13	0.16	0.13	0.29	0.29	0.58	212
DC95HW	0.21	0.18	0.21	0.18	0.38	0.38	0.76	279
707QN	0.16		0.16		0.16	0.16	0.31	114
737400	2.20		2.20		2.20	2.20	4.41	1,609
747400	0.01		0.01		0.01	0.01	0.02	8
757PW	0.69		0.69		0.69	0.69	1.37	501
767300	0.04		0.04		0.04	0.04	0.07	27
777200	0.21		0.21		0.21	0.21	0.42	152
DHC6	1.44	0.26	1.44	0.26	1.70	1.70	3.39	1,239
DHC8	0.41	0.07	0.41	0.07	0.48	0.48	0.97	354
MD83	0.21	0.04	0.21	0.04	0.24	0.24	0.48	177
GASEPV	36.37	5.10	36.37	5.10	41.47	41.47	82.94	30,274
DHC6	4.81	0.72	4.81	0.72	5.53	5.53	11.06	4,036
DHC8	0.24	0.04	0.24	0.04	0.28	0.28	0.57	206
CIT3	2.35	0.40	2.35	0.40	2.75	2.75	5.49	2,005
74720B	0.31		0.31		0.31	0.31	0.62	226
DHC8	2.63		2.63		2.63	2.63	5.26	1,918
GIIB	0.85		0.85		0.85	0.85	1.70	622
BEC58P	7.28	1.02	7.28	1.02	8.30	8.30	16.59	6,055
Total	**346.76**	**62.08**	**346.76**	**62.08**	**409.85**	**408.85**	**817.70**	**298,463**

4.3 Runway and Flight Track Utilization

The direction the aircraft operate into and out of the Airport is dependent upon the direction the wind is blowing at the time. Due to the proximity of Boeing Field to Seattle-Tacoma International Airport (Sea-Tac), when Sea-Tac changes the flow of aircraft operations from north to south, or vice versa, operations at Boeing Field tend to follow suit. During 2002/3, departures and arrivals were assumed on Runways 13R and 13L 69% of the time, while 31% of the departures and arrivals were on Runways 31L and 31R.

The 2002/3 operation percentages for King County International Airport have been broken down by runway usage for each aircraft category. The values in **Table C4** list each runway and the percentage of operations each aircraft category uses each runway. The majority of all aircraft operations are conducted on Runway 13R/31L. Only the single and multi-engine general aviation aircraft operated from Runway 13L/31R, while all of the remaining aircraft operated from Runway 13R/31L. Operations from single and multi-engine aircraft are almost evenly split between the two runways.

Table C4
2002/3 RUNWAY USE BY AIRCRAFT CATEGORY
King County International Airport

Category	13R	31L	13L	31R
General Aviation (SE & ME)	34%	16%	35%	15%
General Aviation (Jet)	69%	31%	0%	0%
Military	69%	31%	0%	0%
Air Cargo	69%	31%	0%	0%
Aerospace	69%	31%	0%	0%
Passenger	69%	31%	0%	0%
Air Taxi	69%	31%	0%	0%

Flight tracks refer to the actual path over the ground an aircraft flies when arriving to, or departing from, an airport. Flight tracks used in this study are based upon radar data from the FAA air traffic control and from observations by engineers in the field. The flight paths used to model the noise environment are presented in **Figure C9**.

4.4 Existing (2002/3) DNL Contours

The 2002/3 DNL contours for King County International Airport were prepared using Integrated Noise Model (INM) version 6.1. INM is a computer program originally developed by the Federal Aviation Administration to assess noise and plot noise contours for airports. The contours shown are the 60, 65, 70, 75, and 80 DNL. These noise levels establish a baseline against which the future operations and the Master Plan recommendations will be measured.

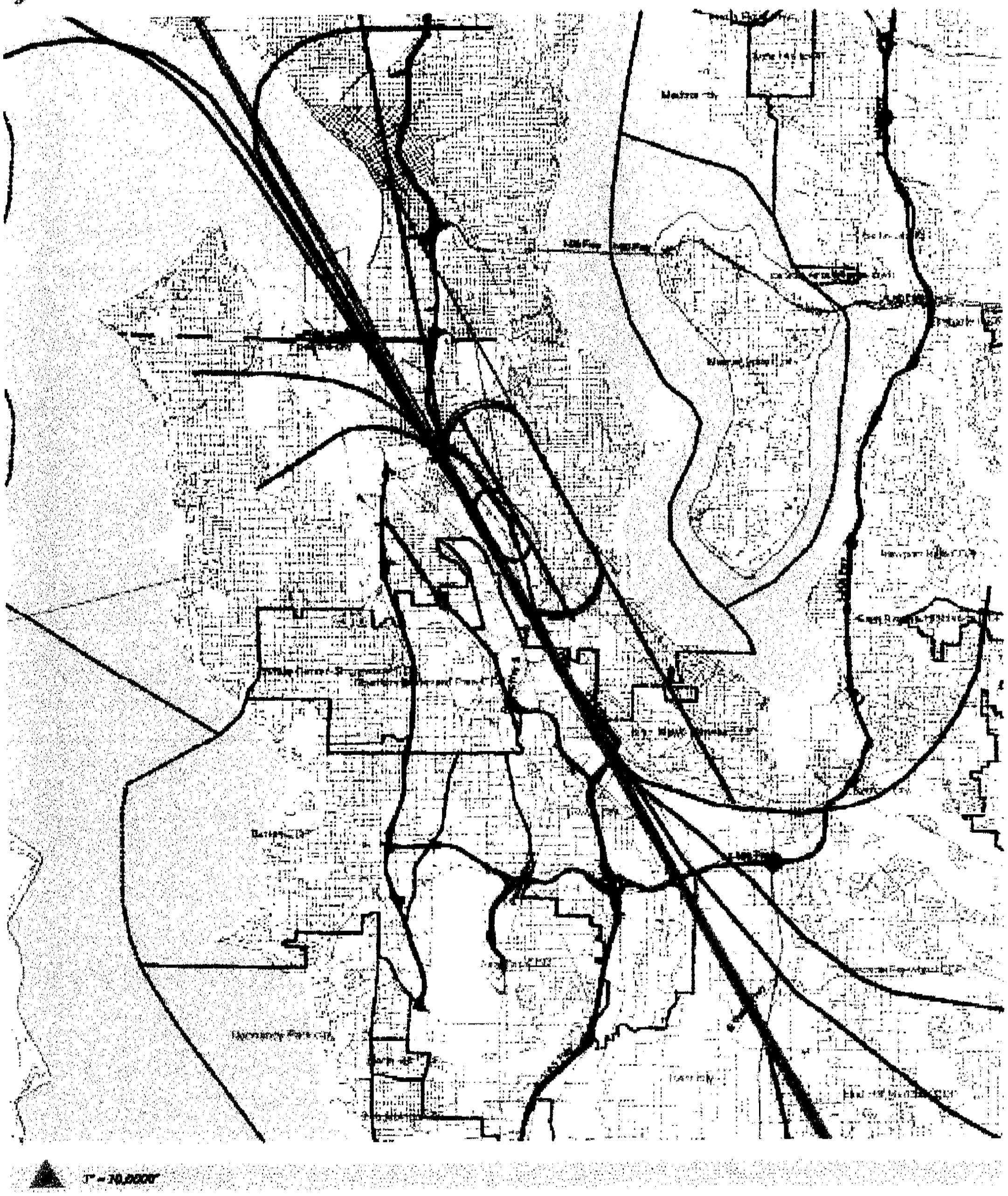


Figure C9 Flight Track Map

Flight Track Legend

Arrivals

Departures

King County INTERNATIONAL AIRPORT/Boeing Field FAR Part 150 Study

5.0 Project Impact on Noise Levels

The potential impact of noise associated with the Master Plan recommendations at King County International Airport is described in this section. The proposed Master Plan project includes shifting Runway 13R/31L 880 feet further to the northwest that would maintain the length of the runway at 10,000 feet. Operations on Runway 13R/31L would not be affected by the proposed runway shift. The future noise levels where determined for both with and without the proposed Master Plan recommendations.

5.1 Future Operation Forecast for the Year 2018

Total flight operations at King County International Airport are expected to increase 25% between 2002/3 and 2018. Due to gradual transition of the fleet to new and quieter aircraft, the future noise contours will be smaller than the existing noise contours, despite the forecast increase in operations.

The aviation forecast predicts that there will be over of 371,798 operations at the Airport in 2018, regardless of project implementation. **Table C5** present summaries of projected daily and annual operations for the year 2018 for the No Action case, listed by aircraft category. These assumptions in operations are the same for the Alternative A-2 (Full Use) and Alternative A-3 (Special Use), the two With Project scenarios that are currently being evaluated. A more detailed breakdown of the future aircraft operational assumptions is presented in **Table C6**.

The runway usage and the flight track utilization are expected to be the same in the future as they are today. The percentage of daytime and nighttime operations is also expected to remain the same.

Table C5
2018 OPERATIONS BY AIRCRAFT CATEGORY – NO BUILD ALTERNATIVE
King County International Airport

Category	Daily Operations	Annual Operations	Annual Percentage
General Aviation - SE	432.83	157,982	42.5%
General Aviation - ME & Helicopter	214.46	78,279	21.1%
General Aviation – Corporate Jet	132.58	48,391	13.0%
Air Cargo < 60,000	32.21	11,758	3.2%
Air Cargo > 60,000	21.42	7,820	2.1%
Boeing Company Aerospace	8.30	3,030	0.8%
Passenger	8.88	3,242	0.9%
Air Taxi	159.71	58,296	15.7%
Military	8.22	3,000	0.8%
Totals	**1018.62**	**371,798**	**100.0%**

Table C6
2018 ANNUAL OPERATIONS FLEET MIX
King County International Airport

INM Type	Daily Arrivals Day	Daily Arrivals Night	Daily Departures Day	Daily Departures Night	Daily Operations Arrivals	Daily Operations Departures	Daily Operations Total	Annual Operations
GASEPF	91.98	16.23	91.98	16.23	108.21	108.21	216.41	78,991
GASEPV	91.98	16.23	91.98	16.23	108.21	108.21	216.41	78,991
BEC58P	34.16	4.83	34.16	4.83	38.99	38.99	77.99	28,465
CNA441	27.05	4.14	27.05	4.14	31.19	31.19	62.39	22,772
CIT3	11.31	1.95	11.31	1.95	13.26	13.26	26.52	9,678
CL600	5.65	0.98	5.65	0.98	6.63	6.63	13.26	4,839
SABR80	5.65	0.98	5.65	0.98	6.63	6.63	13.26	4,839
GIV	5.65	0.98	5.65	0.98	6.63	6.63	13.26	4,839
CNA750	5.65	0.98	5.65	0.98	6.63	6.63	13.26	4,839
LEAR35	16.96	2.93	16.96	2.93	19.89	19.89	39.77	14,517
MU3001	5.65	0.98	5.65	0.98	6.63	6.63	13.26	4,839
CVR580	0.83	0.58	0.83	0.58	1.41	1.41	2.82	1,030
DHC6	3.33	2.31	3.33	2.31	5.65	5.65	11.29	4,122
LEAR25	1.07	0.73	1.07	0.73	1.80	1.80	3.60	1,315
LEAR35	4.27	2.97	4.27	2.97	7.25	7.25	14.50	5,291
DHC6	31.60	5.44	31.60	5.44	37.04	37.04	74.09	27,042
727EM2	1.23	1.04	1.23	1.04	2.27	2.27	4.53	1,654
74720B	0.48	0.41	0.48	0.41	0.88	0.88	1.77	645
757RR	1.77	1.48	1.77	1.48	3.25	3.25	6.51	2,376
A30062	1.16	0.98	1.16	0.98	2.14	2.14	4.29	1,564
DC870	0.58	0.49	0.58	0.49	1.07	1.07	2.14	782
A310	0.26	0.22	0.26	0.22	0.47	0.47	0.94	345
DC95HW	0.34	0.29	0.34	0.29	0.62	0.62	1.24	454
707QN	0.20		0.20		0.20	0.20	0.39	144
737400	2.77		2.77		2.77	2.77	5.54	2,023
747400	0.01		0.01		0.01	0.01	0.03	10
757PW	0.86		0.86		0.86	0.86	1.72	629
767300	0.05		0.05		0.05	0.05	0.09	34
777200	0.26		0.26		0.26	0.26	0.52	190
DHC6	2.63	0.48	2.63	0.48	3.11	3.11	6.22	2,269
DHC8	0.75	0.14	0.75	0.14	0.89	0.89	1.78	648
MD83	0.38	0.07	0.38	0.07	0.44	0.44	0.89	324
GASEPV	46.71	6.55	46.71	6.55	53.26	53.26	106.52	38,879
DHC6	7.93	1.19	7.93	1.19	9.12	9.12	18.24	6,656
DHC8	0.54	0.09	0.54	0.09	0.63	0.63	1.26	458
CIT3	6.20	1.05	6.20	1.05	7.26	7.26	14.51	5,297
74720B	0.34		0.34		0.34	0.34	0.67	245
DHC8	2.85		2.85		2.85	2.85	5.70	2,081
GIIB	0.92		0.92		0.92	0.92	1.85	674
BEC58P	8.42	1.18	8.42	1.18	9.60	9.60	19.19	7,005
Total	**430.43**	**78.88**	**430.43**	**78.88**	**509.31**	**509.31**	**1018.62**	**371,798**

5.2 Future (2018) No Action Project Case

The No Action Project case actually reflects no change to the runway configuration at the Airport. The runway safety area is not meet or is met through other means that do not alter the existing runway length or operational configuration. The noise contours for the 2018 No Action Project case are presented in Chapter 4.1.

5.3 Future (2018) With Project Cases

As previously described, the 2018 With Project cases call for the shifting of Runway 13R/31L by 880 feet to the northwest. The new runway would continue to be 10,000 feet in length. The level of future operations for both of the With Project cases (A-2 and A-3) are the same as those for the No Action Project case. The different alternatives associated with this runway shift are described below.

Alternative A-2 (Full Use). Under this Alternative (A-2 Full Use of the Shifted Runway), all aircraft departing Runway 13R would depart from the north end of the shifted runway. This shifts the departure threshold 880 feet north of the current departure threshold.

The shifted runway includes an 880-foot displaced landing threshold. Thus, for landings, on Runway 13R, aircraft land at the same ground point as they do with existing conditions. The noise contours for this alternative are presented in the main text Chapter 4.

Alternative A-3 (Special Use Area). Under this With Project Alternative, the aircraft departing Runway 13R would be split between two departure thresholds. The heavy aircraft, including B747's and Aerospace category aircraft, which require the greatest amount of runway length, would depart from the north end of the shifted runway. The number of aircraft assumed to use the full runway length are listed in **Table C7**. The remainder of the aircraft departing Runway 13R would depart from the existing threshold.

Table C7
Aircraft Using Full Runway Length
King County International Airport

Category	Daily Operations	Annual Operations
Cargo	0.61	224.1
Military	0.23	85.6
Boeing Aerospace	0.35	128.4
Total	1.20	438.2

The shifted runway includes an 880-foot displaced landing threshold. Thus, for landings, on Runway 13R, aircraft land at the same ground point as they do with existing conditions. The noise contours for the 2018 With Project Special Use Area (Preferred Alternative) case are presented in Chapter 4.

6.0 References

1. Environmental Protection Agency, "Information on Levels on Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U.S. Environmental Protection Agency, Office of Noise Abatement and Control, March 1974.

2. Harris, Cyril M., "Handbook of Noise Control," Second Edition, McGraw-Hill Book Co., 1979.

3. National Association of Noise Control Officials, "Noise Effects Handbook," New York, 1981.

4. James M. Fields, Federal Aviation Administration and NASA Langley Research Center, 'Effect of Personal and Situational Variables on Noise Annoyance: With Special Reference to Implications for En Route Noise,' DOT/FAA/EE-92/03, August 1992.

5. Department of Transport, "Report of a Field Study of Aircraft Noise and Sleep Disturbance," Department of Safety, Environment and Engineering Civil Aviation Authority, December 1992.

6. State of California, "California Airport Noise Regulations," Chapter 6, California Administrative Code, 1970.

7. Fidell, Sanford, and S. Teffeteller, "The Relationship Between Annoyance and Detectability of Low Level Sounds," Report 3699, Bolt, Beranek and Newman, April 1978.

8. Green, D.M., and J. A. Swets, "Signal Detection Theory and Psychophysics," John Wiley and Sons, New York, 1966.

9. Fidell, Sanford, K.S. Pearsons, and R.L. Bennett, "Predicting Aural Detectability of Aircraft in Noise Backgrounds," Report 2202, Bolt, Beranek and Newman, 1972.

10. Fidell, Sanford, and D.E. Bishop, "Prediction of Acoustic Detectability," Technical Report 11949, Bolt, Beranek and Newman, 1974.

11. Fidell, Sanford, and S.R. Teffeteller, "Scaling the Annoyance of Intrusive Sounds," Journal of Sound and Vibration, Volume 78, pp. 291-298, 1981.

12. Dunholter, Paul H., and R.T. Harrison, "Military Aircraft Overflight and Wilderness Perceptions," Presented at the Acoustical Society of America Conference, 1988.

13. Federal Interagency Committee on Noise, August 21, 1992.

14. Part 2, Title 24, CCR, 1974.

15. State Government Code Section 65302(f) and Section 46050.1 of the Health and Safety Code.

16. Section 21675, Public Utilities Code.

17. John Wayne Airport, Orange County, "Phase 2 Commercial Airline Access Plan and Regulation," October 1, 1990 - December 31, 2005.

18. John Wayne Airport, County of Orange, "General Aviation Noise Ordinance," Article 3, Section 2-1-30, July 1, 1985.

19. U.S. Department of Transportation, Federal Aviation Administration, "Integrated Noise Model (INM) Version 6 User's Guide," August 1999.

Figure C-8
King County International Airport
1,000-Ft Grid Locations

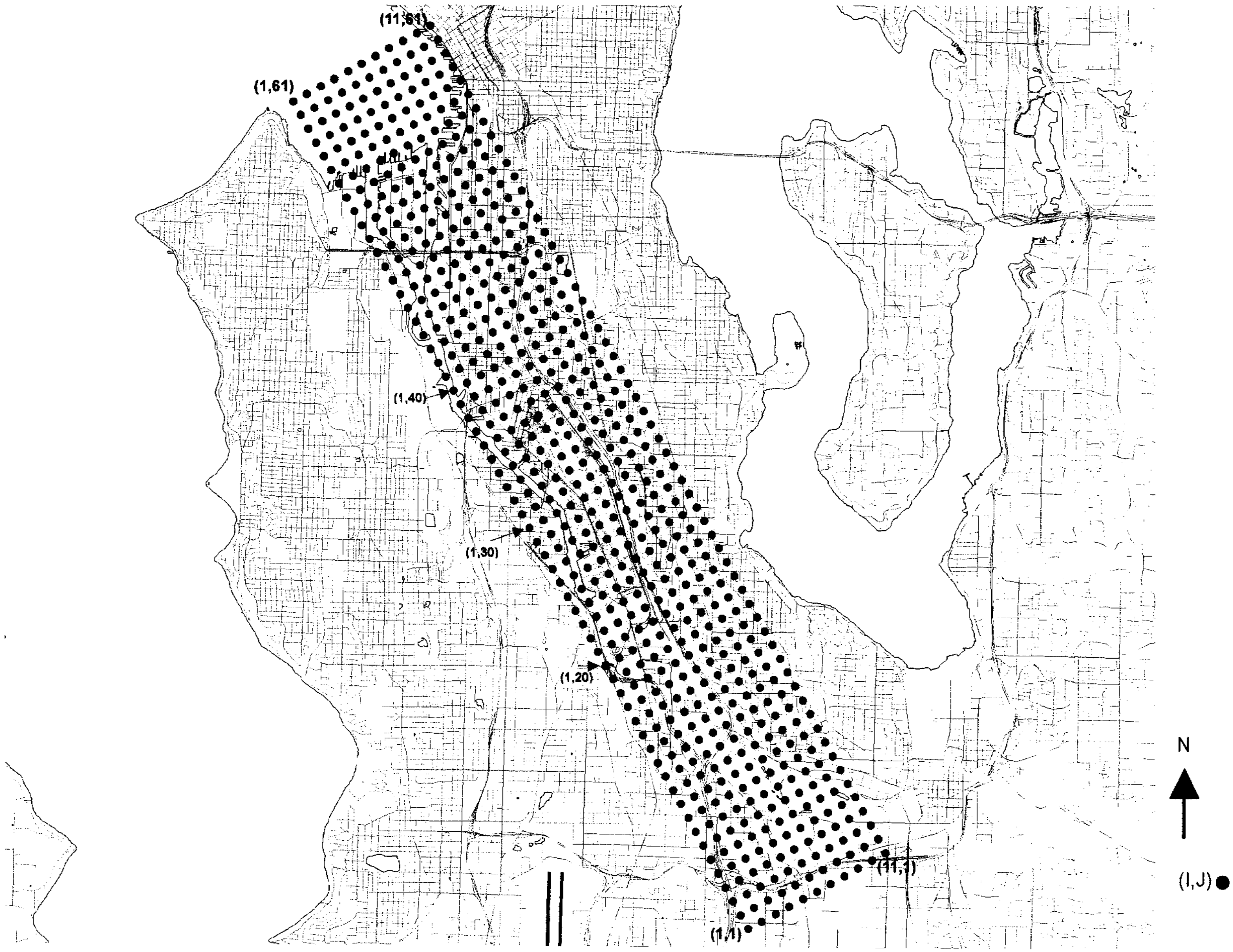
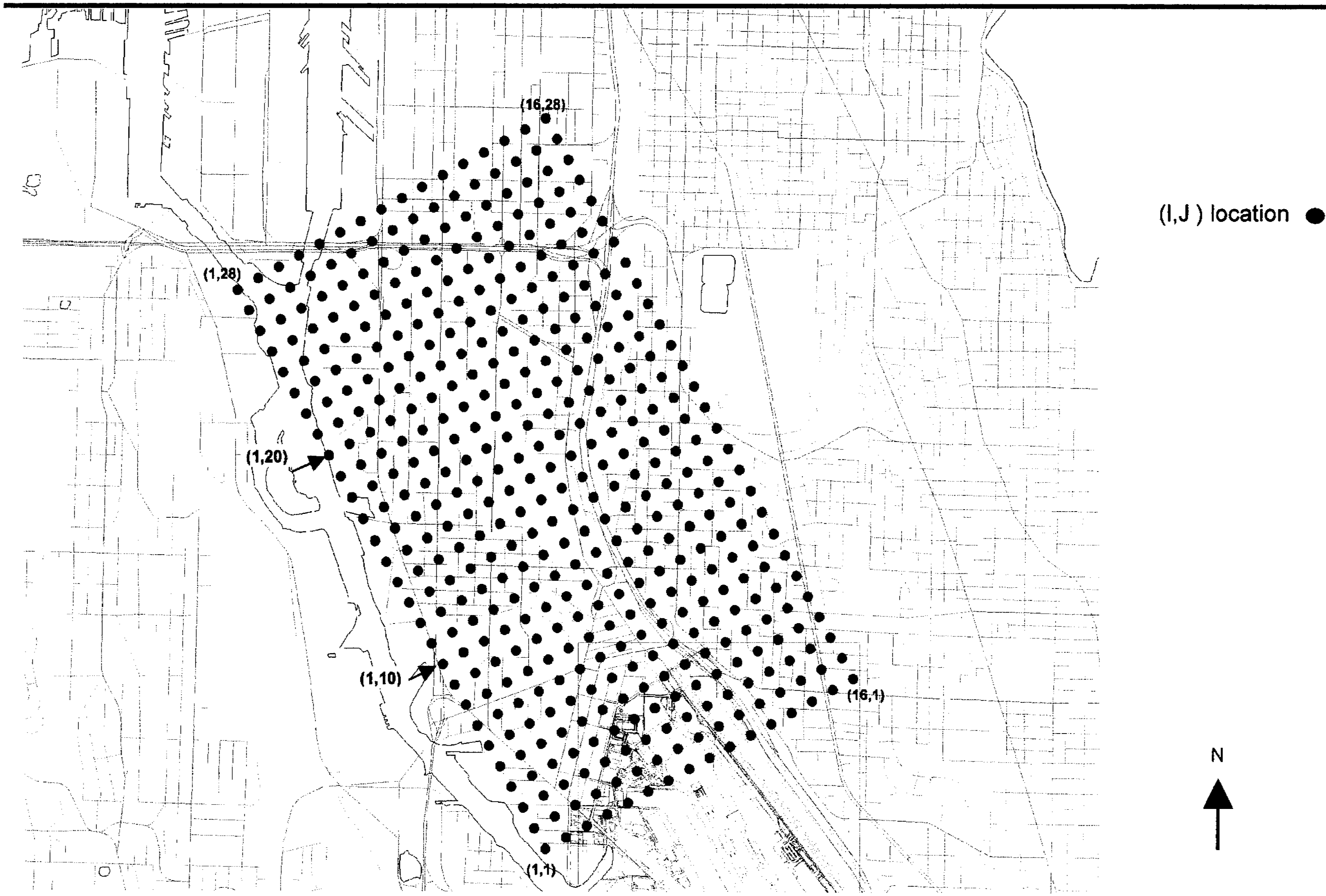


Figure C-9
King County International Airport
250-Ft Grid Locations



PAGE INTENTIONALLY LEFT BLANK

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level: No Project RSA-5	2018 DNL Level: Full Use of Shifted Rwy RSA-2	2018 DNL Level: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
1	1	1	1.7454	-4.5176	52.0	51.2	51.1	51.2	-0.1	0.0
2	1	2	1.6630	-4.3750	52.3	51.4	51.3	51.4	-0.1	0.0
3	1	3	1.5807	-4.2323	52.5	51.6	51.5	51.6	-0.1	0.0
4	1	4	1.4983	-4.0897	52.8	51.8	51.7	51.8	-0.1	0.0
5	1	5	1.4160	-3.9471	53.0	52.0	51.9	52.0	-0.1	0.0
6	1	6	1.3336	-3.8044	53.3	52.2	52.1	52.2	-0.1	0.0
7	1	7	1.2513	-3.6618	53.5	52.4	52.3	52.4	-0.1	0.0
8	1	8	1.1689	-3.5192	53.8	52.7	52.5	52.7	-0.2	0.0
9	1	9	1.0866	-3.3765	54.2	53.1	52.9	53.0	-0.2	-0.1
10	1	10	1.0042	-3.2339	54.5	53.5	53.3	53.4	-0.2	-0.1
11	1	11	0.9219	-3.0913	54.9	53.8	53.6	53.8	-0.2	0.0
12	1	12	0.8395	-2.9486	55.1	54.1	53.9	54.1	-0.2	0.0
13	1	13	0.7572	-2.8060	55.3	54.2	54.2	54.2	0.0	0.0
14	1	14	0.6748	-2.6634	55.3	54.3	54.3	54.3	0.0	0.0
15	1	15	0.5925	-2.5207	55.4	54.4	54.3	54.4	-0.1	0.0
16	1	16	0.5101	-2.3781	55.5	54.5	54.4	54.5	-0.1	0.0
17	1	17	0.4278	-2.2354	55.7	54.7	54.6	54.7	-0.1	0.0
18	1	18	0.3454	-2.0928	56.0	54.9	54.8	54.9	-0.1	0.0
19	1	19	0.2631	-1.9502	56.3	55.1	55.0	55.1	-0.1	0.0
20	1	20	0.1807	-1.8075	56.5	55.2	55.2	55.2	0.0	0.0
21	1	21	0.0984	-1.6649	56.8	55.3	55.3	55.3	0.0	0.0
22	1	22	0.0161	-1.5223	56.9	55.4	55.5	55.4	0.1	0.0
23	1	23	-0.0663	-1.3796	56.7	55.3	55.5	55.3	0.2	0.0
24	1	24	-0.1486	-1.2370	56.4	55.1	55.4	55.1	0.3	0.0
25	1	25	-0.2310	-1.0944	56.1	54.8	55.2	54.8	0.4	0.0
26	1	26	-0.3133	-0.9517	55.5	54.4	54.8	54.4	0.4	0.0
27	1	27	-0.3957	-0.8091	54.8	53.9	54.4	53.9	0.5	0.0
28	1	28	-0.4780	-0.6665	54.0	53.3	53.8	53.3	0.5	0.0
29	1	29	-0.5604	-0.5238	53.5	53.0	53.3	53.0	0.3	0.0
30	1	30	-0.6427	-0.3812	53.5	53.0	53.1	53.0	0.1	0.0
31	1	31	-0.7251	-0.2386	53.9	53.5	53.4	53.4	-0.1	-0.1
32	1	32	-0.8074	-0.0959	54.8	54.2	54.1	54.2	-0.1	0.0
33	1	33	-0.8898	0.0467	55.7	55.0	54.8	55.0	-0.2	0.0
34	1	34	-0.9721	0.1893	56.2	55.6	55.4	55.5	-0.2	-0.1
35	1	35	-1.0545	0.3320	56.5	55.8	55.8	55.8	0.0	0.0
36	1	36	-1.1368	0.4746	56.4	55.6	55.9	55.7	0.3	0.1
37	1	37	-1.2192	0.6172	56.0	55.2	55.5	55.2	0.3	0.0
38	1	38	-1.3015	0.7599	55.6	54.6	55.0	54.7	0.4	0.1
39	1	39	-1.3839	0.9025	55.1	54.2	54.5	54.2	0.3	0.0
40	1	40	-1.4662	1.0451	54.7	53.8	54.0	53.8	0.2	0.0
41	1	41	-1.5486	1.1878	54.5	53.6	53.7	53.6	0.1	0.0
42	1	42	-1.6309	1.3304	54.2	53.4	53.5	53.4	0.1	0.0
43	1	43	-1.7133	1.4730	54.1	53.3	53.3	53.3	0.0	0.0
44	1	44	-1.7956	1.6157	54.1	53.2	53.2	53.2	0.0	0.0
45	1	45	-1.8780	1.7583	54.1	53.2	53.2	53.2	0.0	0.0
46	1	46	-1.9603	1.9009	54.1	53.2	53.2	53.2	0.0	0.0
47	1	47	-2.0427	2.0436	54.1	53.2	53.2	53.2	0.0	0.0
48	1	48	-2.1250	2.1862	54.0	53.0	53.0	53.0	0.0	0.0
49	1	49	-2.2074	2.3288	53.8	52.9	52.9	52.9	0.0	0.0
50	1	50	-2.2897	2.4715	53.6	52.7	52.7	52.7	0.0	0.0
51	1	51	-2.3721	2.6141	53.5	52.4	52.4	52.4	0.0	0.0
52	1	52	-2.4544	2.7568	53.4	52.3	52.3	52.3	0.0	0.0
53	1	53	-2.5368	2.8994	53.2	52.2	52.2	52.2	0.0	0.0
54	1	54	-2.6191	3.0420	53.1	52.1	52.1	52.1	0.0	0.0
55	1	55	-2.7015	3.1847	53.1	52.1	52.1	52.1	0.0	0.0
56	1	56	-2.7838	3.3273	53.0	52.0	52.0	52.0	0.0	0.0
57	1	57	-2.8662	3.4699	52.9	52.0	52.0	52.0	0.0	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

						2018 DNL Level			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	No Project RSA-5	Full Use of Shifted Rwy RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
58	1	58	-2.9485	3.6126	52.8	51.9	51.9	51.9	0.0	0.0
59	1	59	-3.0309	3.7552	52.6	51.9	51.9	51.9	0.0	0.0
60	1	60	-3.1132	3.8978	52.5	51.8	51.8	51.8	0.0	0.0
61	1	61	-3.1956	4.0405	52.5	51.9	51.9	51.9	0.0	0.0
62	2	1	1.8880	-4.4352	54.1	53.3	53.2	53.2	-0.1	-0.1
63	2	2	1.8057	-4.2926	54.4	53.5	53.4	53.5	-0.1	0.0
64	2	3	1.7233	-4.1500	54.7	53.7	53.6	53.7	-0.1	0.0
65	2	4	1.6410	-4.0073	55.0	53.9	53.8	53.9	-0.1	0.0
66	2	5	1.5586	-3.8647	55.3	54.2	54.0	54.2	-0.2	0.0
67	2	6	1.4763	-3.7221	55.6	54.4	54.3	54.4	-0.1	0.0
68	2	7	1.3939	-3.5794	55.9	54.7	54.6	54.7	-0.1	0.0
69	2	8	1.3116	-3.4368	56.3	55.1	54.9	55.1	-0.2	0.0
70	2	9	1.2292	-3.2942	56.7	55.6	55.3	55.5	-0.3	-0.1
71	2	10	1.1469	-3.1515	57.1	56.1	55.8	56.0	-0.3	-0.1
72	2	11	1.0645	-3.0089	57.6	56.5	56.2	56.4	-0.3	-0.1
73	2	12	0.9822	-2.8663	57.9	56.9	56.6	56.9	-0.3	0.0
74	2	13	0.8998	-2.7236	58.1	57.0	56.9	57.0	-0.1	0.0
75	2	14	0.8175	-2.5810	58.2	57.2	57.1	57.2	-0.1	0.0
76	2	15	0.7351	-2.4384	58.4	57.3	57.2	57.3	-0.1	0.0
77	2	16	0.6528	-2.2957	58.6	57.5	57.4	57.5	-0.1	0.0
78	2	17	0.5704	-2.1531	58.9	57.7	57.6	57.8	-0.1	0.1
79	2	18	0.4881	-2.0105	59.3	58.0	57.8	58.0	-0.2	0.0
80	2	19	0.4057	-1.8678	59.6	58.2	58.1	58.2	-0.1	0.0
81	2	20	0.3234	-1.7252	59.9	58.4	58.3	58.4	-0.1	0.0
82	2	21	0.2410	-1.5826	60.2	58.6	58.5	58.6	-0.1	0.0
83	2	22	0.1587	-1.4399	60.4	58.7	58.8	58.8	0.1	0.1
84	2	23	0.0763	-1.2973	60.4	58.7	58.9	58.7	0.2	0.0
85	2	24	-0.0060	-1.1547	60.2	58.5	58.8	58.6	0.3	0.1
86	2	25	-0.0884	-1.0120	59.8	58.2	58.6	58.3	0.4	0.1
87	2	26	-0.1707	-0.8694	59.1	57.7	58.1	57.7	0.4	0.0
88	2	27	-0.2531	-0.7268	58.3	57.0	57.6	57.0	0.6	0.0
89	2	28	-0.3354	-0.5841	57.2	56.2	56.8	56.3	0.6	0.1
90	2	29	-0.4178	-0.4415	56.4	55.7	56.1	55.7	0.4	0.0
91	2	30	-0.5001	-0.2989	56.3	55.6	55.8	55.5	0.2	-0.1
92	2	31	-0.5825	-0.1562	56.8	56.1	56.0	56.1	-0.1	0.0
93	2	32	-0.6648	-0.0136	57.8	57.0	56.8	57.0	-0.2	0.0
94	2	33	-0.7472	0.1291	59.0	58.1	57.8	58.0	-0.3	-0.1
95	2	34	-0.8295	0.2717	59.8	59.0	58.8	59.0	-0.2	0.0
96	2	35	-0.9119	0.4143	60.4	59.6	59.6	59.6	0.0	0.0
97	2	36	-0.9942	0.5570	60.0	59.1	59.4	59.1	0.3	0.0
98	2	37	-1.0766	0.6996	59.3	58.2	58.7	58.3	0.5	0.1
99	2	38	-1.1589	0.8422	58.7	57.5	58.0	57.6	0.5	0.1
100	2	39	-1.2413	0.9849	58.2	57.0	57.3	57.1	0.3	0.1
101	2	40	-1.3236	1.1275	57.8	56.7	56.9	56.7	0.2	0.0
102	2	41	-1.4060	1.2701	57.6	56.5	56.6	56.5	0.1	0.0
103	2	42	-1.4883	1.4128	57.2	56.3	56.4	56.3	0.1	0.0
104	2	43	-1.5707	1.5554	57.1	56.1	56.2	56.1	0.1	0.0
105	2	44	-1.6530	1.6980	57.0	56.1	56.1	56.1	0.0	0.0
106	2	45	-1.7354	1.8407	56.9	56.0	56.0	56.0	0.0	0.0
107	2	46	-1.8177	1.9833	56.9	56.0	56.0	56.0	0.0	0.0
108	2	47	-1.9001	2.1259	56.8	55.9	55.9	55.9	0.0	0.0
109	2	48	-1.9824	2.2686	56.6	55.6	55.6	55.6	0.0	0.0
110	2	49	-2.0648	2.4112	56.3	55.5	55.5	55.5	0.0	0.0
111	2	50	-2.1471	2.5538	56.1	55.2	55.2	55.2	0.0	0.0
112	2	51	-2.2295	2.6965	55.8	54.8	54.8	54.8	0.0	0.0
113	2	52	-2.3118	2.8391	55.6	54.6	54.6	54.6	0.0	0.0
114	2	53	-2.3942	2.9817	55.5	54.4	54.5	54.4	0.1	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
115	2	54	-2.4765	3.1244	55.3	54.3	54.3	54.3	0.0	0.0
116	2	55	-2.5589	3.2670	55.1	54.2	54.2	54.2	0.0	0.0
117	2	56	-2.6412	3.4096	55.0	54.1	54.1	54.1	0.0	0.0
118	2	57	-2.7236	3.5523	54.8	54.0	54.0	54.0	0.0	0.0
119	2	58	-2.8059	3.6949	54.6	53.9	53.9	53.9	0.0	0.0
120	2	59	-2.8883	3.8375	54.4	53.8	53.8	53.8	0.0	0.0
121	2	60	-2.9706	3.9802	54.3	53.7	53.7	53.7	0.0	0.0
122	2	61	-3.0530	4.1228	54.2	53.7	53.7	53.7	0.0	0.0
123	3	1	2.0307	-4.3529	56.3	55.5	55.4	55.5	-0.1	0.0
124	3	2	1.9483	-4.2103	56.6	55.8	55.6	55.7	-0.2	-0.1
125	3	3	1.8660	-4.0676	56.9	56.0	55.9	56.0	-0.1	0.0
126	3	4	1.7836	-3.9250	57.2	56.2	56.1	56.2	-0.1	0.0
127	3	5	1.7013	-3.7824	57.5	56.5	56.4	56.5	-0.1	0.0
128	3	6	1.6189	-3.6397	57.9	56.8	56.6	56.8	-0.2	0.0
129	3	7	1.5366	-3.4971	58.3	57.2	56.9	57.1	-0.3	-0.1
130	3	8	1.4542	-3.3545	58.8	57.7	57.3	57.6	-0.4	-0.1
131	3	9	1.3719	-3.2118	59.3	58.3	57.8	58.2	-0.5	-0.1
132	3	10	1.2895	-3.0692	59.7	58.8	58.4	58.6	-0.4	-0.2
133	3	11	1.2072	-2.9266	60.2	59.2	58.9	59.2	-0.3	0.0
134	3	12	1.1248	-2.7839	60.7	59.8	59.4	59.7	-0.4	-0.1
135	3	13	1.0425	-2.6413	61.0	60.0	59.8	60.0	-0.2	0.0
136	3	14	0.9601	-2.4987	61.2	60.3	60.1	60.3	-0.2	0.0
137	3	15	0.8778	-2.3560	61.5	60.5	60.3	60.5	-0.2	0.0
138	3	16	0.7954	-2.2134	61.9	60.9	60.6	60.8	-0.3	-0.1
139	3	17	0.7131	-2.0707	62.4	61.3	60.9	61.2	-0.4	-0.1
140	3	18	0.6307	-1.9281	62.9	61.6	61.3	61.6	-0.3	0.0
141	3	19	0.5484	-1.7855	63.4	62.0	61.7	62.0	-0.3	0.0
142	3	20	0.4660	-1.6428	63.8	62.3	62.0	62.3	-0.3	0.0
143	3	21	0.3837	-1.5002	64.2	62.6	62.4	62.6	-0.2	0.0
144	3	22	0.3013	-1.3576	64.6	62.8	62.8	62.9	0.0	0.1
145	3	23	0.2190	-1.2149	64.8	63.0	63.1	63.0	0.1	0.0
146	3	24	0.1366	-1.0723	64.9	63.1	63.2	63.1	0.1	0.0
147	3	25	0.0543	-0.9297	64.8	62.9	63.1	63.0	0.2	0.1
148	3	26	-0.0281	-0.7870	64.0	62.2	62.6	62.2	0.4	0.0
149	3	27	-0.1104	-0.6444	63.1	61.4	62.0	61.4	0.6	0.0
150	3	28	-0.1928	-0.5018	61.7	60.4	61.1	60.4	0.7	0.0
151	3	29	-0.2751	-0.3591	60.6	59.6	60.2	59.6	0.6	0.0
152	3	30	-0.3575	-0.2165	60.2	59.3	59.7	59.3	0.4	0.0
153	3	31	-0.4398	-0.0739	60.7	59.8	59.8	59.8	0.0	0.0
154	3	32	-0.5222	0.0688	62.0	60.8	60.6	60.8	-0.2	0.0
155	3	33	-0.6045	0.2114	63.4	62.2	61.8	62.2	-0.4	0.0
156	3	34	-0.6869	0.3540	65.0	64.0	63.8	64.0	-0.2	0.0
157	3	35	-0.7692	0.4967	66.6	66.0	66.0	66.0	0.0	0.0
158	3	36	-0.8516	0.6393	65.0	64.1	64.5	64.2	0.4	0.1
159	3	37	-0.9339	0.7819	63.4	62.2	62.7	62.3	0.5	0.1
160	3	38	-1.0163	0.9246	62.4	61.1	61.5	61.1	0.4	0.0
161	3	39	-1.0986	1.0672	61.8	60.5	60.8	60.6	0.3	0.1
162	3	40	-1.1810	1.2098	61.5	60.2	60.3	60.3	0.1	0.1
163	3	41	-1.2633	1.3525	61.2	60.0	60.1	60.0	0.1	0.0
164	3	42	-1.3457	1.4951	60.7	59.8	59.8	59.8	0.0	0.0
165	3	43	-1.4280	1.6377	60.3	59.5	59.5	59.5	0.0	0.0
166	3	44	-1.5104	1.7804	60.1	59.3	59.3	59.3	0.0	0.0
167	3	45	-1.5927	1.9230	59.9	59.1	59.1	59.1	0.0	0.0
168	3	46	-1.6751	2.0656	59.7	59.0	59.0	59.0	0.0	0.0
169	3	47	-1.7574	2.2083	59.5	58.8	58.8	58.8	0.0	0.0
170	3	48	-1.8398	2.3509	59.1	58.4	58.4	58.4	0.0	0.0
171	3	49	-1.9221	2.4935	58.7	58.1	58.1	58.1	0.0	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
172	3	50	-2.0045	2.6362	58.4	57.8	57.8	57.8	0.0	0.0
173	3	51	-2.0868	2.7788	58.0	57.2	57.2	57.2	0.0	0.0
174	3	52	-2.1692	2.9215	57.7	56.9	56.9	56.9	0.0	0.0
175	3	53	-2.2515	3.0641	57.5	56.7	56.7	56.7	0.0	0.0
176	3	54	-2.3339	3.2067	57.3	56.5	56.5	56.5	0.0	0.0
177	3	55	-2.4162	3.3494	57.0	56.4	56.4	56.4	0.0	0.0
178	3	56	-2.4986	3.4920	56.9	56.3	56.3	56.3	0.0	0.0
179	3	57	-2.5809	3.6346	56.7	56.1	56.1	56.1	0.0	0.0
180	3	58	-2.6633	3.7773	56.5	56.0	56.0	56.0	0.0	0.0
181	3	59	-2.7456	3.9199	56.2	55.8	55.8	55.8	0.0	0.0
182	3	60	-2.8280	4.0625	56.1	55.7	55.7	55.7	0.0	0.0
183	3	61	-2.9103	4.2052	55.9	55.7	55.7	55.7	0.0	0.0
184	4	1	2.1733	-4.2705	58.1	57.5	57.4	57.5	-0.1	0.0
185	4	2	2.0910	-4.1279	58.5	57.8	57.7	57.8	-0.1	0.0
186	4	3	2.0086	-3.9853	58.9	58.1	58.0	58.1	-0.1	0.0
187	4	4	1.9263	-3.8426	59.3	58.5	58.3	58.5	-0.2	0.0
188	4	5	1.8439	-3.7000	59.7	58.8	58.7	58.8	-0.1	0.0
189	4	6	1.7616	-3.5574	60.1	59.2	59.0	59.2	-0.2	0.0
190	4	7	1.6792	-3.4147	60.6	59.7	59.4	59.6	-0.3	-0.1
191	4	8	1.5969	-3.2721	61.1	60.3	59.9	60.2	-0.4	-0.1
192	4	9	1.5145	-3.1295	61.7	61.0	60.5	61.0	-0.5	0.0
193	4	10	1.4322	-2.9868	62.2	61.6	61.2	61.5	-0.4	-0.1
194	4	11	1.3498	-2.8442	62.8	62.1	61.8	62.1	-0.3	0.0
195	4	12	1.2675	-2.7016	63.3	62.8	62.2	62.7	-0.6	-0.1
196	4	13	1.1851	-2.5589	63.7	63.2	62.8	63.1	-0.4	-0.1
197	4	14	1.1028	-2.4163	64.1	63.5	63.2	63.5	-0.3	0.0
198	4	15	1.0204	-2.2737	64.6	63.9	63.5	63.9	-0.4	0.0
199	4	16	0.9381	-2.1310	65.1	64.3	64.0	64.3	-0.3	0.0
200	4	17	0.8557	-1.9884	65.9	65.0	64.4	64.9	-0.6	-0.1
201	4	18	0.7734	-1.8458	66.7	65.5	65.0	65.5	-0.5	0.0
202	4	19	0.6910	-1.7031	67.4	66.1	65.6	66.1	-0.5	0.0
203	4	20	0.6087	-1.5605	68.0	66.6	66.2	66.6	-0.4	0.0
204	4	21	0.5263	-1.4179	68.7	67.1	66.7	67.1	-0.4	0.0
205	4	22	0.4440	-1.2752	69.3	67.6	67.3	67.6	-0.3	0.0
206	4	23	0.3616	-1.1326	70.0	68.3	68.0	68.3	-0.3	0.0
207	4	24	0.2793	-0.9900	71.1	69.3	69.1	69.3	-0.2	0.0
208	4	25	0.1969	-0.8473	71.5	69.5	69.4	69.5	-0.1	0.0
209	4	26	0.1146	-0.7047	70.9	68.8	68.9	68.8	0.1	0.0
210	4	27	0.0322	-0.5621	70.3	68.1	68.4	68.2	0.3	0.1
211	4	28	-0.0501	-0.4194	69.1	67.2	67.8	67.2	0.6	0.0
212	4	29	-0.1325	-0.2768	68.1	66.5	67.2	66.5	0.7	0.0
213	4	30	-0.2148	-0.1342	67.5	66.1	66.7	66.1	0.6	0.0
214	4	31	-0.2972	0.0085	67.8	66.4	66.5	66.3	0.1	-0.1
215	4	32	-0.3795	0.1511	69.1	67.3	66.9	67.3	-0.4	0.0
216	4	33	-0.4619	0.2937	70.4	68.7	68.0	68.6	-0.7	-0.1
217	4	34	-0.5442	0.4364	72.1	70.9	70.5	70.9	-0.4	0.0
218	4	35	-0.6266	0.5790	85.1	85.0	85.1	85.0	0.1	0.0
219	4	36	-0.7089	0.7217	71.5	70.9	71.7	71.0	0.8	0.1
220	4	37	-0.7913	0.8643	67.4	66.1	67.0	66.2	0.9	0.1
221	4	38	-0.8736	1.0069	66.4	65.1	65.3	65.1	0.2	0.0
222	4	39	-0.9560	1.1496	65.8	64.6	64.7	64.6	0.1	0.0
223	4	40	-1.0383	1.2922	65.3	64.2	64.3	64.2	0.1	0.0
224	4	41	-1.1207	1.4348	64.8	63.8	63.8	63.8	0.0	0.0
225	4	42	-1.2030	1.5775	64.0	63.3	63.3	63.3	0.0	0.0
226	4	43	-1.2854	1.7201	63.4	62.8	62.9	62.8	0.1	0.0
227	4	44	-1.3677	1.8627	63.0	62.5	62.5	62.5	0.0	0.0
228	4	45	-1.4501	2.0054	62.6	62.2	62.2	62.2	0.0	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level: No Project RSA-5	2018 DNL Level: Full Use of Shifted Rwy RSA-2	2018 DNL Level: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
229	4	46	-1.5324	2.1480	62.3	62.0	62.0	62.0	0.0	0.0
230	4	47	-1.6148	2.2906	61.9	61.7	61.7	61.7	0.0	0.0
231	4	48	-1.6971	2.4333	61.5	61.2	61.2	61.2	0.0	0.0
232	4	49	-1.7795	2.5759	61.1	60.9	60.9	60.9	0.0	0.0
233	4	50	-1.8618	2.7185	60.8	60.6	60.6	60.6	0.0	0.0
234	4	51	-1.9442	2.8612	60.4	60.0	60.0	60.0	0.0	0.0
235	4	52	-2.0265	3.0038	60.1	59.7	59.7	59.7	0.0	0.0
236	4	53	-2.1089	3.1464	59.8	59.4	59.4	59.4	0.0	0.0
237	4	54	-2.1912	3.2891	59.4	59.1	59.1	59.1	0.0	0.0
238	4	55	-2.2736	3.4317	59.1	58.9	58.9	58.9	0.0	0.0
239	4	56	-2.3559	3.5743	58.9	58.6	58.6	58.6	0.0	0.0
240	4	57	-2.4383	3.7170	58.6	58.4	58.4	58.4	0.0	0.0
241	4	58	-2.5206	3.8596	58.3	58.1	58.1	58.1	0.0	0.0
242	4	59	-2.6030	4.0022	58.0	57.8	57.8	57.8	0.0	0.0
243	4	60	-2.6853	4.1449	57.7	57.6	57.6	57.6	0.0	0.0
244	4	61	-2.7677	4.2875	57.5	57.4	57.4	57.4	0.0	0.0
245	5	1	2.3159	-4.1882	59.5	59.0	58.9	59.0	-0.1	0.0
246	5	2	2.2336	-4.0456	60.0	59.4	59.3	59.4	-0.1	0.0
247	5	3	2.1512	-3.9029	60.4	59.8	59.7	59.8	-0.1	0.0
248	5	4	2.0689	-3.7603	60.8	60.2	60.1	60.2	-0.1	0.0
249	5	5	1.9865	-3.6177	61.3	60.7	60.5	60.7	-0.2	0.0
250	5	6	1.9042	-3.4750	61.8	61.2	61.0	61.1	-0.2	-0.1
251	5	7	1.8218	-3.3324	62.3	61.7	61.4	61.6	-0.3	-0.1
252	5	8	1.7395	-3.1898	62.9	62.3	61.9	62.3	-0.4	0.0
253	5	9	1.6571	-3.0471	63.6	63.2	62.6	63.1	-0.6	-0.1
254	5	10	1.5748	-2.9045	64.1	63.8	63.4	63.7	-0.4	-0.1
255	5	11	1.4924	-2.7619	64.7	64.3	64.0	64.3	-0.3	0.0
256	5	12	1.4101	-2.6192	65.4	65.1	64.6	65.1	-0.5	0.0
257	5	13	1.3277	-2.4766	65.9	65.6	65.3	65.6	-0.3	0.0
258	5	14	1.2454	-2.3340	66.4	66.1	65.8	66.1	-0.3	0.0
259	5	15	1.1630	-2.1913	67.0	66.6	66.3	66.6	-0.3	0.0
260	5	16	1.0807	-2.0487	67.7	67.2	66.8	67.2	-0.4	0.0
261	5	17	0.9983	-1.9060	68.6	68.0	67.4	68.0	-0.6	0.0
262	5	18	0.9160	-1.7634	69.6	68.7	68.2	68.7	-0.5	0.0
263	5	19	0.8336	-1.6208	70.4	69.5	68.9	69.5	-0.6	0.0
264	5	20	0.7513	-1.4781	71.2	70.3	69.7	70.2	-0.6	-0.1
265	5	21	0.6689	-1.3355	72.1	71.1	70.4	71.0	-0.7	-0.1
266	5	22	0.5866	-1.1929	73.1	72.0	71.3	72.0	-0.7	0.0
267	5	23	0.5042	-1.0502	74.1	73.0	72.2	73.0	-0.8	0.0
268	5	24	0.4219	-0.9076	78.5	77.0	76.4	76.9	-0.6	-0.1
269	5	25	0.3395	-0.7650	84.2	82.2	81.9	82.1	-0.3	-0.1
270	5	26	0.2572	-0.6223	82.5	80.3	80.0	80.2	-0.3	-0.1
271	5	27	0.1748	-0.4797	82.4	79.7	79.3	79.7	-0.4	0.0
272	5	28	0.0925	-0.3371	82.1	79.5	78.9	79.5	-0.6	0.0
273	5	29	0.0101	-0.1944	82.5	79.9	79.5	79.8	-0.4	-0.1
274	5	30	-0.0722	-0.0518	82.3	79.8	80.0	79.8	0.2	0.0
275	5	31	-0.1546	0.0908	81.8	79.6	79.5	79.6	-0.1	0.0
276	5	32	-0.2369	0.2335	82.8	80.3	79.5	80.3	-0.8	0.0
277	5	33	-0.3193	0.3761	84.0	81.7	80.5	81.7	-1.2	0.0
278	5	34	-0.4016	0.5187	85.9	83.8	81.8	83.7	-2.0	-0.1
279	5	35	-0.4840	0.6614	81.9	80.3	84.0	80.6	3.7	0.3
280	5	36	-0.5663	0.8040	71.9	71.1	77.7	72.2	6.6	1.1
281	5	37	-0.6487	0.9466	71.0	70.3	70.4	70.3	0.1	0.0
282	5	38	-0.7310	1.0893	70.2	69.6	69.6	69.6	0.0	0.0
283	5	39	-0.8134	1.2319	69.5	69.0	69.0	69.0	0.0	0.0
284	5	40	-0.8957	1.3745	68.8	68.4	68.4	68.4	0.0	0.0
285	5	41	-0.9781	1.5172	68.2	67.8	67.8	67.8	0.0	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

						2018 DNL Level			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	No Project RSA-5	Full Use of Shifted Rwy RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
286	5	42	-1.0604	1.6598	67.4	67.2	67.2	67.2	0.0	0.0
287	5	43	-1.1428	1.8024	66.7	66.6	66.6	66.6	0.0	0.0
288	5	44	-1.2251	1.9451	66.1	66.1	66.1	66.1	0.0	0.0
289	5	45	-1.3075	2.0877	65.6	65.6	65.6	65.6	0.0	0.0
290	5	46	-1.3898	2.2303	65.1	65.2	65.2	65.2	0.0	0.0
291	5	47	-1.4722	2.3730	64.7	64.7	64.7	64.7	0.0	0.0
292	5	48	-1.5545	2.5156	64.2	64.2	64.2	64.2	0.0	0.0
293	5	49	-1.6369	2.6582	63.7	63.7	63.7	63.7	0.0	0.0
294	5	50	-1.7192	2.8009	63.3	63.3	63.3	63.3	0.0	0.0
295	5	51	-1.8016	2.9435	62.8	62.7	62.7	62.7	0.0	0.0
296	5	52	-1.8839	3.0862	62.4	62.3	62.3	62.3	0.0	0.0
297	5	53	-1.9663	3.2288	62.0	61.8	61.8	61.8	0.0	0.0
298	5	54	-2.0486	3.3714	61.5	61.4	61.4	61.4	0.0	0.0
299	5	55	-2.1310	3.5141	61.1	61.0	61.0	61.0	0.0	0.0
300	5	56	-2.2133	3.6567	60.7	60.6	60.6	60.6	0.0	0.0
301	5	57	-2.2957	3.7993	60.3	60.3	60.3	60.3	0.0	0.0
302	5	58	-2.3780	3.9420	59.9	59.9	59.9	59.9	0.0	0.0
303	5	59	-2.4604	4.0846	59.5	59.6	59.6	59.6	0.0	0.0
304	5	60	-2.5427	4.2272	59.2	59.3	59.3	59.3	0.0	0.0
305	5	61	-2.6251	4.3699	58.8	59.0	59.0	59.0	0.0	0.0
306	6	1	2.4586	-4.1058	59.8	59.2	59.1	59.2	-0.1	0.0
307	6	2	2.3762	-3.9632	60.2	59.6	59.5	59.6	-0.1	0.0
308	6	3	2.2939	-3.8206	60.7	60.0	59.9	60.0	-0.1	0.0
309	6	4	2.2115	-3.6779	61.1	60.4	60.3	60.4	-0.1	0.0
310	6	5	2.1292	-3.5353	61.5	60.8	60.7	60.8	-0.1	0.0
311	6	6	2.0468	-3.3927	62.0	61.3	61.1	61.3	-0.2	0.0
312	6	7	1.9645	-3.2500	62.5	61.8	61.5	61.8	-0.3	0.0
313	6	8	1.8821	-3.1074	63.0	62.4	62.0	62.4	-0.4	0.0
314	6	9	1.7998	-2.9648	63.7	63.3	62.7	63.2	-0.6	-0.1
315	6	10	1.7174	-2.8221	64.3	63.9	63.5	63.7	-0.4	-0.2
316	6	11	1.6351	-2.6795	64.8	64.4	64.0	64.4	-0.4	0.0
317	6	12	1.5527	-2.5369	65.5	65.2	64.6	65.2	-0.6	0.0
318	6	13	1.4704	-2.3942	66.0	65.7	65.4	65.7	-0.3	0.0
319	6	14	1.3880	-2.2516	66.5	66.2	65.8	66.1	-0.4	-0.1
320	6	15	1.3057	-2.1090	67.1	66.7	66.3	66.7	-0.4	0.0
321	6	16	1.2233	-1.9663	67.8	67.3	66.9	67.3	-0.4	0.0
322	6	17	1.1410	-1.8237	68.7	68.1	67.5	68.0	-0.6	-0.1
323	6	18	1.0586	-1.6811	69.7	68.8	68.2	68.8	-0.6	0.0
324	6	19	0.9763	-1.5384	70.5	69.5	69.0	69.5	-0.5	0.0
325	6	20	0.8939	-1.3958	71.3	70.3	69.7	70.2	-0.6	-0.1
326	6	21	0.8116	-1.2532	72.1	71.1	70.4	71.0	-0.7	-0.1
327	6	22	0.7292	-1.1105	73.0	71.9	71.2	71.9	-0.7	0.0
328	6	23	0.6469	-0.9679	74.0	72.9	72.1	72.8	-0.8	-0.1
329	6	24	0.5645	-0.8253	77.7	76.3	75.7	76.2	-0.6	-0.1
330	6	25	0.4822	-0.6826	80.8	79.1	78.7	79.0	-0.4	-0.1
331	6	26	0.3998	-0.5400	80.0	77.9	77.6	77.8	-0.3	-0.1
332	6	27	0.3175	-0.3974	80.1	77.6	77.3	77.7	-0.3	0.1
333	6	28	0.2351	-0.2547	80.0	77.6	77.3	77.7	-0.3	0.1
334	6	29	0.1528	-0.1121	80.3	78.1	78.0	78.0	-0.1	-0.1
335	6	30	0.0704	0.0305	82.2	81.4	81.5	81.4	0.1	0.0
336	6	31	-0.0119	0.1732	81.5	80.5	80.5	80.5	0.0	0.0
337	6	32	-0.0943	0.3158	82.9	82.0	81.7	82.0	-0.3	0.0
338	6	33	-0.1766	0.4584	84.8	84.2	83.9	84.2	-0.3	0.0
339	6	34	-0.2590	0.6011	83.4	81.5	79.7	81.4	-1.8	-0.1
340	6	35	-0.3413	0.7437	80.4	78.7	81.5	78.9	2.8	0.2
341	6	36	-0.4237	0.8864	72.0	71.3	77.1	72.3	5.8	1.0
342	6	37	-0.5060	1.0290	70.9	70.3	70.4	70.3	0.1	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level: No Project RSA-5	2018 DNL Level: Full Use of Shifted Rwy RSA-2	2018 DNL Level: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
343	6	38	-0.5884	1.1716	70.0	69.5	69.5	69.5	0.0	0.0
344	6	39	-0.6707	1.3143	69.2	68.8	68.8	68.8	0.0	0.0
345	6	40	-0.7531	1.4569	68.5	68.1	68.1	68.1	0.0	0.0
346	6	41	-0.8354	1.5995	67.8	67.5	67.5	67.5	0.0	0.0
347	6	42	-0.9178	1.7422	67.1	66.9	66.9	66.9	0.0	0.0
348	6	43	-1.0001	1.8848	66.4	66.3	66.3	66.3	0.0	0.0
349	6	44	-1.0825	2.0274	65.9	65.8	65.8	65.8	0.0	0.0
350	6	45	-1.1648	2.1701	65.4	65.4	65.4	65.4	0.0	0.0
351	6	46	-1.2472	2.3127	65.0	65.0	65.0	65.0	0.0	0.0
352	6	47	-1.3295	2.4553	64.5	64.6	64.6	64.6	0.0	0.0
353	6	48	-1.4119	2.5980	64.1	64.1	64.1	64.1	0.0	0.0
354	6	49	-1.4942	2.7406	63.6	63.7	63.7	63.7	0.0	0.0
355	6	50	-1.5766	2.8832	63.2	63.2	63.2	63.2	0.0	0.0
356	6	51	-1.6589	3.0259	62.8	62.7	62.7	62.7	0.0	0.0
357	6	52	-1.7413	3.1685	62.4	62.3	62.3	62.3	0.0	0.0
358	6	53	-1.8236	3.3111	61.9	61.9	61.9	61.9	0.0	0.0
359	6	54	-1.9060	3.4538	61.5	61.5	61.5	61.5	0.0	0.0
360	6	55	-1.9883	3.5964	61.1	61.1	61.1	61.1	0.0	0.0
361	6	56	-2.0707	3.7390	60.7	60.7	60.7	60.7	0.0	0.0
362	6	57	-2.1530	3.8817	60.3	60.3	60.3	60.3	0.0	0.0
363	6	58	-2.2354	4.0243	59.9	60.0	60.0	60.0	0.0	0.0
364	6	59	-2.3177	4.1669	59.5	59.6	59.6	59.6	0.0	0.0
365	6	60	-2.4001	4.3096	59.2	59.3	59.3	59.3	0.0	0.0
366	6	61	-2.4824	4.4522	58.8	59.0	59.0	59.0	0.0	0.0
367	7	1	2.6012	-4.0235	59.3	58.6	58.4	58.6	-0.2	0.0
368	7	2	2.5189	-3.8809	59.7	58.9	58.8	58.9	-0.1	0.0
369	7	3	2.4365	-3.7382	60.1	59.3	59.1	59.3	-0.2	0.0
370	7	4	2.3542	-3.5956	60.5	59.6	59.5	59.6	-0.1	0.0
371	7	5	2.2718	-3.4530	60.9	60.0	59.8	60.0	-0.2	0.0
372	7	6	2.1895	-3.3103	61.3	60.4	60.1	60.3	-0.3	-0.1
373	7	7	2.1071	-3.1677	61.7	60.8	60.5	60.7	-0.3	-0.1
374	7	8	2.0248	-3.0251	62.1	61.3	60.9	61.3	-0.4	0.0
375	7	9	1.9424	-2.8824	62.7	62.1	61.4	62.0	-0.7	-0.1
376	7	10	1.8601	-2.7398	63.2	62.6	62.2	62.5	-0.4	-0.1
377	7	11	1.7777	-2.5972	63.6	63.1	62.6	63.0	-0.5	-0.1
378	7	12	1.6954	-2.4545	64.2	63.7	63.1	63.7	-0.6	0.0
379	7	13	1.6130	-2.3119	64.6	64.1	63.8	64.0	-0.3	-0.1
380	7	14	1.5307	-2.1693	65.0	64.4	64.1	64.4	-0.3	0.0
381	7	15	1.4483	-2.0266	65.4	64.8	64.5	64.8	-0.3	0.0
382	7	16	1.3660	-1.8840	66.0	65.3	64.8	65.2	-0.5	-0.1
383	7	17	1.2836	-1.7413	66.7	65.9	65.3	65.8	-0.6	-0.1
384	7	18	1.2013	-1.5987	67.5	66.4	65.8	66.3	-0.6	-0.1
385	7	19	1.1189	-1.4561	68.0	66.8	66.3	66.8	-0.5	0.0
386	7	20	1.0366	-1.3134	68.5	67.2	66.8	67.2	-0.4	0.0
387	7	21	0.9542	-1.1708	69.0	67.6	67.1	67.5	-0.5	-0.1
388	7	22	0.8719	-1.0282	69.5	67.9	67.5	67.9	-0.4	0.0
389	7	23	0.7895	-0.8855	69.9	68.3	68.1	68.3	-0.2	0.0
390	7	24	0.7072	-0.7429	70.7	69.1	69.0	69.2	-0.1	0.1
391	7	25	0.6248	-0.6003	71.1	69.6	69.6	69.6	0.0	0.0
392	7	26	0.5425	-0.4576	70.5	68.9	69.0	68.9	0.1	0.0
393	7	27	0.4601	-0.3150	69.7	68.0	68.3	68.0	0.3	0.0
394	7	28	0.3778	-0.1724	68.5	67.2	67.7	67.2	0.5	0.0
395	7	29	0.2954	-0.0297	67.7	66.6	67.2	66.6	0.6	0.0
396	7	30	0.2131	0.1129	67.3	66.4	66.8	66.4	0.4	0.0
397	7	31	0.1307	0.2555	67.6	66.6	66.6	66.5	0.0	-0.1
398	7	32	0.0484	0.3982	68.9	67.6	67.3	67.6	-0.3	0.0
399	7	33	-0.0340	0.5408	70.1	68.8	68.3	68.7	-0.5	-0.1

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
400	7	34	-0.1163	0.6834	70.6	69.4	69.0	69.4	-0.4	0.0
401	7	35	-0.1987	0.8261	69.8	68.4	68.8	68.4	0.4	0.0
402	7	36	-0.2810	0.9687	67.9	66.7	68.2	66.8	1.5	0.1
403	7	37	-0.3634	1.1113	66.6	65.6	66.5	65.7	0.9	0.1
404	7	38	-0.4457	1.2540	66.0	65.1	65.3	65.1	0.2	0.0
405	7	39	-0.5281	1.3966	65.0	64.0	64.1	64.0	0.1	0.0
406	7	40	-0.6104	1.5392	64.2	63.2	63.2	63.2	0.0	0.0
407	7	41	-0.6928	1.6819	63.5	62.6	62.6	62.6	0.0	0.0
408	7	42	-0.7751	1.8245	62.8	62.1	62.1	62.1	0.0	0.0
409	7	43	-0.8575	1.9671	62.2	61.7	61.7	61.7	0.0	0.0
410	7	44	-0.9398	2.1098	61.9	61.4	61.4	61.4	0.0	0.0
411	7	45	-1.0222	2.2524	61.6	61.2	61.2	61.2	0.0	0.0
412	7	46	-1.1045	2.3950	61.3	61.0	61.0	61.0	0.0	0.0
413	7	47	-1.1869	2.5377	61.1	60.8	60.8	60.8	0.0	0.0
414	7	48	-1.2692	2.6803	60.7	60.5	60.5	60.5	0.0	0.0
415	7	49	-1.3516	2.8229	60.5	60.3	60.3	60.3	0.0	0.0
416	7	50	-1.4339	2.9656	60.2	60.1	60.1	60.1	0.0	0.0
417	7	51	-1.5163	3.1082	59.9	59.7	59.7	59.7	0.0	0.0
418	7	52	-1.5986	3.2509	59.6	59.4	59.4	59.4	0.0	0.0
419	7	53	-1.6810	3.3935	59.3	59.2	59.2	59.2	0.0	0.0
420	7	54	-1.7633	3.5361	59.0	58.9	58.9	58.9	0.0	0.0
421	7	55	-1.8457	3.6788	58.7	58.6	58.6	58.6	0.0	0.0
422	7	56	-1.9280	3.8214	58.5	58.4	58.4	58.4	0.0	0.0
423	7	57	-2.0104	3.9640	58.2	58.2	58.2	58.2	0.0	0.0
424	7	58	-2.0927	4.1067	58.0	58.0	58.0	58.0	0.0	0.0
425	7	59	-2.1751	4.2493	57.7	57.7	57.7	57.7	0.0	0.0
426	7	60	-2.2574	4.3919	57.4	57.5	57.5	57.5	0.0	0.0
427	7	61	-2.3398	4.5346	57.2	57.3	57.3	57.3	0.0	0.0
428	8	1	2.7438	-3.9411	58.7	57.9	57.7	57.9	-0.2	0.0
429	8	2	2.6615	-3.7985	59.1	58.1	58.0	58.1	-0.1	0.0
430	8	3	2.5791	-3.6559	59.4	58.4	58.2	58.4	-0.2	0.0
431	8	4	2.4968	-3.5132	59.7	58.7	58.5	58.7	-0.2	0.0
432	8	5	2.4144	-3.3706	60.0	59.0	58.7	58.9	-0.3	-0.1
433	8	6	2.3321	-3.2280	60.3	59.2	59.0	59.2	-0.2	0.0
434	8	7	2.2497	-3.0853	60.5	59.5	59.3	59.5	-0.2	0.0
435	8	8	2.1674	-2.9427	60.9	59.9	59.5	59.8	-0.4	-0.1
436	8	9	2.0850	-2.8001	61.3	60.5	59.9	60.5	-0.6	0.0
437	8	10	2.0027	-2.6574	61.7	61.0	60.5	60.8	-0.5	-0.2
438	8	11	1.9203	-2.5148	62.0	61.2	60.9	61.2	-0.3	0.0
439	8	12	1.8380	-2.3722	62.4	61.7	61.2	61.7	-0.5	0.0
440	8	13	1.7556	-2.2295	62.6	61.9	61.6	61.9	-0.3	0.0
441	8	14	1.6733	-2.0869	62.8	62.1	61.8	62.0	-0.3	-0.1
442	8	15	1.5909	-1.9443	63.0	62.2	61.9	62.2	-0.3	0.0
443	8	16	1.5086	-1.8016	63.3	62.4	62.1	62.4	-0.3	0.0
444	8	17	1.4262	-1.6590	63.6	62.7	62.3	62.7	-0.4	0.0
445	8	18	1.3439	-1.5164	64.1	62.9	62.5	62.9	-0.4	0.0
446	8	19	1.2615	-1.3737	64.4	63.1	62.8	63.1	-0.3	0.0
447	8	20	1.1792	-1.2311	64.6	63.2	62.9	63.1	-0.3	-0.1
448	8	21	1.0968	-1.0885	64.8	63.3	63.1	63.3	-0.2	0.0
449	8	22	1.0145	-0.9458	65.0	63.5	63.4	63.5	-0.1	0.0
450	8	23	0.9321	-0.8032	65.3	64.0	64.1	64.1	0.1	0.1
451	8	24	0.8498	-0.6606	66.0	65.1	65.2	65.1	0.1	0.0
452	8	25	0.7674	-0.5179	65.9	65.2	65.3	65.2	0.1	0.0
453	8	26	0.6851	-0.3753	64.8	64.0	64.3	64.0	0.3	0.0
454	8	27	0.6027	-0.2327	63.5	62.6	63.0	62.6	0.4	0.0
455	8	28	0.5204	-0.0900	62.4	61.8	62.2	61.8	0.4	0.0
456	8	29	0.4380	0.0526	62.4	62.2	62.5	62.2	0.3	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level: No Project RSA-5	2018 DNL Level: Full Use of Shifted Rwy RSA-2	2018 DNL Level: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
457	8	30	0.3557	0.1952	61.9	61.8	61.9	61.8	0.1	0.0
458	8	31	0.2733	0.3379	62.2	62.0	62.0	61.9	0.0	-0.1
459	8	32	0.1910	0.4805	63.1	62.6	62.5	62.6	-0.1	0.0
460	8	33	0.1086	0.6231	64.1	63.6	63.3	63.5	-0.3	-0.1
461	8	34	0.0263	0.7658	64.0	63.1	62.9	63.1	-0.2	0.0
462	8	35	-0.0561	0.9084	63.7	62.7	62.8	62.7	0.1	0.0
463	8	36	-0.1384	1.0511	63.2	62.3	62.8	62.4	0.5	0.1
464	8	37	-0.2208	1.1937	62.9	62.2	62.7	62.3	0.5	0.1
465	8	38	-0.3031	1.3363	62.7	62.2	62.5	62.3	0.3	0.1
466	8	39	-0.3855	1.4790	61.9	61.4	61.5	61.4	0.1	0.0
467	8	40	-0.4678	1.6216	60.6	59.9	60.0	59.9	0.1	0.0
468	8	41	-0.5502	1.7642	59.8	59.0	59.1	59.0	0.1	0.0
469	8	42	-0.6325	1.9069	59.2	58.5	58.6	58.5	0.1	0.0
470	8	43	-0.7149	2.0495	58.8	58.2	58.2	58.2	0.0	0.0
471	8	44	-0.7972	2.1921	58.5	57.9	57.9	57.9	0.0	0.0
472	8	45	-0.8796	2.3348	58.3	57.7	57.7	57.7	0.0	0.0
473	8	46	-0.9619	2.4774	58.1	57.6	57.6	57.6	0.0	0.0
474	8	47	-1.0443	2.6200	57.9	57.4	57.4	57.4	0.0	0.0
475	8	48	-1.1266	2.7627	57.6	57.1	57.1	57.1	0.0	0.0
476	8	49	-1.2090	2.9053	57.4	56.9	56.9	56.9	0.0	0.0
477	8	50	-1.2913	3.0479	57.1	56.7	56.7	56.7	0.0	0.0
478	8	51	-1.3737	3.1906	56.9	56.4	56.4	56.4	0.0	0.0
479	8	52	-1.4560	3.3332	56.7	56.3	56.3	56.3	0.0	0.0
480	8	53	-1.5384	3.4758	56.5	56.1	56.1	56.1	0.0	0.0
481	8	54	-1.6207	3.6185	56.3	56.0	56.0	56.0	0.0	0.0
482	8	55	-1.7031	3.7611	56.2	55.9	55.9	55.9	0.0	0.0
483	8	56	-1.7854	3.9037	56.1	55.9	55.9	55.9	0.0	0.0
484	8	57	-1.8678	4.0464	55.9	55.8	55.8	55.8	0.0	0.0
485	8	58	-1.9501	4.1890	55.7	55.6	55.6	55.6	0.0	0.0
486	8	59	-2.0325	4.3316	55.6	55.5	55.5	55.5	0.0	0.0
487	8	60	-2.1148	4.4743	55.4	55.5	55.5	55.5	0.0	0.0
488	8	61	-2.1972	4.6169	55.4	55.4	55.4	55.4	0.0	0.0
489	9	1	2.8865	-3.8588	58.0	57.1	56.9	57.1	-0.2	0.0
490	9	2	2.8041	-3.7162	58.2	57.3	57.1	57.3	-0.2	0.0
491	9	3	2.7218	-3.5735	58.5	57.5	57.3	57.5	-0.2	0.0
492	9	4	2.6394	-3.4309	58.7	57.7	57.5	57.7	-0.2	0.0
493	9	5	2.5571	-3.2883	58.8	57.8	57.6	57.8	-0.2	0.0
494	9	6	2.4747	-3.1456	59.0	58.0	57.8	57.9	-0.2	-0.1
495	9	7	2.3924	-3.0030	59.2	58.1	57.9	58.1	-0.2	0.0
496	9	8	2.3100	-2.8604	59.3	58.3	58.0	58.2	-0.3	-0.1
497	9	9	2.2277	-2.7177	59.5	58.7	58.1	58.6	-0.6	-0.1
498	9	10	2.1453	-2.5751	59.7	58.9	58.5	58.8	-0.4	-0.1
499	9	11	2.0630	-2.4325	59.9	59.0	58.7	58.9	-0.3	-0.1
500	9	12	1.9806	-2.2898	60.1	59.2	58.8	59.1	-0.4	-0.1
501	9	13	1.8983	-2.1472	60.1	59.2	59.0	59.2	-0.2	0.0
502	9	14	1.8159	-2.0046	60.1	59.2	59.0	59.2	-0.2	0.0
503	9	15	1.7336	-1.8619	60.1	59.2	59.0	59.2	-0.2	0.0
504	9	16	1.6512	-1.7193	60.1	59.2	59.0	59.2	-0.2	0.0
505	9	17	1.5689	-1.5766	60.2	59.3	59.1	59.3	-0.2	0.0
506	9	18	1.4865	-1.4340	60.5	59.4	59.2	59.4	-0.2	0.0
507	9	19	1.4042	-1.2914	60.6	59.4	59.3	59.4	-0.1	0.0
508	9	20	1.3218	-1.1487	60.7	59.4	59.3	59.4	-0.1	0.0
509	9	21	1.2395	-1.0061	60.9	59.5	59.5	59.5	0.0	0.0
510	9	22	1.1571	-0.8635	61.2	59.9	59.9	59.9	0.0	0.0
511	9	23	1.0748	-0.7208	61.7	60.8	60.9	60.9	0.1	0.1
512	9	24	0.9924	-0.5782	62.8	62.4	62.5	62.4	0.1	0.0
513	9	25	0.9101	-0.4356	62.5	62.3	62.4	62.3	0.1	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
514	9	26	0.8277	-0.2929	61.4	61.1	61.3	61.1	0.2	0.0
515	9	27	0.7454	-0.1503	60.0	59.7	60.0	59.7	0.3	0.0
516	9	28	0.6630	-0.0077	58.9	58.8	59.1	58.8	0.3	0.0
517	9	29	0.5807	0.1350	58.4	58.3	58.5	58.3	0.2	0.0
518	9	30	0.4983	0.2776	58.3	58.3	58.4	58.2	0.1	-0.1
519	9	31	0.4160	0.4202	58.5	58.4	58.4	58.4	0.0	0.0
520	9	32	0.3336	0.5629	59.1	58.8	58.7	58.8	-0.1	0.0
521	9	33	0.2513	0.7055	59.6	59.2	59.0	59.1	-0.2	-0.1
522	9	34	0.1689	0.8481	59.8	59.4	59.2	59.3	-0.2	-0.1
523	9	35	0.0866	0.9908	60.0	59.5	59.5	59.5	0.0	0.0
524	9	36	0.0042	1.1334	60.0	59.5	59.7	59.5	0.2	0.0
525	9	37	-0.0781	1.2760	60.1	59.7	60.0	59.8	0.3	0.1
526	9	38	-0.1605	1.4187	60.1	60.0	60.2	60.0	0.2	0.0
527	9	39	-0.2428	1.5613	59.5	59.4	59.5	59.4	0.1	0.0
528	9	40	-0.3252	1.7039	58.0	57.6	57.8	57.6	0.2	0.0
529	9	41	-0.4075	1.8466	57.0	56.5	56.6	56.5	0.1	0.0
530	9	42	-0.4899	1.9892	56.4	56.0	56.0	56.0	0.0	0.0
531	9	43	-0.5722	2.1318	56.1	55.7	55.7	55.7	0.0	0.0
532	9	44	-0.6546	2.2745	55.9	55.5	55.5	55.5	0.0	0.0
533	9	45	-0.7369	2.4171	55.8	55.3	55.4	55.3	0.1	0.0
534	9	46	-0.8193	2.5597	55.6	55.2	55.2	55.2	0.0	0.0
535	9	47	-0.9016	2.7024	55.5	55.1	55.1	55.1	0.0	0.0
536	9	48	-0.9840	2.8450	55.3	54.9	54.9	54.9	0.0	0.0
537	9	49	-1.0663	2.9876	55.1	54.7	54.7	54.7	0.0	0.0
538	9	50	-1.1487	3.1303	54.9	54.5	54.5	54.5	0.0	0.0
539	9	51	-1.2310	3.2729	54.6	54.3	54.3	54.3	0.0	0.0
540	9	52	-1.3134	3.4156	54.5	54.1	54.1	54.1	0.0	0.0
541	9	53	-1.3957	3.5582	54.3	54.0	54.0	54.0	0.0	0.0
542	9	54	-1.4781	3.7008	54.1	53.9	53.9	53.9	0.0	0.0
543	9	55	-1.5604	3.8435	54.0	53.8	53.8	53.8	0.0	0.0
544	9	56	-1.6428	3.9861	53.9	53.7	53.7	53.7	0.0	0.0
545	9	57	-1.7251	4.1287	53.7	53.6	53.6	53.6	0.0	0.0
546	9	58	-1.8075	4.2714	53.6	53.5	53.5	53.5	0.0	0.0
547	9	59	-1.8898	4.4140	53.5	53.4	53.4	53.4	0.0	0.0
548	9	60	-1.9722	4.5566	53.4	53.4	53.4	53.4	0.0	0.0
549	9	61	-2.0545	4.6993	53.4	53.4	53.4	53.4	0.0	0.0
550	10	1	3.0291	-3.7764	57.1	56.2	56.0	56.2	-0.2	0.0
551	10	2	2.9468	-3.6338	57.2	56.3	56.1	56.3	-0.2	0.0
552	10	3	2.8644	-3.4912	57.4	56.4	56.3	56.4	-0.1	0.0
553	10	4	2.7821	-3.3485	57.5	56.5	56.3	56.5	-0.2	0.0
554	10	5	2.6997	-3.2059	57.5	56.5	56.4	56.5	-0.1	0.0
555	10	6	2.6174	-3.0633	57.6	56.5	56.4	56.5	-0.1	0.0
556	10	7	2.5350	-2.9206	57.5	56.5	56.3	56.5	-0.2	0.0
557	10	8	2.4527	-2.7780	57.5	56.5	56.2	56.4	-0.3	-0.1
558	10	9	2.3703	-2.6354	57.5	56.5	56.2	56.5	-0.3	0.0
559	10	10	2.2880	-2.4927	57.5	56.6	56.3	56.5	-0.3	-0.1
560	10	11	2.2056	-2.3501	57.6	56.6	56.4	56.6	-0.2	0.0
561	10	12	2.1233	-2.2075	57.6	56.7	56.4	56.6	-0.3	-0.1
562	10	13	2.0409	-2.0648	57.5	56.6	56.5	56.6	-0.1	0.0
563	10	14	1.9586	-1.9222	57.3	56.5	56.4	56.5	-0.1	0.0
564	10	15	1.8762	-1.7796	57.3	56.4	56.3	56.4	-0.1	0.0
565	10	16	1.7939	-1.6369	57.2	56.4	56.3	56.4	-0.1	0.0
566	10	17	1.7115	-1.4943	57.2	56.4	56.2	56.4	-0.2	0.0
567	10	18	1.6292	-1.3517	57.3	56.4	56.3	56.4	-0.1	0.0
568	10	19	1.5468	-1.2090	57.4	56.4	56.3	56.4	-0.1	0.0
569	10	20	1.4645	-1.0664	57.5	56.5	56.4	56.5	-0.1	0.0
570	10	21	1.3821	-0.9238	57.7	56.6	56.6	56.7	0.0	0.1

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

						2018 DNL Level			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	No Project RSA-5	Full Use of Shifted Rwy RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
571	10	22	1.2998	-0.7811	58.1	57.3	57.3	57.3	0.0	0.0
572	10	23	1.2174	-0.6385	59.0	58.6	58.7	58.6	0.1	0.0
573	10	24	1.1351	-0.4959	60.2	60.2	60.3	60.2	0.1	0.0
574	10	25	1.0527	-0.3532	60.4	60.5	60.6	60.5	0.1	0.0
575	10	26	0.9704	-0.2106	59.4	59.6	59.7	59.6	0.1	0.0
576	10	27	0.8880	-0.0680	58.3	58.5	58.7	58.5	0.2	0.0
577	10	28	0.8057	0.0747	57.3	57.6	57.7	57.6	0.1	0.0
578	10	29	0.7233	0.2173	56.7	56.9	57.0	56.9	0.1	0.0
579	10	30	0.6410	0.3599	56.4	56.7	56.7	56.7	0.0	0.0
580	10	31	0.5586	0.5026	56.5	56.8	56.7	56.7	-0.1	-0.1
581	10	32	0.4763	0.6452	56.9	57.0	56.9	57.0	-0.1	0.0
582	10	33	0.3939	0.7878	57.2	57.2	57.1	57.2	-0.1	0.0
583	10	34	0.3116	0.9305	57.5	57.5	57.4	57.5	-0.1	0.0
584	10	35	0.2292	1.0731	57.7	57.7	57.7	57.7	0.0	0.0
585	10	36	0.1469	1.2158	57.9	57.9	58.1	58.0	0.2	0.1
586	10	37	0.0645	1.3584	58.2	58.2	58.4	58.3	0.2	0.1
587	10	38	-0.0178	1.5010	58.4	58.5	58.6	58.5	0.1	0.0
588	10	39	-0.1002	1.6437	57.6	57.8	57.9	57.8	0.1	0.0
589	10	40	-0.1825	1.7863	56.2	56.2	56.4	56.3	0.2	0.1
590	10	41	-0.2649	1.9289	55.1	55.0	55.1	55.0	0.1	0.0
591	10	42	-0.3472	2.0716	54.6	54.4	54.5	54.5	0.1	0.1
592	10	43	-0.4296	2.2142	54.2	54.1	54.2	54.1	0.1	0.0
593	10	44	-0.5119	2.3568	54.1	53.9	54.0	53.9	0.1	0.0
594	10	45	-0.5943	2.4995	53.9	53.8	53.8	53.8	0.0	0.0
595	10	46	-0.6766	2.6421	53.8	53.7	53.7	53.7	0.0	0.0
596	10	47	-0.7590	2.7847	53.8	53.6	53.6	53.6	0.0	0.0
597	10	48	-0.8413	2.9274	53.6	53.4	53.4	53.4	0.0	0.0
598	10	49	-0.9237	3.0700	53.4	53.3	53.3	53.3	0.0	0.0
599	10	50	-1.0060	3.2126	53.3	53.1	53.1	53.1	0.0	0.0
600	10	51	-1.0884	3.3553	53.1	53.0	53.0	53.0	0.0	0.0
601	10	52	-1.1707	3.4979	52.9	52.8	52.8	52.8	0.0	0.0
602	10	53	-1.2531	3.6405	52.8	52.7	52.7	52.7	0.0	0.0
603	10	54	-1.3354	3.7832	52.7	52.6	52.6	52.6	0.0	0.0
604	10	55	-1.4178	3.9258	52.5	52.5	52.5	52.5	0.0	0.0
605	10	56	-1.5001	4.0684	52.4	52.4	52.4	52.4	0.0	0.0
606	10	57	-1.5825	4.2111	52.3	52.3	52.3	52.3	0.0	0.0
607	10	58	-1.6648	4.3537	52.2	52.2	52.2	52.2	0.0	0.0
608	10	59	-1.7472	4.4963	52.1	52.1	52.1	52.1	0.0	0.0
609	10	60	-1.8295	4.6390	52.0	52.1	52.1	52.1	0.0	0.0
610	10	61	-1.9119	4.7816	52.0	52.1	52.1	52.1	0.0	0.0
611	11	1	3.1717	-3.6941	56.0	55.2	55.0	55.2	-0.2	0.0
612	11	2	3.0894	-3.5515	56.1	55.2	55.1	55.2	-0.1	0.0
613	11	3	3.0070	-3.4088	56.1	55.2	55.1	55.2	-0.1	0.0
614	11	4	2.9247	-3.2662	56.1	55.2	55.0	55.2	-0.2	0.0
615	11	5	2.8423	-3.1236	56.0	55.1	55.0	55.1	-0.1	0.0
616	11	6	2.7600	-2.9809	55.9	55.0	54.8	54.9	-0.2	-0.1
617	11	7	2.6776	-2.8383	55.7	54.8	54.6	54.7	-0.2	-0.1
618	11	8	2.5953	-2.6957	55.6	54.6	54.5	54.6	-0.1	0.0
619	11	9	2.5129	-2.5530	55.4	54.5	54.3	54.5	-0.2	0.0
620	11	10	2.4306	-2.4104	55.4	54.5	54.3	54.5	-0.2	0.0
621	11	11	2.3482	-2.2678	55.3	54.5	54.3	54.5	-0.2	0.0
622	11	12	2.2659	-2.1251	55.2	54.5	54.3	54.5	-0.2	0.0
623	11	13	2.1835	-1.9825	55.1	54.3	54.3	54.3	0.0	0.0
624	11	14	2.1012	-1.8399	54.9	54.2	54.2	54.2	0.0	0.0
625	11	15	2.0188	-1.6972	54.8	54.1	54.1	54.1	0.0	0.0
626	11	16	1.9365	-1.5546	54.7	54.1	54.0	54.1	-0.1	0.0
627	11	17	1.8541	-1.4119	54.7	54.1	54.0	54.1	-0.1	0.0

Table C-8
King County International Airport EA
DNL Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
628	11	18	1.7718	-1.2693	54.8	54.1	54.1	54.1	0.0	0.0
629	11	19	1.6894	-1.1267	54.9	54.2	54.1	54.2	-0.1	0.0
630	11	20	1.6071	-0.9840	55.0	54.3	54.3	54.3	0.0	0.0
631	11	21	1.5247	-0.8414	55.2	54.5	54.6	54.6	0.1	0.1
632	11	22	1.4424	-0.6988	55.7	55.2	55.2	55.2	0.0	0.0
633	11	23	1.3600	-0.5561	56.6	56.5	56.6	56.5	0.1	0.0
634	11	24	1.2777	-0.4135	57.9	58.1	58.1	58.1	0.0	0.0
635	11	25	1.1953	-0.2709	58.9	59.3	59.4	59.3	0.1	0.0
636	11	26	1.1130	-0.1282	58.6	59.0	59.1	59.1	0.1	0.1
637	11	27	1.0306	0.0144	57.8	58.2	58.3	58.2	0.1	0.0
638	11	28	0.9483	0.1570	57.1	57.6	57.6	57.6	0.0	0.0
639	11	29	0.8659	0.2997	56.6	57.1	57.1	57.1	0.0	0.0
640	11	30	0.7836	0.4423	56.4	56.9	56.9	56.9	0.0	0.0
641	11	31	0.7012	0.5849	56.3	56.8	56.8	56.8	0.0	0.0
642	11	32	0.6189	0.7276	56.4	56.9	56.8	56.9	-0.1	0.0
643	11	33	0.5365	0.8702	56.6	57.0	56.9	56.9	-0.1	-0.1
644	11	34	0.4542	1.0128	56.7	57.0	57.0	57.0	0.0	0.0
645	11	35	0.3718	1.1555	56.9	57.2	57.2	57.2	0.0	0.0
646	11	36	0.2895	1.2981	57.1	57.4	57.5	57.4	0.1	0.0
647	11	37	0.2071	1.4407	57.3	57.7	57.8	57.7	0.1	0.0
648	11	38	0.1248	1.5834	57.2	57.5	57.6	57.6	0.1	0.1
649	11	39	0.0424	1.7260	56.0	56.4	56.5	56.4	0.1	0.0
650	11	40	-0.0399	1.8686	54.9	55.2	55.3	55.2	0.1	0.0
651	11	41	-0.1223	2.0113	54.0	54.2	54.3	54.3	0.1	0.1
652	11	42	-0.2046	2.1539	53.5	53.7	53.8	53.7	0.1	0.0
653	11	43	-0.2870	2.2965	53.2	53.4	53.5	53.4	0.1	0.0
654	11	44	-0.3693	2.4392	53.0	53.2	53.2	53.2	0.0	0.0
655	11	45	-0.4517	2.5818	52.9	53.0	53.0	53.0	0.0	0.0
656	11	46	-0.5340	2.7244	52.8	52.9	52.9	52.9	0.0	0.0
657	11	47	-0.6164	2.8671	52.6	52.8	52.8	52.8	0.0	0.0
658	11	48	-0.6987	3.0097	52.5	52.6	52.6	52.6	0.0	0.0
659	11	49	-0.7811	3.1523	52.4	52.5	52.5	52.5	0.0	0.0
660	11	50	-0.8634	3.2950	52.2	52.3	52.4	52.3	0.1	0.0
661	11	51	-0.9458	3.4376	52.1	52.2	52.2	52.2	0.0	0.0
662	11	52	-1.0281	3.5803	52.0	52.1	52.1	52.1	0.0	0.0
663	11	53	-1.1105	3.7229	51.8	52.0	52.0	52.0	0.0	0.0
664	11	54	-1.1928	3.8655	51.7	51.8	51.9	51.8	0.1	0.0
665	11	55	-1.2752	4.0082	51.6	51.7	51.7	51.7	0.0	0.0
666	11	56	-1.3575	4.1508	51.5	51.7	51.7	51.7	0.0	0.0
667	11	57	-1.4399	4.2934	51.4	51.6	51.6	51.6	0.0	0.0
668	11	58	-1.5222	4.4361	51.3	51.5	51.5	51.5	0.0	0.0
669	11	59	-1.6046	4.5787	51.2	51.4	51.4	51.4	0.0	0.0
670	11	60	-1.6869	4.7213	51.2	51.4	51.4	51.4	0.0	0.0
671	11	61	-1.7693	4.8640	51.1	51.4	51.4	51.4	0.0	0.0
SP	1	1	-0.5832	0.7732	71.7	70.8	77.3	71.9	6.5	1.1

Prepared December 31, 2003

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing (2002/3) TA 65 dBA	Existing (2002/3) TA 75 dBA	Existing (2002/3) TA 85 dBA	2018 Future No Project (RSA-5) TA 65 dBA	2018 Future No Project (RSA-5) TA 75 dBA	2018 Future No Project (RSA-5) TA 85 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 65 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 75 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 85 dBA	2018 W/ Special Use Procedures (A3) TA 65 dBA	2018 W/ Special Use Procedures (A3) TA 75 dBA	2018 W/ Special Use Procedures (A3) TA 85 dBA
1	1	1	1.7454	-4.5176	3.0	0.3	0.0	1.5	0.1	0.0	1.4	0.1	0.0	1.5	0.1	0.0
2	1	2	1.6630	-4.3750	3.2	0.3	0.0	1.6	0.1	0.0	1.5	0.1	0.0	1.5	0.1	0.0
3	1	3	1.5807	-4.2323	3.3	0.3	0.0	1.6	0.1	0.0	1.6	0.1	0.0	1.6	0.1	0.0
4	1	4	1.4983	-4.0897	3.6	0.3	0.0	1.8	0.1	0.0	1.7	0.1	0.0	1.8	0.1	0.0
5	1	5	1.4160	-3.9471	3.8	0.4	0.0	1.9	0.1	0.0	1.8	0.1	0.0	1.9	0.1	0.0
6	1	6	1.3336	-3.8044	4.0	0.4	0.0	2.0	0.1	0.0	2.0	0.1	0.0	2.0	0.1	0.0
7	1	7	1.2513	-3.6618	4.2	0.5	0.0	2.2	0.1	0.0	2.1	0.1	0.0	2.2	0.1	0.0
8	1	8	1.1689	-3.5192	4.4	0.6	0.0	2.3	0.2	0.0	2.2	0.1	0.0	2.3	0.2	0.0
9	1	9	1.0866	-3.3765	4.7	0.6	0.0	2.5	0.2	0.0	2.4	0.2	0.0	2.5	0.2	0.0
10	1	10	1.0042	-3.2339	5.0	0.7	0.0	2.8	0.3	0.0	2.6	0.2	0.0	2.7	0.3	0.0
11	1	11	0.9219	-3.0913	5.3	0.8	0.0	3.0	0.3	0.0	2.8	0.3	0.0	3.0	0.3	0.0
12	1	12	0.8395	-2.9486	5.6	0.9	0.0	3.2	0.4	0.0	3.0	0.3	0.0	3.2	0.4	0.0
13	1	13	0.7572	-2.8060	5.7	0.9	0.0	3.3	0.4	0.0	3.2	0.4	0.0	3.3	0.4	0.0
14	1	14	0.6748	-2.6634	5.8	0.9	0.0	3.4	0.4	0.0	3.3	0.4	0.0	3.4	0.4	0.0
15	1	15	0.5925	-2.5207	5.9	1.0	0.0	3.5	0.4	0.0	3.4	0.4	0.0	3.5	0.4	0.0
16	1	16	0.5101	-2.3781	6.0	1.0	0.0	3.6	0.4	0.0	3.5	0.4	0.0	3.6	0.4	0.0
17	1	17	0.4278	-2.2354	6.1	1.1	0.0	3.9	0.4	0.0	3.6	0.4	0.0	3.9	0.4	0.0
18	1	18	0.3454	-2.0928	6.5	1.2	0.0	4.3	0.4	0.0	3.9	0.4	0.0	4.3	0.4	0.0
19	1	19	0.2631	-1.9502	7.1	1.3	0.0	4.7	0.4	0.0	4.4	0.4	0.0	4.7	0.4	0.0
20	1	20	0.1807	-1.8075	7.6	1.4	0.0	5.0	0.4	0.0	4.8	0.4	0.0	5.0	0.4	0.0
21	1	21	0.0984	-1.6649	8.3	1.4	0.0	5.4	0.4	0.0	5.3	0.4	0.0	5.4	0.4	0.0
22	1	22	0.0161	-1.5223	9.1	1.4	0.0	5.8	0.4	0.0	5.6	0.4	0.0	5.8	0.4	0.0
23	1	23	-0.0663	-1.3796	9.3	1.3	0.0	5.7	0.3	0.0	6.0	0.4	0.0	5.8	0.3	0.0
24	1	24	-0.1486	-1.2370	8.9	1.1	0.0	5.2	0.2	0.0	5.8	0.3	0.0	5.2	0.3	0.0
25	1	25	-0.2310	-1.0944	8.2	0.9	0.0	4.6	0.2	0.0	5.1	0.3	0.0	4.6	0.2	0.0
26	1	26	-0.3133	-0.9517	7.2	0.7	0.0	3.6	0.2	0.0	4.2	0.2	0.0	3.6	0.2	0.0
27	1	27	-0.3957	-0.8091	6.4	0.3	0.0	2.9	0.1	0.0	3.2	0.2	0.0	2.9	0.1	0.0
28	1	28	-0.4780	-0.6665	5.7	0.0	0.0	2.5	0.0	0.0	2.7	0.0	0.0	2.5	0.0	0.0
29	1	29	-0.5604	-0.5238	5.3	0.0	0.0	2.4	0.0	0.0	2.3	0.0	0.0	2.4	0.0	0.0
30	1	30	-0.6427	-0.3812	5.4	0.0	0.0	2.5	0.0	0.0	2.3	0.0	0.0	2.4	0.0	0.0
31	1	31	-0.7251	-0.2386	11.7	0.0	0.0	8.6	0.0	0.0	8.4	0.0	0.0	8.6	0.0	0.0
32	1	32	-0.8074	-0.0959	12.4	0.1	0.0	9.1	0.0	0.0	8.8	0.0	0.0	9.0	0.0	0.0
33	1	33	-0.8898	0.0467	13.4	0.4	0.0	9.7	0.1	0.0	9.4	0.1	0.0	9.6	0.1	0.0
34	1	34	-0.9721	0.1893	13.9	0.5	0.0	10.3	0.1	0.0	10.1	0.1	0.0	10.2	0.1	0.0
35	1	35	-1.0545	0.3320	16.3	0.5	0.0	12.6	0.1	0.0	12.6	0.1	0.0	12.6	0.1	0.0
36	1	36	-1.1368	0.4746	13.9	0.6	0.0	10.7	0.2	0.0	11.1	0.2	0.0	10.7	0.2	0.0
37	1	37	-1.2192	0.6172	12.9	0.7	0.0	10.4	0.2	0.0	11.0	0.2	0.0	10.6	0.2	0.0
38	1	38	-1.3015	0.7599	11.5	0.8	0.0	10.0	0.2	0.0	10.6	0.2	0.0	10.1	0.2	0.0
39	1	39	-1.3839	0.9025	8.2	0.8	0.0	7.3	0.3	0.0	8.0	0.3	0.0	7.5	0.3	0.0
40	1	40	-1.4662	1.0451	4.0	0.8	0.0	3.2	0.3	0.0	3.4	0.3	0.0	3.3	0.3	0.0
41	1	41	-1.5486	1.1878	4.1	0.7	0.0	3.2	0.3	0.0	3.3	0.3	0.0	3.3	0.3	0.0
42	1	42	-1.6309	1.3304	4.1	0.7	0.0	3.2	0.3	0.0	3.2	0.3	0.0	3.2	0.3	0.0
43	1	43	-1.7133	1.4730	4.0	0.7	0.0	3.0	0.3	0.0	3.0	0.3	0.0	3.0	0.3	0.0
44	1	44	-1.7956	1.6157	3.9	0.7	0.0	2.9	0.3	0.0	2.9	0.3	0.0	2.9	0.3	0.0
45	1	45	-1.8780	1.7583	3.9	0.7	0.0	2.9	0.3	0.0	2.9	0.3	0.0	2.9	0.3	0.0
46	1	46	-1.9603	1.9009	4.0	0.7	0.0	2.9	0.3	0.0	2.9	0.3	0.0	2.9	0.3	0.0
47	1	47	-2.0427	2.0436	3.9	0.7	0.0	2.9	0.3	0.0	2.9	0.3	0.0	2.9	0.3	0.0
48	1	48	-2.1250	2.1862	3.7	0.7	0.0	2.7	0.3	0.0	2.7	0.3	0.0	2.7	0.3	0.0
49	1	49	-2.2074	2.3288	3.4	0.7	0.0	2.4	0.3	0.0	2.4	0.3	0.0	2.4	0.3	0.0
50	1	50	-2.2897	2.4715	3.2	0.6	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
51	1	51	-2.3721	2.6141	3.2	0.6	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
52	1	52	-2.4544	2.7568	3.2	0.6	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
53	1	53	-2.5368	2.8994	3.1	0.6	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
54	1	54	-2.6191	3.0420	3.1	0.5	0.0	2.2	0.2	0.0	2.2	0.2	0.0	2.2	0.2	0.0
55	1	55	-2.7015	3.1847	3.0	0.5	0.0	2.1	0.2	0.0	2.1	0.2	0.0	2.1	0.2	0.0
56	1	56	-2.7838	3.3273	2.9	0.5	0.0	2.1	0.2	0.0	2.1	0.2	0.0	2.1	0.2	0.0
57	1	57	-2.8662	3.4699	2.8	0.5	0.0	2.1	0.2	0.0	2.1	0.2	0.0	2.1	0.2	0.0
58	1	58	-2.9485	3.6126	2.8	0.5	0.0	2.0	0.2	0.0	2.0	0.2	0.0	2.0	0.2	0.0
59	1	59	-3.0309	3.7552	2.7	0.5	0.0	1.9	0.2	0.0	1.9	0.2	0.0	1.9	0.2	0.0
60	1	60	-3.1132	3.8978	2.6	0.4	0.0	1.9	0.2	0.0	1.9	0.2	0.0	1.9	0.2	0.0
61	1	61	-3.1956	4.0405	2.5	0.4	0.0	1.9	0.2	0.0	1.9	0.2	0.0	1.9	0.2	0.0
62	2	1	1.8880	-4.4352	4.3	0.6	0.0	2.7	0.2	0.0	2.5	0.2	0.0	2.7	0.2	0.0
63	2	2	1.8057	-4.2926	4.5	0.6	0.0	2.9	0.2	0.0	2.7	0.2	0.0	2.8	0.2	0.0
64	2	3	1.7233	-4.1500	4.8	0.7	0.0	3.1	0.2	0.0	3.0	0.2	0.0	3.1	0.2	0.0
65	2	4	1.6410	-4.0073	5.2	0.8	0.0	3.4	0.3	0.0	3.2	0.2	0.0	3.4	0.2	0.0
66	2	5	1.5586	-3.8647	5.6	0.9	0.0	3.7	0.3	0.0	3.5	0.3	0.0	3.7	0.3	0.0
67	2	6	1.4763	-3.7221	5.9	1.0	0.0	4.0	0.3	0.0	3.8	0.3	0.0	4.0	0.3	0.0
68	2	7	1.3939	-3.5794	6.2	1.0	0.0	4.3	0.4	0.0	4.2	0.3	0.0	4.3	0.3	0.0
69	2	8	1.3116	-3.4368	6.5	1.2	0.0	4.6	0.4	0.0	4.5	0.4	0.0	4.6	0.4	0.0
70	2	9	1.2292	-3.2942	6.9	1.3	0.0	4.9	0.5	0.0	4.8	0.4	0.0	4.9	0.5	0.0
71	2	10	1.1469	-3.1515	7.4	1.5	0.0	5.5	0.6	0.0	5.1	0.5	0.0	5.5	0.6	0.0
72	2	11	1.0645	-3.0089	8.2	1.6	0.0	6.2	0.7	0.0	5.7	0.6	0.0	6.2	0.7	0.0
73	2	12	0.9822	-2.8663	8.8	1.7	0.0	6.9	0.7	0.0	6.4	0.7	0.0	6.9	0.7	0.0
74	2	13	0.8998	-2.7236	9.1	1.8	0.0	7.2	0.8	0.0	7.0	0.8	0.0	7.2	0.8	0.0
75	2	14	0.8175	-2.5810	9.4	1.9	0.0	7.6	0.8	0.0	7.3	0.8	0.0	7.7	0.8	0.0
76	2	15	0.7351	-2.4384	9.8	2.0	0.0	8.2	0.8	0.0	7.7	0.8	0.0	8.2	0.8	0.0
77	2	16	0.6528	-2.2957	10.3	2.0	0.0	9.2	0.9	0.0	8.2	0.9	0.0	9.3	0.9	0.0
78	2	17	0.5704	-2.1531	11.0	2.1	0.0	10.3	0.9	0.0	9.4	0.9	0.0	10.5	0.9	0.0

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
79	2	18	0.4881	-2.0105	12.1	2.3	0.1	11.6	1.0	0.0	10.6	1.0	0.0	11.7	1.0	0.0
80	2	19	0.4057	-1.8678	13.3	2.5	0.1	13.0	1.0	0.0	11.9	1.0	0.0	13.1	1.0	0.0
81	2	20	0.3234	-1.7252	15.0	2.6	0.1	14.8	1.0	0.0	13.6	1.0	0.0	14.8	1.0	0.0
82	2	21	0.2410	-1.5826	16.6	2.7	0.1	16.0	1.0	0.0	15.3	1.0	0.0	16.0	1.0	0.0
83	2	22	0.1587	-1.4399	17.9	2.7	0.1	16.6	0.9	0.0	16.8	1.0	0.0	16.7	1.0	0.0
84	2	23	0.0763	-1.2973	18.4	2.5	0.1	16.3	0.8	0.0	17.2	0.9	0.0	16.5	0.9	0.0
85	2	24	-0.0060	-1.1547	17.9	2.4	0.1	15.4	0.7	0.0	16.6	0.8	0.0	15.6	0.7	0.0
86	2	25	-0.0884	-1.0120	16.7	2.1	0.1	14.3	0.6	0.0	15.7	0.7	0.0	14.4	0.6	0.0
87	2	26	-0.1707	-0.8694	14.8	1.9	0.0	11.8	0.5	0.0	13.6	0.6	0.0	11.8	0.5	0.0
88	2	27	-0.2531	-0.7268	12.7	1.6	0.0	9.4	0.4	0.0	11.2	0.5	0.0	9.4	0.4	0.0
89	2	28	-0.3354	-0.5841	10.3	1.2	0.0	6.8	0.3	0.0	8.6	0.4	0.0	6.8	0.3	0.0
90	2	29	-0.4178	-0.4415	7.9	0.7	0.0	3.9	0.1	0.0	6.1	0.3	0.0	3.9	0.2	0.0
91	2	30	-0.5001	-0.2989	13.9	0.3	0.0	9.8	0.1	0.0	9.8	0.2	0.0	9.8	0.1	0.0
92	2	31	-0.5825	-0.1562	15.3	0.5	0.0	11.3	0.1	0.0	10.9	0.1	0.0	11.2	0.1	0.0
93	2	32	-0.6648	-0.0136	17.3	0.7	0.0	13.1	0.2	0.0	12.5	0.2	0.0	13.0	0.2	0.0
94	2	33	-0.7472	0.1291	25.4	0.9	0.0	21.1	0.2	0.0	20.4	0.2	0.0	21.0	0.2	0.0
95	2	34	-0.8295	0.2717	36.8	5.0	0.0	32.7	4.3	0.0	32.0	4.3	0.0	32.5	4.3	0.0
96	2	35	-0.9119	0.4143	37.7	5.1	0.0	33.6	4.4	0.0	33.5	4.4	0.0	33.6	4.4	0.0
97	2	36	-0.9942	0.5570	35.0	5.3	0.0	31.5	4.4	0.0	32.4	4.4	0.0	31.6	4.4	0.0
98	2	37	-1.0766	0.6996	25.3	1.3	0.1	22.9	0.5	0.0	24.1	0.5	0.0	23.1	0.5	0.0
99	2	38	-1.1589	0.8422	17.0	1.3	0.1	15.9	0.5	0.0	17.1	0.5	0.0	16.1	0.5	0.0
100	2	39	-1.2413	0.9849	15.1	1.3	0.1	15.0	0.6	0.0	15.8	0.6	0.0	15.2	0.6	0.0
101	2	40	-1.3236	1.1275	11.7	1.3	0.1	12.1	0.6	0.0	12.7	0.6	0.0	12.2	0.6	0.0
102	2	41	-1.4060	1.2701	7.3	1.2	0.1	7.6	0.6	0.0	7.7	0.6	0.0	7.7	0.6	0.0
103	2	42	-1.4883	1.4128	7.0	1.2	0.1	7.2	0.6	0.0	7.2	0.6	0.0	7.2	0.6	0.0
104	2	43	-1.5707	1.5554	6.9	1.2	0.1	6.9	0.6	0.0	6.9	0.6	0.0	6.9	0.6	0.0
105	2	44	-1.6530	1.6980	6.7	1.2	0.1	6.4	0.6	0.0	6.4	0.6	0.0	6.4	0.6	0.0
106	2	45	-1.7354	1.8407	6.4	1.2	0.1	6.1	0.6	0.0	6.1	0.6	0.0	6.1	0.6	0.0
107	2	46	-1.8177	1.9833	6.3	1.2	0.1	5.9	0.6	0.0	5.9	0.6	0.0	5.9	0.6	0.0
108	2	47	-1.9001	2.1259	6.1	1.1	0.0	5.7	0.5	0.0	5.7	0.5	0.0	5.7	0.5	0.0
109	2	48	-1.9824	2.2686	5.7	1.1	0.0	5.3	0.5	0.0	5.3	0.5	0.0	5.3	0.5	0.0
110	2	49	-2.0648	2.4112	5.3	1.1	0.0	4.9	0.5	0.0	4.9	0.5	0.0	4.9	0.5	0.0
111	2	50	-2.1471	2.5538	5.0	1.0	0.0	4.6	0.4	0.0	4.6	0.4	0.0	4.6	0.4	0.0
112	2	51	-2.2295	2.6965	4.8	0.9	0.0	4.4	0.4	0.0	4.4	0.4	0.0	4.4	0.4	0.0
113	2	52	-2.3118	2.8391	4.7	0.9	0.0	4.3	0.3	0.0	4.3	0.3	0.0	4.3	0.3	0.0
114	2	53	-2.3942	2.9817	4.6	0.9	0.0	4.1	0.3	0.0	4.1	0.3	0.0	4.1	0.3	0.0
115	2	54	-2.4765	3.1244	4.5	0.9	0.0	4.0	0.3	0.0	4.0	0.3	0.0	4.0	0.3	0.0
116	2	55	-2.5589	3.2670	4.3	0.8	0.0	3.8	0.3	0.0	3.8	0.3	0.0	3.8	0.3	0.0
117	2	56	-2.6412	3.4096	4.1	0.8	0.0	3.6	0.3	0.0	3.6	0.3	0.0	3.6	0.3	0.0
118	2	57	-2.7236	3.5523	3.9	0.7	0.0	3.4	0.3	0.0	3.4	0.3	0.0	3.4	0.3	0.0
119	2	58	-2.8059	3.6949	3.8	0.7	0.0	3.3	0.3	0.0	3.3	0.3	0.0	3.3	0.3	0.0
120	2	59	-2.8883	3.8375	3.7	0.7	0.0	3.1	0.3	0.0	3.1	0.3	0.0	3.1	0.3	0.0
121	2	60	-2.9706	3.9802	3.5	0.7	0.0	3.0	0.3	0.0	3.0	0.3	0.0	3.0	0.3	0.0
122	2	61	-3.0530	4.1228	3.4	0.7	0.0	2.9	0.3	0.0	2.9	0.3	0.0	2.9	0.3	0.0
123	3	1	2.0307	-4.3529	7.5	1.0	0.0	6.2	0.4	0.0	5.9	0.4	0.0	6.2	0.4	0.0
124	3	2	1.9483	-4.2103	7.7	1.1	0.0	6.3	0.4	0.0	6.0	0.4	0.0	6.2	0.4	0.0
125	3	3	1.8660	-4.0676	8.3	1.2	0.0	6.9	0.5	0.0	6.6	0.4	0.0	6.9	0.5	0.0
126	3	4	1.7836	-3.9250	8.7	1.3	0.0	7.1	0.5	0.0	6.9	0.5	0.0	7.1	0.5	0.0
127	3	5	1.7013	-3.7824	9.2	1.4	0.0	7.6	0.5	0.0	7.2	0.5	0.0	7.6	0.5	0.0
128	3	6	1.6189	-3.6397	9.7	1.6	0.0	8.0	0.6	0.0	7.6	0.6	0.0	8.0	0.6	0.0
129	3	7	1.5366	-3.4971	10.0	1.7	0.0	8.4	0.7	0.0	8.1	0.6	0.0	8.4	0.7	0.0
130	3	8	1.4542	-3.3545	10.6	1.9	0.0	9.2	0.8	0.0	8.8	0.7	0.0	9.1	0.8	0.0
131	3	9	1.3719	-3.2118	11.4	2.1	0.1	10.1	0.9	0.0	9.5	0.8	0.0	10.1	0.9	0.0
132	3	10	1.2895	-3.0692	12.6	2.3	0.1	11.5	1.1	0.1	10.5	1.0	0.0	11.5	1.0	0.0
133	3	11	1.2072	-2.9266	13.8	2.5	0.1	12.9	1.2	0.1	11.9	1.1	0.1	13.1	1.2	0.1
134	3	12	1.1248	-2.7839	15.0	2.7	0.2	14.5	1.3	0.1	13.4	1.2	0.1	14.7	1.3	0.1
135	3	13	1.0425	-2.6413	15.7	2.8	0.2	15.4	1.4	0.1	14.7	1.4	0.1	15.7	1.4	0.1
136	3	14	0.9601	-2.4987	16.8	3.0	0.2	16.9	1.5	0.1	15.7	1.4	0.1	17.2	1.5	0.1
137	3	15	0.8778	-2.3560	17.8	3.1	0.3	18.5	1.6	0.2	17.3	1.5	0.1	18.7	1.6	0.1
138	3	16	0.7954	-2.2134	19.0	3.1	0.4	20.6	1.7	0.2	18.9	1.6	0.2	20.8	1.7	0.2
139	3	17	0.7131	-2.0707	20.1	3.2	0.5	22.5	1.8	0.2	21.1	1.7	0.2	22.8	1.8	0.2
140	3	18	0.6307	-1.9281	21.7	3.6	0.6	24.7	2.1	0.2	23.2	1.9	0.2	25.0	2.1	0.2
141	3	19	0.5484	-1.7855	23.9	4.1	0.6	27.3	2.5	0.2	25.5	2.2	0.2	27.7	2.5	0.2
142	3	20	0.4660	-1.6428	26.9	4.4	0.7	30.7	2.6	0.2	28.4	2.5	0.2	30.9	2.6	0.2
143	3	21	0.3837	-1.5002	29.5	4.7	0.8	33.1	2.8	0.3	31.8	2.6	0.2	33.3	2.8	0.3
144	3	22	0.3013	-1.3576	32.1	4.9	0.9	35.3	3.1	0.3	34.8	2.9	0.3	35.5	3.1	0.3
145	3	23	0.2190	-1.2149	35.9	5.5	0.9	38.8	3.3	0.2	38.7	3.3	0.3	39.1	3.3	0.2
146	3	24	0.1366	-1.0723	41.1	6.1	0.8	44.5	3.5	0.2	44.1	3.7	0.2	44.6	3.5	0.2
147	3	25	0.0543	-0.9297	42.2	6.0	0.8	45.6	3.3	0.2	45.5	3.4	0.2	45.6	3.3	0.2
148	3	26	-0.0281	-0.7870	38.0	5.1	0.8	41.2	2.3	0.2	45.5	2.6	0.2	41.2	2.3	0.2
149	3	27	-0.1104	-0.6444	32.2	4.1	0.5	34.4	1.5	0.1	40.1	1.7	0.2	34.4	1.5	0.1
150	3	28	-0.1928	-0.5018	26.9	3.3	0.0	28.2	1.1	0.0	31.7	1.3	0.1	28.2	1.1	0.0
151	3	29	-0.2751	-0.3591	22.6	2.8	0.0	22.0	0.9	0.0	26.6	1.0	0.0	22.0	0.9	0.0
152	3	30	-0.3575	-0.2165	26.4	2.6	0.0	25.0	0.9	0.0	29.0	0.9	0.0	25.0	0.9	0.0
153	3	31	-0.4398	-0.0739	27.3	2.8	0.0	25.9	1.0	0.0	27.2	0.9	0.0	25.8	1.0	0.0
154	3	32	-0.5222	0.0688	30.1	3.8	0.2	28.0	1.4	0.0	28.0	1.1	0.0	27.8	1.3	0.0
155	3	33	-0.6045	0.2114	56.7	10.9	0.4	55.6	8.0	0.1	49.9	7.7	0.1	55.4	7.9	0.1
156	3	34	-0.6869	0.3540	62.8	15.4	0.4	62.5	12.6	0.1	56.6	12.4	0.1	62.3	12.5	0.1

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing (2002/3) TA 65 dBA	Existing (2002/3) TA 75 dBA	Existing (2002/3) TA 85 dBA	2018 Future No Project (RSA-5) TA 65 dBA	2018 Future No Project (RSA-5) TA 75 dBA	2018 Future No Project (RSA-5) TA 85 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 65 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 75 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 85 dBA	2018 W/ Special Use Procedures (A3) TA 65 dBA	2018 W/ Special Use Procedures (A3) TA 75 dBA	2018 W/ Special Use Procedures (A3) TA 85 dBA
157	3	35	-0.7692	0.4967	62.3	23.4	4.3	61.8	20.6	4.1	63.0	20.8	4.1	61.8	20.7	4.1
158	3	36	-0.8516	0.6393	53.1	16.0	0.4	51.8	14.1	0.1	60.9	14.8	0.1	51.9	14.2	0.1
159	3	37	-0.9339	0.7819	43.7	6.5	0.5	43.0	5.6	0.1	48.7	6.1	0.1	43.4	5.8	0.1
160	3	38	-1.0163	0.9246	25.9	2.4	0.5	26.5	1.6	0.2	28.6	1.6	0.2	26.8	1.6	0.2
161	3	39	-1.0986	1.0672	21.6	2.3	0.4	23.0	1.6	0.2	24.3	1.6	0.2	23.3	1.6	0.2
162	3	40	-1.1810	1.2098	20.0	2.2	0.4	21.7	1.5	0.2	22.2	1.5	0.2	21.8	1.5	0.2
163	3	41	-1.2633	1.3525	13.1	2.0	0.4	14.6	1.4	0.1	14.8	1.4	0.1	14.7	1.4	0.1
164	3	42	-1.3457	1.4951	12.8	1.8	0.3	14.0	1.2	0.1	14.1	1.2	0.1	14.1	1.2	0.1
165	3	43	-1.4280	1.6377	12.5	1.8	0.3	13.4	1.1	0.1	13.4	1.1	0.1	13.4	1.1	0.1
166	3	44	-1.5104	1.7804	11.8	1.7	0.3	12.3	1.0	0.1	12.3	1.0	0.1	12.3	1.0	0.1
167	3	45	-1.5927	1.9230	11.3	1.7	0.2	11.6	1.0	0.1	11.6	1.0	0.1	11.6	1.0	0.1
168	3	46	-1.6751	2.0656	10.9	1.6	0.2	11.0	0.9	0.1	11.0	0.9	0.1	11.0	0.9	0.1
169	3	47	-1.7574	2.2083	10.5	1.6	0.2	10.5	0.9	0.1	10.5	0.9	0.1	10.5	0.9	0.1
170	3	48	-1.8398	2.3509	9.9	1.5	0.2	9.7	0.8	0.1	9.7	0.8	0.1	9.7	0.8	0.1
171	3	49	-1.9221	2.4935	9.5	1.5	0.1	9.2	0.8	0.1	9.2	0.8	0.1	9.2	0.8	0.1
172	3	50	-2.0045	2.6362	8.9	1.4	0.1	8.6	0.7	0.1	8.6	0.7	0.1	8.6	0.7	0.1
173	3	51	-2.0868	2.7788	8.6	1.2	0.1	8.0	0.6	0.0	8.0	0.6	0.0	8.0	0.6	0.0
174	3	52	-2.1692	2.9215	8.2	1.1	0.1	7.6	0.5	0.0	7.6	0.5	0.0	7.6	0.5	0.0
175	3	53	-2.2515	3.0641	7.8	1.1	0.0	7.0	0.5	0.0	7.0	0.5	0.0	7.0	0.5	0.0
176	3	54	-2.3339	3.2067	7.4	1.1	0.0	6.6	0.5	0.0	6.6	0.5	0.0	6.6	0.5	0.0
177	3	55	-2.4162	3.3494	7.0	1.0	0.0	6.3	0.5	0.0	6.3	0.5	0.0	6.3	0.5	0.0
178	3	56	-2.4986	3.4920	6.7	1.0	0.0	6.0	0.4	0.0	6.0	0.4	0.0	6.0	0.4	0.0
179	3	57	-2.5809	3.6346	6.5	0.9	0.0	5.7	0.4	0.0	5.7	0.4	0.0	5.7	0.4	0.0
180	3	58	-2.6633	3.7773	6.2	0.9	0.0	5.4	0.4	0.0	5.4	0.4	0.0	5.4	0.4	0.0
181	3	59	-2.7456	3.9199	5.8	0.9	0.0	5.1	0.4	0.0	5.1	0.4	0.0	5.1	0.4	0.0
182	3	60	-2.8280	4.0625	5.4	0.9	0.0	4.7	0.4	0.0	4.7	0.4	0.0	4.7	0.4	0.0
183	3	61	-2.9103	4.2052	5.1	0.8	0.0	4.5	0.4	0.0	4.5	0.4	0.0	4.5	0.4	0.0
184	4	1	2.1733	-4.2705	11.9	1.4	0.0	11.7	0.7	0.0	11.3	0.6	0.0	11.7	0.7	0.0
185	4	2	2.0910	-4.1279	12.7	1.5	0.0	12.7	0.7	0.0	12.3	0.7	0.0	12.7	0.7	0.0
186	4	3	2.0086	-3.9853	13.6	1.7	0.0	13.8	0.8	0.0	13.3	0.7	0.0	13.8	0.7	0.0
187	4	4	1.9263	-3.8426	14.6	1.9	0.0	14.9	0.8	0.0	14.4	0.8	0.0	14.9	0.8	0.0
188	4	5	1.8439	-3.7000	15.6	2.2	0.0	16.0	0.9	0.0	15.4	0.9	0.0	16.0	0.9	0.0
189	4	6	1.7616	-3.5574	16.8	2.3	0.0	17.4	1.0	0.0	16.9	1.0	0.0	17.4	1.0	0.0
190	4	7	1.6792	-3.4147	18.0	2.5	0.1	19.3	1.1	0.0	18.3	1.1	0.0	19.3	1.1	0.0
191	4	8	1.5969	-3.2721	19.6	2.8	0.2	21.5	1.4	0.1	20.3	1.2	0.0	21.5	1.4	0.1
192	4	9	1.5145	-3.1295	21.4	3.2	0.3	23.8	1.6	0.1	22.3	1.4	0.1	24.0	1.6	0.1
193	4	10	1.4322	-2.9868	23.4	3.5	0.3	26.3	1.8	0.2	24.8	1.7	0.1	26.6	1.8	0.2
194	4	11	1.3498	-2.8442	26.3	3.7	0.5	29.6	2.1	0.2	28.3	1.9	0.2	29.8	2.0	0.2
195	4	12	1.2675	-2.7016	27.9	4.0	0.6	31.7	2.4	0.3	30.3	2.1	0.2	31.9	2.3	0.3
196	4	13	1.1851	-2.5589	29.5	4.2	0.7	33.6	2.5	0.3	32.3	2.4	0.3	33.8	2.5	0.3
197	4	14	1.1028	-2.4163	31.7	4.5	0.7	36.3	2.8	0.4	34.4	2.6	0.3	36.2	2.8	0.4
198	4	15	1.0204	-2.2737	33.8	4.7	0.8	38.9	3.1	0.4	37.1	2.8	0.4	38.8	3.1	0.4
199	4	16	0.9381	-2.1310	35.7	5.0	1.0	41.7	3.6	0.5	39.5	3.2	0.4	41.5	3.6	0.5
200	4	17	0.8557	-1.9884	37.2	5.4	1.2	44.1	4.2	0.5	42.3	3.7	0.5	43.8	4.2	0.5
201	4	18	0.7734	-1.8458	39.1	6.5	1.3	46.6	5.5	0.6	44.6	4.3	0.6	46.4	5.4	0.6
202	4	19	0.6910	-1.7031	42.5	7.4	1.5	50.3	6.3	0.7	47.4	5.7	0.6	50.1	6.3	0.6
203	4	20	0.6087	-1.5605	45.6	8.2	1.7	53.7	7.2	0.7	50.8	6.5	0.7	53.6	7.2	0.7
204	4	21	0.5263	-1.4179	48.4	9.0	1.9	56.8	8.2	0.8	54.7	7.4	0.8	56.9	8.2	0.8
205	4	22	0.4440	-1.2752	52.1	10.1	2.0	60.4	9.4	0.9	59.5	8.5	0.8	60.6	9.4	0.9
206	4	23	0.3616	-1.1326	67.1	12.6	2.2	76.7	11.3	0.9	75.2	10.7	0.9	76.9	11.4	0.9
207	4	24	0.2793	-0.9900	86.5	17.1	2.8	99.4	15.8	1.2	97.1	15.3	1.1	99.6	15.9	1.2
208	4	25	0.1969	-0.8473	97.2	18.4	3.3	112.7	17.2	1.3	111.9	16.9	1.3	112.9	17.2	1.3
209	4	26	0.1146	-0.7047	95.8	16.8	2.9	111.8	15.3	1.0	113.1	15.6	1.0	111.8	15.3	1.0
210	4	27	0.0322	-0.5621	89.4	14.6	2.5	104.5	13.1	0.7	106.9	14.4	0.8	104.6	13.1	0.8
211	4	28	-0.0501	-0.4194	84.2	12.3	1.9	99.3	11.1	0.5	102.0	12.2	0.6	99.4	11.1	0.6
212	4	29	-0.1325	-0.2768	81.8	11.2	1.7	95.2	10.2	0.4	99.8	11.0	0.5	95.2	10.2	0.4
213	4	30	-0.2148	-0.1342	81.3	9.8	1.5	93.1	8.4	0.4	97.6	11.2	0.5	93.0	8.4	0.4
214	4	31	-0.2972	0.0085	89.0	10.1	1.5	101.7	8.1	0.4	102.1	8.9	0.4	101.5	8.0	0.4
215	4	32	-0.3795	0.1511	112.1	12.7	2.1	125.6	9.3	0.6	117.7	8.8	0.4	125.3	9.2	0.5
216	4	33	-0.4619	0.2937	140.3	23.1	2.9	155.9	19.6	0.9	139.4	16.5	0.7	155.5	19.4	0.8
217	4	34	-0.5442	0.4364	145.7	43.7	9.4	162.6	40.7	7.2	151.4	37.7	7.0	162.3	40.5	7.1
218	4	35	-0.6266	0.5790	128.2	42.4	22.8	141.7	39.4	21.0	150.0	40.9	21.3	141.8	39.5	21.0
219	4	36	-0.7089	0.7217	91.8	32.2	7.0	99.4	29.5	6.4	134.8	36.4	6.9	100.0	29.8	6.6
220	4	37	-0.7913	0.8643	62.7	11.8	1.0	67.3	11.1	0.4	92.8	13.0	0.4	68.1	11.5	0.4
221	4	38	-0.8736	1.0069	45.8	4.5	0.9	50.6	4.4	0.4	54.2	4.6	0.4	51.0	4.5	0.4
222	4	39	-0.9560	1.1496	35.2	4.2	0.9	40.0	4.0	0.4	40.4	4.0	0.4	40.1	4.0	0.4
223	4	40	-1.0383	1.2922	33.5	4.0	0.8	38.8	3.6	0.4	38.9	3.6	0.4	38.8	3.6	0.4
224	4	41	-1.1207	1.4348	25.9	3.7	0.7	31.5	3.2	0.3	31.6	3.2	0.3	31.5	3.2	0.3
225	4	42	-1.2030	1.5775	25.3	3.2	0.7	30.7	2.7	0.3	30.7	2.7	0.3	30.7	2.7	0.3
226	4	43	-1.2854	1.7201	24.8	3.1	0.6	29.9	2.3	0.3	29.9	2.3	0.3	29.9	2.3	0.3
227	4	44	-1.3677	1.8627	24.3	2.9	0.5	29.3	2.0	0.3	29.3	2.0	0.3	29.3	2.0	0.3
228	4	45	-1.4501	2.0054	23.9	2.7	0.5	28.8	1.8	0.2	28.8	1.8	0.2	28.8	1.8	0.2
229	4	46	-1.5324	2.1480	23.4	2.6	0.5	28.3	1.6	0.2	28.3	1.6	0.2	28.3	1.6	0.2
230	4	47	-1.6148	2.2906	22.9	2.5	0.4	27.7	1.6	0.2	27.7	1.6	0.2	27.7	1.6	0.2
231	4	48	-1.6971	2.4333	22.4	2.4	0.3	27.0	1.4	0.2	27.0	1.4	0.2	27.0	1.4	0.2
232	4	49	-1.7795	2.5759	22.0	2.2	0.2	26.6	1.3	0.1	26.6	1.3	0.1	26.6	1.3	0.1
233	4	50	-1.8618	2.7185	21.3	2.1	0.2	25.8	1.1	0.1	25.8	1.2	0.1	25.8	1.1	0.1
234	4	51	-1.9442	2.8612	20.6	1.9	0.2	24.9	1.0	0.1	24.9	1.0	0.1	24.9	1.0	0.1

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
235	4	52	-2.0265	3.0038	19.4	1.8	0.1	23.5	0.9	0.1	23.5	0.9	0.1	23.5	0.9	0.1
236	4	53	-2.1089	3.1464	18.6	1.5	0.1	22.2	0.8	0.0	22.3	0.8	0.0	22.2	0.8	0.0
237	4	54	-2.1912	3.2891	17.4	1.3	0.0	20.5	0.7	0.0	20.5	0.7	0.0	20.5	0.7	0.0
238	4	55	-2.2736	3.4317	16.6	1.3	0.0	19.6	0.7	0.0	19.6	0.7	0.0	19.6	0.7	0.0
239	4	56	-2.3559	3.5743	16.0	1.2	0.0	18.9	0.7	0.0	18.9	0.7	0.0	18.9	0.7	0.0
240	4	57	-2.4383	3.7170	15.1	1.1	0.0	17.8	0.6	0.0	17.8	0.6	0.0	17.8	0.6	0.0
241	4	58	-2.5206	3.8596	14.5	1.1	0.0	16.8	0.6	0.0	16.8	0.6	0.0	16.8	0.6	0.0
242	4	59	-2.6030	4.0022	13.5	1.1	0.0	15.6	0.6	0.0	15.6	0.6	0.0	15.6	0.6	0.0
243	4	60	-2.6853	4.1449	12.7	1.0	0.0	14.5	0.6	0.0	14.5	0.6	0.0	14.5	0.6	0.0
244	4	61	-2.7677	4.2875	12.1	1.0	0.0	13.8	0.6	0.0	13.8	0.6	0.0	13.8	0.6	0.0
245	5	1	2.3159	-4.1882	15.9	2.2	0.0	16.8	1.1	0.0	16.4	1.0	0.0	16.8	1.0	0.0
246	5	2	2.2336	-4.0456	17.5	2.4	0.0	18.9	1.2	0.0	18.3	1.2	0.0	18.9	1.2	0.0
247	5	3	2.1512	-3.9029	19.5	2.6	0.0	21.4	1.4	0.0	20.7	1.4	0.0	21.4	1.4	0.0
248	5	4	2.0689	-3.7603	21.3	2.9	0.0	23.5	1.5	0.0	22.8	1.5	0.0	23.5	1.5	0.0
249	5	5	1.9865	-3.6177	23.7	3.2	0.1	26.1	1.7	0.1	25.4	1.6	0.0	26.1	1.7	0.0
250	5	6	1.9042	-3.4750	26.4	3.4	0.1	29.4	1.9	0.1	28.3	1.8	0.1	29.4	1.9	0.1
251	5	7	1.8218	-3.3324	29.4	4.0	0.3	33.7	2.7	0.1	31.8	2.5	0.1	33.7	2.7	0.1
252	5	8	1.7395	-3.1898	32.3	4.6	0.4	37.6	3.2	0.2	35.8	3.0	0.1	37.8	3.2	0.2
253	5	9	1.6571	-3.0471	35.4	5.1	0.5	41.5	3.8	0.3	39.4	3.6	0.2	41.8	3.8	0.2
254	5	10	1.5748	-2.9045	38.4	5.5	0.6	45.2	4.2	0.3	43.4	4.1	0.3	45.2	4.2	0.3
255	5	11	1.4924	-2.7619	41.7	6.0	0.8	48.9	4.8	0.4	47.5	4.5	0.3	48.7	4.8	0.4
256	5	12	1.4101	-2.6192	45.0	6.4	1.0	52.9	5.3	0.5	51.2	5.0	0.4	52.6	5.3	0.5
257	5	13	1.3277	-2.4766	47.9	6.8	1.2	56.7	5.7	0.6	54.9	5.5	0.5	56.4	5.7	0.6
258	5	14	1.2454	-2.3340	50.4	7.2	1.3	59.9	6.1	0.6	58.2	5.8	0.6	59.7	6.1	0.6
259	5	15	1.1630	-2.1913	52.7	7.9	1.5	62.9	7.1	0.7	61.2	6.3	0.6	62.7	7.1	0.7
260	5	16	1.0807	-2.0487	55.0	8.8	1.7	66.3	8.6	0.8	64.2	7.4	0.7	66.1	8.6	0.8
261	5	17	0.9983	-1.9060	57.2	10.0	2.0	70.0	10.4	1.0	67.5	9.2	0.9	69.8	10.4	1.0
262	5	18	0.9160	-1.7634	60.3	11.6	2.2	74.0	12.3	1.2	71.7	11.0	1.1	73.9	12.3	1.2
263	5	19	0.8336	-1.6208	65.6	13.1	2.5	79.8	14.0	1.3	75.9	12.9	1.2	79.6	14.0	1.3
264	5	20	0.7513	-1.4781	70.2	14.5	2.8	84.8	15.7	1.6	81.2	14.7	1.4	84.5	15.7	1.6
265	5	21	0.6689	-1.3355	74.1	16.5	3.1	89.4	18.2	1.8	86.4	16.3	1.6	89.2	18.2	1.8
266	5	22	0.5866	-1.1929	77.0	17.9	3.3	92.8	19.9	1.9	91.6	18.4	1.8	92.7	19.9	1.9
267	5	23	0.5042	-1.0502	83.5	19.6	3.9	100.4	22.0	2.5	98.1	20.8	2.0	100.3	21.9	2.5
268	5	24	0.4219	-0.9076	128.9	39.0	9.7	154.7	44.7	8.4	152.0	41.7	7.5	154.7	44.7	8.4
269	5	25	0.3395	-0.7650	179.6	66.5	21.6	215.8	77.8	22.4	214.4	74.3	21.3	215.9	77.8	22.4
270	5	26	0.2572	-0.6223	165.2	59.8	16.1	198.2	70.1	16.4	198.2	68.9	15.4	198.2	70.1	16.4
271	5	27	0.1748	-0.4797	151.1	57.7	14.5	179.2	66.8	14.4	179.7	65.3	13.7	179.2	66.9	14.4
272	5	28	0.0925	-0.3371	145.0	54.4	11.1	173.1	63.8	11.3	172.9	62.4	11.2	173.2	63.8	11.3
273	5	29	0.0101	-0.1944	157.2	57.5	11.9	185.8	67.6	12.5	185.7	66.5	11.2	185.6	67.5	12.4
274	5	30	-0.0722	-0.0518	171.2	62.3	12.0	201.9	73.7	12.6	200.5	72.4	12.5	202.0	73.7	12.6
275	5	31	-0.1546	0.0908	185.8	64.2	12.1	218.8	75.3	12.8	212.5	73.0	12.2	218.7	75.3	12.8
276	5	32	-0.2369	0.2335	232.3	82.4	16.7	272.5	93.6	16.1	254.3	86.8	12.9	272.2	93.4	16.0
277	5	33	-0.3193	0.3761	286.6	108.5	24.4	337.1	125.1	24.6	300.1	105.0	17.6	336.5	124.7	24.4
278	5	34	-0.4016	0.5187	300.7	128.9	42.5	359.3	149.4	44.9	305.2	121.6	32.2	358.3	148.8	44.6
279	5	35	-0.4840	0.6614	204.5	91.2	38.2	243.9	102.6	37.7	324.6	145.8	58.3	244.7	103.1	38.0
280	5	36	-0.5663	0.8040	102.5	43.0	8.6	121.1	46.4	7.7	214.7	88.4	17.6	123.0	47.4	8.3
281	5	37	-0.6487	0.9466	98.5	22.2	2.2	116.2	25.2	1.5	118.2	25.5	1.5	116.2	25.2	1.5
282	5	38	-0.7310	1.0893	82.7	14.4	2.1	99.5	17.1	1.4	99.8	17.2	1.4	99.5	17.1	1.4
283	5	39	-0.8134	1.2319	73.5	13.1	2.0	89.7	15.5	1.3	89.8	15.5	1.3	89.7	15.5	1.3
284	5	40	-0.8957	1.3745	68.5	11.7	1.8	84.0	14.0	1.1	84.1	14.0	1.1	84.0	14.0	1.1
285	5	41	-0.9781	1.5172	59.8	10.9	1.6	75.3	13.0	1.0	75.4	13.0	1.0	75.3	13.0	1.0
286	5	42	-1.0604	1.6598	58.2	9.8	1.4	73.5	11.5	0.8	73.6	11.5	0.8	73.5	11.5	0.8
287	5	43	-1.1428	1.8024	56.6	8.8	1.2	71.2	9.9	0.5	71.3	9.9	0.5	71.3	9.9	0.5
288	5	44	-1.2251	1.9451	54.8	8.1	1.0	68.9	8.8	0.5	69.0	8.8	0.5	69.0	8.8	0.5
289	5	45	-1.3075	2.0877	53.0	7.6	0.9	66.6	8.1	0.4	66.6	8.1	0.4	66.6	8.1	0.4
290	5	46	-1.3898	2.2303	51.1	7.1	0.8	64.2	7.5	0.4	64.2	7.5	0.4	64.2	7.5	0.4
291	5	47	-1.4722	2.3730	49.3	6.6	0.6	61.9	6.7	0.3	61.9	6.7	0.3	61.9	6.7	0.3
292	5	48	-1.5545	2.5156	47.3	6.2	0.5	59.2	6.2	0.3	59.3	6.2	0.3	59.2	6.2	0.3
293	5	49	-1.6369	2.6582	45.2	5.8	0.4	56.5	5.7	0.2	56.6	5.7	0.2	56.5	5.7	0.2
294	5	50	-1.7192	2.8009	42.5	5.4	0.3	53.0	5.1	0.2	53.1	5.1	0.2	53.0	5.1	0.2
295	5	51	-1.8016	2.9435	38.0	4.8	0.2	47.2	4.3	0.1	47.2	4.3	0.1	47.2	4.3	0.1
296	5	52	-1.8839	3.0862	35.8	4.3	0.2	44.4	3.6	0.1	44.4	3.6	0.1	44.4	3.6	0.1
297	5	53	-1.9663	3.2288	33.1	3.4	0.1	40.2	2.2	0.1	40.2	2.2	0.1	40.2	2.2	0.1
298	5	54	-2.0486	3.3714	30.9	3.1	0.0	37.4	2.0	0.0	37.4	2.0	0.0	37.4	2.0	0.0
299	5	55	-2.1310	3.5141	28.3	2.9	0.0	34.2	1.9	0.0	34.2	1.9	0.0	34.2	1.9	0.0
300	5	56	-2.2133	3.6567	25.4	2.6	0.0	30.9	1.6	0.0	30.9	1.6	0.0	30.9	1.6	0.0
301	5	57	-2.2957	3.7993	21.6	2.4	0.0	26.4	1.4	0.0	26.4	1.4	0.0	26.4	1.4	0.0
302	5	58	-2.3780	3.9420	19.8	2.1	0.0	24.1	1.1	0.0	24.1	1.1	0.0	24.1	1.1	0.0
303	5	59	-2.4604	4.0846	18.1	1.9	0.0	21.8	1.0	0.0	21.8	1.0	0.0	21.8	1.0	0.0
304	5	60	-2.5427	4.2272	16.7	1.7	0.0	20.0	0.9	0.0	20.0	0.9	0.0	20.0	0.9	0.0
305	5	61	-2.6251	4.3699	15.4	1.4	0.0	18.4	0.8	0.0	18.4	0.8	0.0	18.4	0.8	0.0
306	6	1	2.4586	-4.1058	16.0	2.3	0.0	16.8	1.1	0.0	16.3	1.1	0.0	16.8	1.1	0.0
307	6	2	2.3762	-3.9632	17.6	2.5	0.0	18.8	1.2	0.0	18.2	1.2	0.0	18.8	1.2	0.0
308	6	3	2.2939	-3.8206	19.5	2.7	0.0	21.3	1.3	0.0	20.4	1.3	0.0	21.3	1.3	0.0
309	6	4	2.2115	-3.6779	21.8	3.0	0.0	23.8	1.5	0.0	23.0	1.5	0.0	23.8	1.5	0.0
310	6	5	2.1292	-3.5353	24.4	3.2	0.1	26.8	1.7	0.0	26.0	1.6	0.0	26.8	1.6	0.0
311	6	6	2.0468	-3.3927	28.7	3.5	0.2	32.1	1.8	0.1	30.7	1.8	0.1	32.2	1.8	0.1
312	6	7	1.9645	-3.2500	32.0	3.8	0.3	36.8	2.2	0.1	34.8	2.0	0.1	36.9	2.1	0.1

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
313	6	8	1.8821	-3.1074	35.9	4.2	0.4	41.7	2.5	0.2	39.4	2.3	0.1	42.0	2.5	0.2
314	6	9	1.7998	-2.9648	40.3	4.8	0.5	47.1	3.2	0.3	44.4	3.0	0.2	47.0	3.2	0.2
315	6	10	1.7174	-2.8221	43.7	5.5	0.6	51.2	4.0	0.4	49.3	3.8	0.3	50.9	4.0	0.3
316	6	11	1.6351	-2.6795	46.9	6.1	0.9	54.9	4.8	0.4	53.3	4.5	0.4	54.6	4.8	0.4
317	6	12	1.5527	-2.5369	49.5	6.6	1.1	58.2	5.5	0.5	56.4	5.1	0.5	57.9	5.5	0.5
318	6	13	1.4704	-2.3942	51.8	7.0	1.2	61.3	5.9	0.6	59.5	5.8	0.5	61.0	5.9	0.6
319	6	14	1.3880	-2.2516	53.9	7.6	1.2	64.2	6.6	0.6	62.4	6.2	0.6	64.0	6.5	0.6
320	6	15	1.3057	-2.1090	55.9	8.3	1.4	66.9	7.6	0.7	65.3	6.8	0.7	66.8	7.6	0.7
321	6	16	1.2233	-1.9663	58.0	9.2	1.7	70.0	9.0	0.8	67.8	7.8	0.7	69.8	9.0	0.8
322	6	17	1.1410	-1.8237	60.7	10.2	1.9	74.2	10.6	1.0	71.7	9.3	0.9	74.0	10.5	1.0
323	6	18	1.0586	-1.6811	63.5	11.7	2.1	77.8	12.4	1.1	75.3	11.0	1.0	77.6	12.4	1.0
324	6	19	0.9763	-1.5384	68.5	13.0	2.4	83.2	13.9	1.2	79.3	12.7	1.1	82.9	13.8	1.2
325	6	20	0.8939	-1.3958	72.9	14.5	2.7	87.9	15.5	1.4	84.2	14.4	1.2	87.7	15.5	1.4
326	6	21	0.8116	-1.2532	76.4	16.4	3.0	92.0	18.0	1.7	88.9	16.0	1.5	91.8	17.9	1.7
327	6	22	0.7292	-1.1105	80.7	17.9	3.2	97.1	19.8	1.8	95.8	18.3	1.7	97.0	19.7	1.8
328	6	23	0.6469	-0.9679	97.2	21.7	3.7	116.7	23.9	2.3	114.5	22.7	1.9	116.7	23.9	2.3
329	6	24	0.5645	-0.8253	150.5	43.5	9.0	181.2	49.1	7.3	178.6	46.7	6.6	181.2	49.1	7.3
330	6	25	0.4822	-0.6826	186.0	67.9	15.6	223.3	78.7	14.9	221.8	75.5	14.1	223.3	78.6	14.9
331	6	26	0.3998	-0.5400	174.1	66.3	12.0	208.6	77.4	11.0	208.5	76.1	10.3	208.6	77.4	11.0
332	6	27	0.3175	-0.3974	159.3	62.9	11.6	189.1	72.4	10.6	189.5	71.0	9.9	189.2	72.4	10.6
333	6	28	0.2351	-0.2547	151.9	59.9	10.3	180.8	70.2	10.1	180.5	68.8	10.0	180.8	70.3	10.1
334	6	29	0.1528	-0.1121	149.5	62.0	14.7	176.2	72.7	15.6	176.4	72.4	15.2	176.1	72.6	15.5
335	6	30	0.0704	0.0305	230.8	102.4	32.4	270.1	120.3	36.4	269.4	120.0	36.9	270.2	120.3	36.5
336	6	31	-0.0119	0.1732	231.0	94.4	27.4	271.1	110.1	30.2	266.0	108.6	30.5	270.9	110.0	30.2
337	6	32	-0.0943	0.3158	307.9	130.5	39.5	358.1	148.9	42.3	340.6	142.3	41.1	357.7	148.7	42.2
338	6	33	-0.1766	0.4584	378.9	170.0	55.5	444.0	196.9	60.7	408.1	178.0	55.1	443.3	196.5	60.5
339	6	34	-0.2590	0.6011	268.0	112.9	31.4	318.4	130.4	32.5	271.2	106.7	21.2	317.6	130.0	32.2
340	6	35	-0.3413	0.7437	218.4	88.2	17.8	260.2	100.2	16.3	318.9	131.3	30.9	261.0	100.6	16.5
341	6	36	-0.4237	0.8864	114.6	32.1	2.8	134.7	36.4	2.2	238.8	80.1	11.3	136.7	37.5	2.7
342	6	37	-0.5060	1.0290	107.5	27.7	2.2	126.6	31.9	1.5	129.5	32.3	1.6	126.7	31.9	1.6
343	6	38	-0.5884	1.1716	87.1	20.4	2.0	105.7	24.0	1.4	106.0	24.0	1.4	105.7	24.0	1.4
344	6	39	-0.6707	1.3143	83.1	16.0	1.7	101.1	18.6	0.9	101.2	18.6	0.9	101.1	18.6	0.9
345	6	40	-0.7531	1.4569	76.3	13.2	1.4	93.2	15.2	0.7	93.3	15.2	0.7	93.3	15.2	0.7
346	6	41	-0.8354	1.5995	63.2	10.7	1.2	79.1	12.3	0.6	79.3	12.3	0.6	79.2	12.3	0.6
347	6	42	-0.9178	1.7422	60.3	9.7	1.1	75.7	10.9	0.5	75.8	11.0	0.5	75.7	10.9	0.5
348	6	43	-1.0001	1.8848	59.0	8.7	1.0	73.9	9.8	0.5	73.9	9.8	0.5	73.9	9.8	0.5
349	6	44	-1.0825	2.0274	57.4	8.2	0.9	71.7	9.0	0.4	71.7	9.0	0.4	71.7	9.0	0.4
350	6	45	-1.1648	2.1701	55.7	7.8	0.7	69.7	8.5	0.4	69.7	8.5	0.4	69.7	8.5	0.4
351	6	46	-1.2472	2.3127	54.1	7.5	0.5	67.5	8.0	0.3	67.5	8.0	0.3	67.5	8.0	0.3
352	6	47	-1.3295	2.4553	52.3	7.1	0.5	65.2	7.5	0.3	65.3	7.6	0.3	65.2	7.5	0.3
353	6	48	-1.4119	2.5980	50.8	6.7	0.4	63.1	7.0	0.2	63.2	7.0	0.2	63.1	7.0	0.2
354	6	49	-1.4942	2.7406	49.2	6.3	0.3	61.0	6.4	0.2	61.0	6.4	0.2	61.0	6.4	0.2
355	6	50	-1.5766	2.8832	47.2	5.8	0.2	58.3	5.8	0.1	58.3	5.8	0.1	58.3	5.8	0.1
356	6	51	-1.6589	3.0259	45.3	5.2	0.2	55.6	4.9	0.1	55.6	4.9	0.1	55.6	4.9	0.1
357	6	52	-1.7413	3.1685	42.5	4.5	0.1	52.2	3.9	0.1	52.2	3.9	0.1	52.2	3.9	0.1
358	6	53	-1.8236	3.3111	39.7	3.5	0.1	48.1	2.5	0.1	48.1	2.5	0.1	48.1	2.5	0.1
359	6	54	-1.9060	3.4538	37.1	3.0	0.0	44.7	2.0	0.0	44.7	2.0	0.0	44.7	2.0	0.0
360	6	55	-1.9883	3.5964	33.9	2.8	0.0	40.8	1.8	0.0	40.9	1.8	0.0	40.8	1.8	0.0
361	6	56	-2.0707	3.7390	30.2	2.5	0.0	36.4	1.6	0.0	36.4	1.6	0.0	36.4	1.6	0.0
362	6	57	-2.1530	3.8817	25.2	2.3	0.0	30.4	1.4	0.0	30.4	1.4	0.0	30.4	1.4	0.0
363	6	58	-2.2354	4.0243	21.3	2.0	0.0	25.4	1.1	0.0	25.4	1.1	0.0	25.4	1.1	0.0
364	6	59	-2.3177	4.1669	19.2	1.8	0.0	22.8	1.0	0.0	22.8	1.0	0.0	22.8	1.0	0.0
365	6	60	-2.4001	4.3096	17.1	1.6	0.0	20.2	0.9	0.0	20.2	0.9	0.0	20.2	0.9	0.0
366	6	61	-2.4824	4.4522	15.7	1.4	0.0	18.5	0.7	0.0	18.5	0.7	0.0	18.5	0.7	0.0
367	7	1	2.6012	-4.0235	14.5	2.1	0.0	14.8	1.0	0.0	14.2	1.0	0.0	14.8	1.0	0.0
368	7	2	2.5189	-3.8809	15.7	2.2	0.0	16.4	1.0	0.0	15.7	1.0	0.0	16.3	1.0	0.0
369	7	3	2.4365	-3.7382	16.8	2.3	0.0	17.9	1.1	0.0	17.0	1.1	0.0	17.9	1.1	0.0
370	7	4	2.3542	-3.5956	18.0	2.5	0.0	19.2	1.2	0.0	18.4	1.1	0.0	19.2	1.2	0.0
371	7	5	2.2718	-3.4530	19.2	2.6	0.0	20.6	1.2	0.0	19.7	1.2	0.0	20.6	1.2	0.0
372	7	6	2.1895	-3.3103	20.5	2.8	0.1	22.3	1.3	0.1	21.2	1.3	0.0	22.4	1.3	0.1
373	7	7	2.1071	-3.1677	22.8	2.9	0.2	25.5	1.5	0.1	23.8	1.4	0.1	25.6	1.5	0.1
374	7	8	2.0248	-3.0251	26.0	3.2	0.3	29.1	1.7	0.1	27.0	1.5	0.1	28.9	1.7	0.1
375	7	9	1.9424	-2.8824	28.9	3.5	0.4	32.3	2.0	0.2	30.0	1.7	0.1	31.9	1.9	0.2
376	7	10	1.8601	-2.7398	31.2	3.8	0.5	35.0	2.2	0.3	33.1	2.0	0.2	34.6	2.2	0.2
377	7	11	1.7777	-2.5972	33.3	4.0	0.6	37.3	2.5	0.3	35.6	2.2	0.3	36.8	2.4	0.3
378	7	12	1.6954	-2.4545	34.8	4.3	0.8	39.3	2.8	0.4	37.4	2.5	0.3	38.8	2.7	0.4
379	7	13	1.6130	-2.3119	36.2	4.4	0.9	41.2	2.9	0.4	39.5	2.8	0.4	40.8	2.9	0.4
380	7	14	1.5307	-2.1693	37.7	4.7	0.9	43.1	3.2	0.5	41.4	2.9	0.4	42.9	3.2	0.5
381	7	15	1.4483	-2.0266	39.3	5.1	1.0	45.3	3.7	0.5	43.6	3.2	0.5	45.1	3.7	0.5
382	7	16	1.3660	-1.8840	40.9	5.5	1.2	47.7	4.3	0.6	45.5	3.7	0.5	47.4	4.3	0.6
383	7	17	1.2836	-1.7413	42.2	5.9	1.4	50.0	5.0	0.6	48.0	4.3	0.6	49.9	5.0	0.6
384	7	18	1.2013	-1.5987	43.8	6.8	1.5	52.3	6.1	0.7	50.2	5.0	0.6	52.1	6.1	0.7
385	7	19	1.1189	-1.4561	46.6	7.8	1.6	55.2	7.1	0.7	52.2	6.1	0.7	55.1	7.0	0.7
386	7	20	1.0366	-1.3134	50.0	8.6	1.8	58.8	7.8	0.8	55.8	7.0	0.7	58.8	7.8	0.8
387	7	21	0.9542	-1.1708	52.8	9.2	2.0	61.8	8.5	0.9	59.6	7.7	0.8	62.0	8.5	0.9
388	7	22	0.8719	-1.0282	62.2	10.4	2.0	72.2	9.6	0.9	71.3	8.6	0.8	72.4	9.6	0.9
389	7	23	0.7895	-0.8855	86.9	12.6	2.1	100.7	11.1	0.9	99.3	10.5	0.8	100.9	11.2	0.9
390	7	24	0.7072	-0.7429	112.3	21.2	2.4	130.2	20.7	0.9	127.6	20.4	0.9	130.3	20.8	0.9

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
391	7	25	0.6248	-0.6003	128.1	26.6	2.7	149.8	27.3	0.9	149.2	27.2	0.9	149.8	27.4	0.9
392	7	26	0.5425	-0.4576	128.2	23.4	2.4	151.2	23.6	0.7	153.1	24.0	0.7	151.2	23.7	0.7
393	7	27	0.4601	-0.3150	111.0	15.6	2.0	131.0	14.2	0.5	134.0	14.9	0.6	131.1	14.3	0.6
394	7	28	0.3778	-0.1724	103.6	13.4	1.7	121.9	12.4	0.5	124.8	12.9	0.5	122.0	12.5	0.5
395	7	29	0.2954	-0.0297	109.7	10.6	1.4	127.4	9.4	0.3	132.5	11.1	0.4	127.4	9.4	0.3
396	7	30	0.2131	0.1129	103.1	13.0	1.2	119.4	12.1	0.3	123.9	13.5	0.4	119.3	12.0	0.3
397	7	31	0.1307	0.2555	116.0	9.3	1.2	133.0	7.2	0.3	134.0	7.8	0.3	132.8	7.1	0.3
398	7	32	0.0484	0.3982	133.5	14.8	1.6	151.8	11.8	0.4	144.9	11.7	0.3	151.5	11.7	0.4
399	7	33	-0.0340	0.5408	158.3	24.4	2.3	180.0	22.1	0.6	164.7	19.6	0.4	179.6	21.9	0.5
400	7	34	-0.1163	0.6834	165.7	22.7	3.1	186.4	19.9	1.2	176.6	16.8	1.1	186.1	19.8	1.2
401	7	35	-0.1987	0.8261	130.3	18.4	2.1	144.3	15.1	0.7	151.6	16.9	0.8	144.5	15.2	0.7
402	7	36	-0.2810	0.9687	97.2	13.7	0.9	106.8	11.5	0.3	137.8	16.4	0.7	107.3	11.8	0.5
403	7	37	-0.3634	1.1113	61.5	9.7	0.8	69.2	9.8	0.3	91.8	11.4	0.3	70.0	10.1	0.3
404	7	38	-0.4457	1.2540	53.6	8.2	0.8	61.7	8.8	0.3	66.1	9.1	0.3	62.1	9.0	0.3
405	7	39	-0.5281	1.3966	46.2	5.4	0.7	53.4	5.3	0.3	53.9	5.3	0.3	53.5	5.3	0.3
406	7	40	-0.6104	1.5392	35.0	3.2	0.6	41.5	2.7	0.3	41.7	2.7	0.3	41.5	2.7	0.3
407	7	41	-0.6928	1.6819	27.8	2.7	0.6	33.2	2.3	0.2	33.4	2.3	0.2	33.3	2.3	0.2
408	7	42	-0.7751	1.8245	26.1	2.2	0.5	31.2	1.7	0.2	31.3	1.7	0.2	31.3	1.7	0.2
409	7	43	-0.8575	1.9671	25.9	2.1	0.4	30.7	1.5	0.2	30.7	1.5	0.2	30.7	1.5	0.2
410	7	44	-0.9398	2.1098	25.1	2.1	0.3	29.6	1.3	0.2	29.6	1.3	0.2	29.6	1.3	0.2
411	7	45	-1.0222	2.2524	24.8	2.1	0.3	29.2	1.2	0.1	29.2	1.2	0.1	29.2	1.2	0.1
412	7	46	-1.1045	2.3950	24.2	2.0	0.2	28.3	1.2	0.1	28.3	1.2	0.1	28.3	1.2	0.1
413	7	47	-1.1869	2.5377	23.4	2.0	0.2	27.5	1.1	0.1	27.5	1.1	0.1	27.5	1.1	0.1
414	7	48	-1.2692	2.6803	22.8	1.9	0.2	26.7	1.0	0.1	26.7	1.0	0.1	26.7	1.0	0.1
415	7	49	-1.3516	2.8229	22.1	1.8	0.1	25.9	0.9	0.1	25.9	0.9	0.1	25.9	0.9	0.1
416	7	50	-1.4339	2.9656	21.3	1.7	0.1	25.0	0.9	0.0	25.0	0.9	0.0	25.0	0.9	0.0
417	7	51	-1.5163	3.1082	20.7	1.5	0.0	24.2	0.7	0.0	24.2	0.7	0.0	24.2	0.7	0.0
418	7	52	-1.5986	3.2509	19.6	1.4	0.0	22.9	0.7	0.0	22.9	0.7	0.0	22.9	0.7	0.0
419	7	53	-1.6810	3.3935	18.8	1.2	0.0	21.9	0.6	0.0	21.9	0.6	0.0	21.9	0.6	0.0
420	7	54	-1.7633	3.5361	17.3	1.1	0.0	20.0	0.5	0.0	20.0	0.5	0.0	20.0	0.5	0.0
421	7	55	-1.8457	3.6788	16.1	1.0	0.0	18.8	0.5	0.0	18.8	0.5	0.0	18.8	0.5	0.0
422	7	56	-1.9280	3.8214	15.5	0.9	0.0	18.0	0.5	0.0	18.1	0.5	0.0	18.0	0.5	0.0
423	7	57	-2.0104	3.9640	14.4	0.9	0.0	16.8	0.5	0.0	16.8	0.5	0.0	16.8	0.5	0.0
424	7	58	-2.0927	4.1067	13.9	0.9	0.0	16.1	0.5	0.0	16.1	0.5	0.0	16.1	0.5	0.0
425	7	59	-2.1751	4.2493	13.0	0.8	0.0	15.0	0.4	0.0	15.0	0.4	0.0	15.0	0.4	0.0
426	7	60	-2.2574	4.3919	12.3	0.8	0.0	14.2	0.4	0.0	14.2	0.4	0.0	14.2	0.4	0.0
427	7	61	-2.3398	4.5346	11.9	0.7	0.0	13.7	0.4	0.0	13.7	0.4	0.0	13.7	0.4	0.0
428	8	1	2.7438	-3.9411	10.7	2.0	0.0	9.8	0.9	0.0	9.2	0.9	0.0	9.8	0.9	0.0
429	8	2	2.6615	-3.7985	11.5	2.1	0.0	10.8	0.9	0.0	10.3	0.9	0.0	10.8	0.9	0.0
430	8	3	2.5791	-3.6559	12.3	2.1	0.0	11.8	0.9	0.0	11.1	0.9	0.0	11.8	0.9	0.0
431	8	4	2.4968	-3.5132	13.1	2.3	0.0	12.6	1.0	0.0	11.9	1.0	0.0	12.6	1.0	0.0
432	8	5	2.4144	-3.3706	13.9	2.4	0.0	13.5	1.0	0.0	12.8	1.0	0.0	13.6	1.0	0.0
433	8	6	2.3321	-3.2280	15.0	2.4	0.1	14.8	1.1	0.0	13.8	1.0	0.0	14.8	1.1	0.0
434	8	7	2.2497	-3.0853	16.0	2.5	0.1	16.1	1.2	0.1	14.9	1.1	0.0	16.3	1.1	0.0
435	8	8	2.1674	-2.9427	18.1	2.7	0.2	18.3	1.3	0.1	16.8	1.2	0.1	17.8	1.3	0.1
436	8	9	2.0850	-2.8001	19.3	3.0	0.2	19.6	1.5	0.1	18.1	1.3	0.1	19.0	1.4	0.1
437	8	10	2.0027	-2.6574	20.3	3.1	0.2	20.9	1.6	0.1	19.2	1.5	0.1	20.5	1.6	0.1
438	8	11	1.9203	-2.5148	20.5	3.3	0.3	21.5	1.7	0.2	20.1	1.6	0.1	21.4	1.7	0.2
439	8	12	1.8380	-2.3722	21.3	3.4	0.4	22.5	1.9	0.2	21.2	1.7	0.2	22.7	1.9	0.2
440	8	13	1.7556	-2.2295	22.4	3.5	0.4	23.9	2.0	0.2	22.7	1.8	0.2	24.1	1.9	0.2
441	8	14	1.6733	-2.0869	23.3	3.6	0.4	25.1	2.0	0.2	24.0	1.9	0.2	25.3	2.0	0.2
442	8	15	1.5909	-1.9443	24.3	3.7	0.5	26.6	2.1	0.2	25.2	2.0	0.2	26.8	2.1	0.2
443	8	16	1.5086	-1.8016	25.6	3.8	0.5	28.7	2.4	0.2	26.5	2.1	0.2	28.9	2.4	0.2
444	8	17	1.4262	-1.6590	27.0	3.9	0.6	30.8	2.6	0.3	29.1	2.4	0.2	31.0	2.6	0.3
445	8	18	1.3439	-1.5164	28.6	4.3	0.7	32.9	3.0	0.3	31.0	2.6	0.3	33.1	3.0	0.3
446	8	19	1.2615	-1.3737	30.7	4.8	0.8	35.1	3.3	0.3	32.8	2.9	0.3	35.2	3.3	0.3
447	8	20	1.1792	-1.2311	33.2	5.0	0.8	37.6	3.4	0.3	34.9	3.2	0.3	37.7	3.3	0.3
448	8	21	1.0968	-1.0885	35.0	5.1	0.9	39.3	3.4	0.3	37.8	3.2	0.3	39.5	3.4	0.3
449	8	22	1.0145	-0.9458	44.1	5.2	0.9	49.3	3.5	0.3	48.7	3.2	0.3	49.5	3.5	0.3
450	8	23	0.9321	-0.8032	60.6	6.1	0.8	68.0	4.2	0.2	67.9	4.2	0.2	68.2	4.2	0.2
451	8	24	0.8498	-0.6606	76.7	12.1	0.7	86.7	11.1	0.2	87.0	11.3	0.2	86.8	11.2	0.2
452	8	25	0.7674	-0.5179	86.8	12.3	0.6	99.3	11.4	0.1	99.4	11.5	0.2	99.4	11.4	0.1
453	8	26	0.6851	-0.3753	79.7	5.1	0.5	92.0	2.6	0.1	95.4	2.8	0.1	92.2	2.6	0.1
454	8	27	0.6027	-0.2327	56.4	3.9	0.3	63.3	1.6	0.1	66.5	1.8	0.1	63.3	1.6	0.1
455	8	28	0.5204	-0.0900	37.1	3.3	0.0	38.7	1.5	0.0	43.1	1.6	0.0	38.8	1.5	0.0
456	8	29	0.4380	0.0526	40.9	4.8	0.0	42.3	3.3	0.1	46.8	3.4	0.1	42.3	3.4	0.1
457	8	30	0.3557	0.1952	38.6	4.4	0.0	39.1	2.9	0.1	42.0	2.9	0.1	39.0	2.9	0.1
458	8	31	0.2733	0.3379	40.3	4.3	0.1	39.5	2.7	0.1	42.0	2.6	0.1	39.4	2.6	0.1
459	8	32	0.1910	0.4805	52.9	5.4	0.2	53.3	3.4	0.1	52.5	3.1	0.1	53.1	3.3	0.1
460	8	33	0.1086	0.6231	62.0	6.6	0.4	63.6	4.2	0.2	58.7	3.9	0.2	63.4	4.1	0.2
461	8	34	0.0263	0.7658	62.2	5.3	0.3	64.0	2.8	0.1	58.5	2.6	0.1	63.8	2.8	0.1
462	8	35	-0.0561	0.9084	48.9	4.8	0.3	48.8	2.3	0.1	50.5	2.5	0.1	48.8	2.4	0.1
463	8	36	-0.1384	1.0511	50.3	3.4	0.3	51.7	1.7	0.1	58.6	2.4	0.1	51.9	1.8	0.1
464	8	37	-0.2208	1.1937	48.4	2.6	0.3	51.7	1.9	0.1	56.8	2.3	0.1	52.1	2.1	0.1
465	8	38	-0.3031	1.3363	44.1	5.5	0.3	48.1	5.5	0.1	50.1	5.5	0.1	48.5	5.5	0.1
466	8	39	-0.3855	1.4790	36.6	3.9	0.3	40.5	3.6	0.1	41.7	3.6	0.1	40.8	3.6	0.1
467	8	40	-0.4678	1.6216	21.0	1.8	0.2	23.7	1.1	0.1	24.3	1.1	0.1	23.8	1.1	0.1
468	8	41	-0.5502	1.7642	14.0	1.6	0.2	15.1	0.9	0.1	15.2	0.9	0.1	15.2	0.9	0.1

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
469	8	42	-0.6325	1.9069	11.6	1.4	0.2	11.9	0.8	0.1	12.0	0.8	0.1	11.9	0.8	0.1
470	8	43	-0.7149	2.0495	11.1	1.4	0.1	11.0	0.8	0.0	11.0	0.8	0.0	11.0	0.8	0.0
471	8	44	-0.7972	2.1921	10.6	1.3	0.1	10.0	0.7	0.0	10.0	0.7	0.0	10.0	0.7	0.0
472	8	45	-0.8796	2.3348	10.1	1.3	0.1	9.2	0.7	0.0	9.2	0.7	0.0	9.2	0.7	0.0
473	8	46	-0.9619	2.4774	9.8	1.2	0.0	8.8	0.6	0.0	8.8	0.6	0.0	8.8	0.6	0.0
474	8	47	-1.0443	2.6200	9.6	1.1	0.0	8.7	0.5	0.0	8.7	0.5	0.0	8.7	0.5	0.0
475	8	48	-1.1266	2.7627	9.1	1.1	0.0	8.1	0.5	0.0	8.1	0.5	0.0	8.1	0.5	0.0
476	8	49	-1.2090	2.9053	8.3	1.0	0.0	7.4	0.4	0.0	7.4	0.4	0.0	7.4	0.4	0.0
477	8	50	-1.2913	3.0479	7.7	0.9	0.0	6.8	0.4	0.0	6.8	0.4	0.0	6.8	0.4	0.0
478	8	51	-1.3737	3.1906	7.6	0.8	0.0	6.7	0.3	0.0	6.7	0.3	0.0	6.7	0.3	0.0
479	8	52	-1.4560	3.3332	7.4	0.8	0.0	6.5	0.3	0.0	6.5	0.3	0.0	6.5	0.3	0.0
480	8	53	-1.5384	3.4758	7.1	0.7	0.0	6.2	0.3	0.0	6.2	0.3	0.0	6.2	0.3	0.0
481	8	54	-1.6207	3.6185	6.7	0.7	0.0	5.9	0.3	0.0	5.9	0.3	0.0	5.9	0.3	0.0
482	8	55	-1.7031	3.7611	6.4	0.7	0.0	5.7	0.2	0.0	5.7	0.2	0.0	5.7	0.2	0.0
483	8	56	-1.7854	3.9037	6.3	0.6	0.0	5.6	0.2	0.0	5.6	0.2	0.0	5.6	0.2	0.0
484	8	57	-1.8678	4.0464	6.0	0.6	0.0	5.2	0.2	0.0	5.2	0.2	0.0	5.2	0.2	0.0
485	8	58	-1.9501	4.1890	5.7	0.5	0.0	5.0	0.2	0.0	5.0	0.2	0.0	5.0	0.2	0.0
486	8	59	-2.0325	4.3316	5.2	0.5	0.0	4.6	0.2	0.0	4.6	0.2	0.0	4.6	0.2	0.0
487	8	60	-2.1148	4.4743	4.9	0.5	0.0	4.2	0.2	0.0	4.2	0.2	0.0	4.2	0.2	0.0
488	8	61	-2.1972	4.6169	4.7	0.5	0.0	4.1	0.2	0.0	4.1	0.2	0.0	4.1	0.2	0.0
489	9	1	2.8865	-3.8588	9.0	1.7	0.0	7.9	0.7	0.0	7.5	0.7	0.0	7.9	0.7	0.0
490	9	2	2.8041	-3.7162	9.4	1.7	0.0	8.4	0.7	0.0	8.0	0.7	0.0	8.4	0.7	0.0
491	9	3	2.7218	-3.5735	9.9	1.8	0.0	9.0	0.7	0.0	8.4	0.7	0.0	9.0	0.7	0.0
492	9	4	2.6394	-3.4309	10.3	1.8	0.0	9.4	0.8	0.0	8.9	0.7	0.0	9.5	0.7	0.0
493	9	5	2.5571	-3.2883	11.0	1.9	0.0	10.1	0.8	0.0	9.5	0.7	0.0	10.0	0.8	0.0
494	9	6	2.4747	-3.1456	11.5	1.9	0.0	10.6	0.8	0.0	9.9	0.7	0.0	10.5	0.8	0.0
495	9	7	2.3924	-3.0030	12.4	2.0	0.1	11.4	0.8	0.0	10.5	0.8	0.0	11.0	0.8	0.0
496	9	8	2.3100	-2.8604	12.9	2.1	0.1	12.0	0.9	0.0	10.9	0.8	0.0	11.7	0.9	0.0
497	9	9	2.2277	-2.7177	12.8	2.2	0.1	11.9	1.0	0.0	10.6	0.8	0.0	11.6	1.0	0.0
498	9	10	2.1453	-2.5751	12.5	2.4	0.1	11.6	1.1	0.1	10.7	0.9	0.0	11.7	1.0	0.0
499	9	11	2.0630	-2.4325	12.3	2.4	0.1	11.4	1.1	0.1	10.6	1.0	0.0	11.8	1.1	0.1
500	9	12	1.9806	-2.2898	12.6	2.5	0.1	11.6	1.2	0.1	10.9	1.1	0.0	12.0	1.1	0.1
501	9	13	1.8983	-2.1472	12.7	2.4	0.1	11.9	1.2	0.1	11.3	1.1	0.1	12.2	1.2	0.1
502	9	14	1.8159	-2.0046	12.9	2.5	0.1	12.1	1.2	0.1	11.6	1.1	0.1	12.5	1.2	0.1
503	9	15	1.7336	-1.8619	13.4	2.5	0.1	12.8	1.2	0.1	12.0	1.1	0.1	13.1	1.2	0.1
504	9	16	1.6512	-1.7193	13.9	2.5	0.1	14.0	1.2	0.1	12.6	1.1	0.1	14.1	1.2	0.1
505	9	17	1.5689	-1.5766	14.4	2.4	0.1	14.8	1.2	0.1	13.7	1.2	0.1	14.9	1.2	0.1
506	9	18	1.4865	-1.4340	15.0	2.5	0.2	15.6	1.2	0.1	14.5	1.2	0.0	15.7	1.2	0.1
507	9	19	1.4042	-1.2914	16.0	2.7	0.2	16.7	1.2	0.1	15.3	1.2	0.0	16.7	1.2	0.0
508	9	20	1.3218	-1.1487	17.9	2.8	0.1	18.4	1.2	0.0	17.0	1.2	0.0	18.4	1.2	0.0
509	9	21	1.2395	-1.0061	20.0	2.8	0.1	20.2	1.1	0.0	19.4	1.1	0.0	20.2	1.1	0.0
510	9	22	1.1571	-0.8635	26.9	2.7	0.1	27.6	1.0	0.0	27.5	1.0	0.0	27.6	1.0	0.0
511	9	23	1.0748	-0.7208	36.9	3.2	0.1	38.9	1.6	0.0	39.5	1.7	0.0	39.1	1.6	0.0
512	9	24	0.9924	-0.5782	47.9	6.1	0.0	51.9	5.3	0.0	52.9	5.4	0.0	52.1	5.3	0.0
513	9	25	0.9101	-0.4356	55.7	3.6	0.0	61.9	2.5	0.0	63.5	2.6	0.0	62.0	2.5	0.0
514	9	26	0.8277	-0.2929	48.8	1.9	0.0	54.0	0.6	0.0	56.0	0.7	0.0	54.0	0.6	0.0
515	9	27	0.7454	-0.1503	22.9	1.6	0.0	22.2	0.6	0.0	24.1	0.6	0.0	22.3	0.6	0.0
516	9	28	0.6630	-0.0077	15.4	1.1	0.0	12.8	0.4	0.0	14.3	0.5	0.0	12.8	0.4	0.0
517	9	29	0.5807	0.1350	15.7	0.6	0.0	12.7	0.3	0.0	14.3	0.4	0.0	12.7	0.3	0.0
518	9	30	0.4983	0.2776	16.9	0.3	0.0	14.2	0.2	0.0	14.1	0.3	0.0	14.1	0.2	0.0
519	9	31	0.4160	0.4202	20.4	0.5	0.0	17.6	0.3	0.0	17.3	0.3	0.0	17.5	0.3	0.0
520	9	32	0.3336	0.5629	23.7	0.8	0.0	20.7	0.3	0.0	20.1	0.3	0.0	20.6	0.3	0.0
521	9	33	0.2513	0.7055	26.0	0.9	0.0	22.6	0.3	0.0	21.9	0.3	0.0	22.5	0.3	0.0
522	9	34	0.1689	0.8481	24.9	1.0	0.0	21.5	0.3	0.0	20.9	0.3	0.0	21.4	0.3	0.0
523	9	35	0.0866	0.9908	25.4	1.1	0.0	22.0	0.4	0.0	21.9	0.4	0.0	22.0	0.4	0.0
524	9	36	0.0042	1.1334	27.0	1.1	0.0	24.9	0.4	0.0	25.7	0.4	0.0	25.0	0.4	0.0
525	9	37	-0.0781	1.2760	34.4	1.1	0.0	35.6	0.4	0.0	36.7	0.4	0.0	35.8	0.4	0.0
526	9	38	-0.1605	1.4187	29.9	1.8	0.0	32.1	1.3	0.0	33.2	1.3	0.0	32.3	1.3	0.0
527	9	39	-0.2428	1.5613	20.4	2.3	0.0	22.4	1.9	0.0	23.2	1.9	0.0	22.7	1.9	0.0
528	9	40	-0.3252	1.7039	13.0	1.2	0.0	14.2	0.6	0.0	14.8	0.6	0.0	14.3	0.6	0.0
529	9	41	-0.4075	1.8466	8.2	1.0	0.0	8.4	0.4	0.0	8.5	0.4	0.0	8.5	0.4	0.0
530	9	42	-0.4899	1.9892	5.8	0.9	0.0	5.3	0.4	0.0	5.4	0.4	0.0	5.4	0.4	0.0
531	9	43	-0.5722	2.1318	5.3	0.8	0.0	4.6	0.4	0.0	4.6	0.4	0.0	4.6	0.4	0.0
532	9	44	-0.6546	2.2745	4.9	0.8	0.0	4.1	0.3	0.0	4.1	0.3	0.0	4.1	0.3	0.0
533	9	45	-0.7369	2.4171	4.7	0.8	0.0	3.8	0.3	0.0	3.8	0.3	0.0	3.8	0.3	0.0
534	9	46	-0.8193	2.5597	4.6	0.7	0.0	3.7	0.3	0.0	3.7	0.3	0.0	3.7	0.3	0.0
535	9	47	-0.9016	2.7024	4.4	0.7	0.0	3.5	0.3	0.0	3.5	0.3	0.0	3.5	0.3	0.0
536	9	48	-0.9840	2.8450	4.1	0.7	0.0	3.2	0.3	0.0	3.2	0.3	0.0	3.2	0.3	0.0
537	9	49	-1.0663	2.9876	3.8	0.6	0.0	2.9	0.2	0.0	2.9	0.2	0.0	2.9	0.2	0.0
538	9	50	-1.1487	3.1303	3.5	0.5	0.0	2.6	0.2	0.0	2.6	0.2	0.0	2.6	0.2	0.0
539	9	51	-1.2310	3.2729	3.2	0.5	0.0	2.4	0.2	0.0	2.4	0.2	0.0	2.4	0.2	0.0
540	9	52	-1.3134	3.4156	3.1	0.4	0.0	2.2	0.1	0.0	2.2	0.1	0.0	2.2	0.1	0.0
541	9	53	-1.3957	3.5582	3.0	0.4	0.0	2.1	0.1	0.0	2.1	0.1	0.0	2.1	0.1	0.0
542	9	54	-1.4781	3.7008	2.8	0.4	0.0	2.0	0.1	0.0	2.0	0.1	0.0	2.0	0.1	0.0
543	9	55	-1.5604	3.8435	2.7	0.4	0.0	1.9	0.1	0.0	1.9	0.1	0.0	1.9	0.1	0.0
544	9	56	-1.6428	3.9861	2.5	0.3	0.0	1.8	0.1	0.0	1.8	0.1	0.0	1.8	0.1	0.0
545	9	57	-1.7251	4.1287	2.5	0.3	0.0	1.7	0.1	0.0	1.7	0.1	0.0	1.7	0.1	0.0
546	9	58	-1.8075	4.2714	2.4	0.3	0.0	1.7	0.1	0.0	1.7	0.1	0.0	1.7	0.1	0.0

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing (2002/3) TA 65 dBA	Existing (2002/3) TA 75 dBA	Existing (2002/3) TA 85 dBA	2018 Future No Project (RSA-5) TA 65 dBA	2018 Future No Project (RSA-5) TA 75 dBA	2018 Future No Project (RSA-5) TA 85 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 65 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 75 dBA	2018 W/ Full Use of Shifted Rwy (A2) TA 85 dBA	2018 W/ Special Use Procedures (A3) TA 65 dBA	2018 W/ Special Use Procedures (A3) TA 75 dBA	2018 W/ Special Use Procedures (A3) TA 85 dBA
547	9	59	-1.8898	4.4140	2.4	0.3	0.0	1.6	0.1	0.0	1.6	0.1	0.0	1.6	0.1	0.0
548	9	60	-1.9722	4.5566	2.3	0.3	0.0	1.6	0.1	0.0	1.6	0.1	0.0	1.6	0.1	0.0
549	9	61	-2.0545	4.6993	2.3	0.3	0.0	1.6	0.1	0.0	1.6	0.1	0.0	1.6	0.1	0.0
550	10	1	3.0291	-3.7764	7.4	1.3	0.0	6.0	0.6	0.0	5.7	0.5	0.0	6.0	0.6	0.0
551	10	2	2.9468	-3.6338	7.6	1.3	0.0	6.2	0.6	0.0	5.9	0.5	0.0	6.2	0.5	0.0
552	10	3	2.8644	-3.4912	7.8	1.3	0.0	6.4	0.5	0.0	6.1	0.5	0.0	6.5	0.5	0.0
553	10	4	2.7821	-3.3485	8.2	1.3	0.0	6.8	0.5	0.0	6.4	0.5	0.0	6.8	0.5	0.0
554	10	5	2.6997	-3.2059	8.7	1.3	0.0	7.2	0.5	0.0	6.8	0.5	0.0	7.0	0.5	0.0
555	10	6	2.6174	-3.0633	8.8	1.3	0.0	7.3	0.5	0.0	6.9	0.5	0.0	7.1	0.5	0.0
556	10	7	2.5350	-2.9206	9.1	1.3	0.0	7.3	0.5	0.0	6.7	0.5	0.0	7.1	0.5	0.0
557	10	8	2.4527	-2.7780	8.5	1.3	0.0	6.9	0.5	0.0	6.4	0.5	0.0	6.9	0.5	0.0
558	10	9	2.3703	-2.6354	8.3	1.3	0.0	6.4	0.5	0.0	6.1	0.5	0.0	6.6	0.5	0.0
559	10	10	2.2880	-2.4927	8.0	1.4	0.0	5.9	0.5	0.0	5.6	0.5	0.0	6.1	0.5	0.0
560	10	11	2.2056	-2.3501	8.1	1.4	0.0	6.0	0.6	0.0	5.6	0.5	0.0	6.1	0.6	0.0
561	10	12	2.1233	-2.2075	8.2	1.5	0.0	6.0	0.6	0.0	5.6	0.5	0.0	6.1	0.6	0.0
562	10	13	2.0409	-2.0648	8.1	1.4	0.0	6.0	0.6	0.0	5.7	0.6	0.0	6.0	0.6	0.0
563	10	14	1.9586	-1.9222	8.0	1.4	0.0	5.9	0.6	0.0	5.6	0.6	0.0	5.9	0.6	0.0
564	10	15	1.8762	-1.7796	7.9	1.4	0.0	5.8	0.6	0.0	5.6	0.6	0.0	5.9	0.6	0.0
565	10	16	1.7939	-1.6369	7.8	1.4	0.0	5.9	0.6	0.0	5.6	0.5	0.0	5.9	0.6	0.0
566	10	17	1.7115	-1.4943	7.8	1.4	0.0	6.1	0.6	0.0	5.6	0.5	0.0	6.1	0.6	0.0
567	10	18	1.6292	-1.3517	8.0	1.4	0.0	6.3	0.5	0.0	5.8	0.5	0.0	6.3	0.5	0.0
568	10	19	1.5468	-1.2090	8.4	1.5	0.0	6.5	0.5	0.0	6.0	0.5	0.0	6.5	0.5	0.0
569	10	20	1.4645	-1.0664	8.8	1.5	0.0	6.7	0.5	0.0	6.4	0.5	0.0	6.8	0.5	0.0
570	10	21	1.3821	-0.9238	9.7	1.5	0.0	7.4	0.5	0.0	7.2	0.5	0.0	7.5	0.5	0.0
571	10	22	1.2998	-0.7811	13.9	1.5	0.0	12.2	0.4	0.0	12.1	0.4	0.0	12.2	0.4	0.0
572	10	23	1.2174	-0.6385	24.4	1.3	0.0	24.8	0.3	0.0	25.0	0.4	0.0	24.8	0.3	0.0
573	10	24	1.1351	-0.4959	34.0	2.2	0.0	36.2	1.7	0.0	36.7	1.7	0.0	36.3	1.7	0.0
574	10	25	1.0527	-0.3532	38.7	1.9	0.0	42.6	1.5	0.0	43.2	1.6	0.0	42.7	1.6	0.0
575	10	26	0.9704	-0.2106	35.2	0.5	0.0	39.1	0.1	0.0	39.5	0.2	0.0	39.2	0.1	0.0
576	10	27	0.8880	-0.0680	25.1	0.2	0.0	26.8	0.0	0.0	27.1	0.1	0.0	26.8	0.0	0.0
577	10	28	0.8057	0.0747	18.2	0.0	0.0	18.6	0.0	0.0	18.8	0.0	0.0	18.7	0.0	0.0
578	10	29	0.7233	0.2173	15.3	0.0	0.0	15.3	0.0	0.0	15.3	0.0	0.0	15.3	0.0	0.0
579	10	30	0.6410	0.3599	15.8	0.0	0.0	15.9	0.0	0.0	15.8	0.0	0.0	15.9	0.0	0.0
580	10	31	0.5586	0.5026	16.0	0.0	0.0	15.8	0.0	0.0	15.6	0.0	0.0	15.8	0.0	0.0
581	10	32	0.4763	0.6452	15.8	0.1	0.0	15.2	0.0	0.0	14.9	0.0	0.0	15.1	0.0	0.0
582	10	33	0.3939	0.7878	16.8	0.3	0.0	15.5	0.1	0.0	15.3	0.1	0.0	15.5	0.1	0.0
583	10	34	0.3116	0.9305	15.7	0.4	0.0	14.1	0.1	0.0	13.9	0.1	0.0	14.0	0.1	0.0
584	10	35	0.2292	1.0731	17.0	0.4	0.0	15.7	0.1	0.0	15.7	0.1	0.0	15.7	0.1	0.0
585	10	36	0.1469	1.2158	19.3	0.5	0.0	19.1	0.1	0.0	19.4	0.1	0.0	19.1	0.1	0.0
586	10	37	0.0645	1.3584	20.0	0.5	0.0	21.2	0.1	0.0	21.7	0.1	0.0	21.3	0.1	0.0
587	10	38	-0.0178	1.5010	18.5	1.1	0.0	20.2	0.8	0.0	20.8	0.8	0.0	20.4	0.8	0.0
588	10	39	-0.1002	1.6437	14.3	1.0	0.0	15.8	0.7	0.0	16.4	0.7	0.0	15.9	0.7	0.0
589	10	40	-0.1825	1.7863	9.7	0.5	0.0	10.3	0.2	0.0	10.5	0.2	0.0	10.5	0.2	0.0
590	10	41	-0.2649	1.9289	4.6	0.5	0.0	4.1	0.2	0.0	4.1	0.2	0.0	4.1	0.2	0.0
591	10	42	-0.3472	2.0716	3.2	0.4	0.0	2.3	0.1	0.0	2.3	0.1	0.0	2.3	0.1	0.0
592	10	43	-0.4296	2.2142	2.7	0.4	0.0	1.7	0.1	0.0	1.7	0.1	0.0	1.7	0.1	0.0
593	10	44	-0.5119	2.3568	2.8	0.3	0.0	1.8	0.1	0.0	1.8	0.1	0.0	1.8	0.1	0.0
594	10	45	-0.5943	2.4995	2.9	0.3	0.0	1.8	0.1	0.0	1.8	0.1	0.0	1.8	0.1	0.0
595	10	46	-0.6766	2.6421	2.9	0.3	0.0	1.8	0.1	0.0	1.8	0.1	0.0	1.8	0.1	0.0
596	10	47	-0.7590	2.7847	2.9	0.3	0.0	1.8	0.1	0.0	1.8	0.1	0.0	1.8	0.1	0.0
597	10	48	-0.8413	2.9274	2.8	0.3	0.0	1.7	0.1	0.0	1.7	0.1	0.0	1.7	0.1	0.0
598	10	49	-0.9237	3.0700	2.7	0.3	0.0	1.6	0.1	0.0	1.6	0.1	0.0	1.6	0.1	0.0
599	10	50	-1.0060	3.2126	2.6	0.2	0.0	1.5	0.1	0.0	1.5	0.1	0.0	1.5	0.1	0.0
600	10	51	-1.0884	3.3553	2.4	0.2	0.0	1.4	0.1	0.0	1.4	0.1	0.0	1.4	0.1	0.0
601	10	52	-1.1707	3.4979	2.2	0.2	0.0	1.3	0.0	0.0	1.3	0.0	0.0	1.3	0.0	0.0
602	10	53	-1.2531	3.6405	2.1	0.2	0.0	1.1	0.0	0.0	1.1	0.0	0.0	1.1	0.0	0.0
603	10	54	-1.3354	3.7832	2.0	0.1	0.0	1.1	0.0	0.0	1.1	0.0	0.0	1.1	0.0	0.0
604	10	55	-1.4178	3.9258	1.8	0.1	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0
605	10	56	-1.5001	4.0684	1.8	0.1	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.9	0.0	0.0
606	10	57	-1.5825	4.2111	1.7	0.1	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.9	0.0	0.0
607	10	58	-1.6648	4.3537	1.7	0.1	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.9	0.0	0.0
608	10	59	-1.7472	4.4963	1.6	0.1	0.0	0.8	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0
609	10	60	-1.8295	4.6390	1.6	0.1	0.0	0.8	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0
610	10	61	-1.9119	4.7816	1.7	0.1	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.9	0.0	0.0
611	11	1	3.1717	-3.6941	6.1	0.9	0.0	4.5	0.4	0.0	4.3	0.4	0.0	4.6	0.4	0.0
612	11	2	3.0894	-3.5515	6.1	0.9	0.0	4.5	0.4	0.0	4.3	0.4	0.0	4.5	0.4	0.0
613	11	3	3.0070	-3.4088	6.1	0.9	0.0	4.5	0.4	0.0	4.2	0.3	0.0	4.6	0.3	0.0
614	11	4	2.9247	-3.2662	6.5	0.8	0.0	4.8	0.3	0.0	4.5	0.3	0.0	4.7	0.3	0.0
615	11	5	2.8423	-3.1236	6.6	0.8	0.0	4.8	0.3	0.0	4.5	0.3	0.0	4.7	0.3	0.0
616	11	6	2.7600	-2.9809	6.5	0.8	0.0	4.6	0.3	0.0	4.4	0.3	0.0	4.5	0.3	0.0
617	11	7	2.6776	-2.8383	6.3	0.7	0.0	4.2	0.3	0.0	4.1	0.2	0.0	4.1	0.3	0.0
618	11	8	2.5953	-2.6957	5.9	0.7	0.0	3.8	0.2	0.0	3.6	0.2	0.0	3.8	0.2	0.0
619	11	9	2.5129	-2.5530	5.5	0.7	0.0	3.2	0.2	0.0	3.1	0.2	0.0	3.4	0.2	0.0
620	11	10	2.4306	-2.4104	5.4	0.7	0.0	3.0	0.2	0.0	2.9	0.2	0.0	3.0	0.2	0.0
621	11	11	2.3482	-2.2678	5.4	0.7	0.0	3.0	0.2	0.0	2.8	0.2	0.0	3.0	0.2	0.0
622	11	12	2.2659	-2.1251	5.4	0.7	0.0	2.9	0.2	0.0	2.7	0.2	0.0	2.9	0.2	0.0
623	11	13	2.1835	-1.9825	5.5	0.6	0.0	3.0	0.2	0.0	2.9	0.2	0.0	3.0	0.2	0.0
624	11	14	2.1012	-1.8399	5.4	0.6	0.0	3.0	0.2	0.0	2.9	0.2	0.0	3.0	0.2	0.0

Table C-9
King County International Airport EA
TA Grid Point Analysis (1,000 ft Detail)

					Existing (2002/3)			2018 Future No Project (RSA-5)			2018 W/ Full Use of Shifted Rwy (A2)			2018 W/ Special Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
625	11	15	2.0188	-1.6972	5.3	0.5	0.0	3.0	0.2	0.0	3.0	0.2	0.0	3.0	0.2	0.0
626	11	16	1.9365	-1.5546	5.3	0.5	0.0	3.1	0.2	0.0	3.0	0.2	0.0	3.1	0.2	0.0
627	11	17	1.8541	-1.4119	5.2	0.5	0.0	3.1	0.2	0.0	3.0	0.2	0.0	3.1	0.2	0.0
628	11	18	1.7718	-1.2693	5.3	0.5	0.0	3.2	0.2	0.0	3.1	0.2	0.0	3.1	0.2	0.0
629	11	19	1.6894	-1.1267	5.5	0.5	0.0	3.3	0.1	0.0	3.2	0.1	0.0	3.3	0.1	0.0
630	11	20	1.6071	-0.9840	5.6	0.4	0.0	3.2	0.1	0.0	3.2	0.1	0.0	3.2	0.1	0.0
631	11	21	1.5247	-0.8414	5.7	0.4	0.0	3.2	0.1	0.0	3.3	0.1	0.0	3.2	0.1	0.0
632	11	22	1.4424	-0.6988	7.9	0.4	0.0	6.0	0.1	0.0	6.1	0.1	0.0	6.0	0.1	0.0
633	11	23	1.3600	-0.5561	16.3	0.3	0.0	16.4	0.1	0.0	16.5	0.1	0.0	16.4	0.1	0.0
634	11	24	1.2777	-0.4135	25.5	0.7	0.0	27.6	0.7	0.0	27.8	0.7	0.0	27.6	0.7	0.0
635	11	25	1.1953	-0.2709	33.0	0.9	0.0	37.2	1.1	0.0	37.4	1.1	0.0	37.2	1.1	0.0
636	11	26	1.1130	-0.1282	35.1	0.2	0.0	40.2	0.3	0.0	40.4	0.3	0.0	40.3	0.3	0.0
637	11	27	1.0306	0.0144	29.5	0.0	0.0	34.0	0.0	0.0	34.2	0.0	0.0	34.1	0.0	0.0
638	11	28	0.9483	0.1570	24.6	0.0	0.0	28.4	0.0	0.0	28.5	0.0	0.0	28.4	0.0	0.0
639	11	29	0.8659	0.2997	22.8	0.0	0.0	26.5	0.0	0.0	26.6	0.0	0.0	26.5	0.0	0.0
640	11	30	0.7836	0.4423	22.0	0.0	0.0	25.5	0.0	0.0	25.5	0.0	0.0	25.5	0.0	0.0
641	11	31	0.7012	0.5849	22.1	0.0	0.0	25.5	0.0	0.0	25.4	0.0	0.0	25.5	0.0	0.0
642	11	32	0.6189	0.7276	22.2	0.0	0.0	25.4	0.0	0.0	25.2	0.0	0.0	25.4	0.0	0.0
643	11	33	0.5365	0.8702	22.1	0.0	0.0	25.0	0.0	0.0	24.8	0.0	0.0	25.0	0.0	0.0
644	11	34	0.4542	1.0128	22.1	0.0	0.0	24.9	0.0	0.0	24.8	0.0	0.0	24.9	0.0	0.0
645	11	35	0.3718	1.1555	22.5	0.0	0.0	25.4	0.0	0.0	25.4	0.0	0.0	25.4	0.0	0.0
646	11	36	0.2895	1.2981	23.0	0.1	0.0	26.3	0.0	0.0	26.5	0.0	0.0	26.3	0.0	0.0
647	11	37	0.2071	1.4407	23.2	0.3	0.0	26.9	0.2	0.0	27.3	0.2	0.0	27.0	0.2	0.0
648	11	38	0.1248	1.5834	20.1	0.5	0.0	23.3	0.5	0.0	23.5	0.5	0.0	23.3	0.5	0.0
649	11	39	0.0424	1.7260	14.4	0.3	0.0	16.3	0.2	0.0	16.4	0.2	0.0	16.4	0.2	0.0
650	11	40	-0.0399	1.8686	7.5	0.1	0.0	7.9	0.0	0.0	8.0	0.0	0.0	7.9	0.0	0.0
651	11	41	-0.1223	2.0113	4.3	0.1	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0
652	11	42	-0.2046	2.1539	3.4	0.1	0.0	2.8	0.0	0.0	2.8	0.0	0.0	2.8	0.0	0.0
653	11	43	-0.2870	2.2965	3.2	0.1	0.0	2.7	0.0	0.0	2.7	0.0	0.0	2.7	0.0	0.0
654	11	44	-0.3693	2.4392	3.1	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0
655	11	45	-0.4517	2.5818	2.9	0.0	0.0	2.2	0.0	0.0	2.2	0.0	0.0	2.2	0.0	0.0
656	11	46	-0.5340	2.7244	2.9	0.1	0.0	2.1	0.0	0.0	2.1	0.0	0.0	2.1	0.0	0.0
657	11	47	-0.6164	2.8671	2.8	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0
658	11	48	-0.6987	3.0097	2.3	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0
659	11	49	-0.7811	3.1523	2.2	0.0	0.0	1.4	0.0	0.0	1.4	0.0	0.0	1.4	0.0	0.0
660	11	50	-0.8634	3.2950	1.8	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0
661	11	51	-0.9458	3.4376	1.7	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0
662	11	52	-1.0281	3.5803	1.6	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.0
663	11	53	-1.1105	3.7229	1.5	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0
664	11	54	-1.1928	3.8655	1.4	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0
665	11	55	-1.2752	4.0082	1.3	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0
666	11	56	-1.3575	4.1508	1.3	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
667	11	57	-1.4399	4.2934	1.2	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
668	11	58	-1.5222	4.4361	1.2	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
669	11	59	-1.6046	4.5787	1.2	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
670	11	60	-1.6869	4.7213	1.2	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
671	11	61	-1.7693	4.8640	1.3	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0
SP	1	1	-0.5832	0.7732	97.8	40.4	8.2	114.2	41.9	7.2	238.3	93.0	16.9	116.2	43.0	7.8

Prepared December 31, 2003

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project RSA-5	Full Use of the Shifted Runway RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
1	1	1	1.7454	-4.5176	81.1	81.1	82.4	81.1	1.3	0.0
2	1	2	1.6630	-4.3750	80.4	80.4	80.8	80.3	0.4	-0.1
3	1	3	1.5807	-4.2323	80.5	80.5	80.3	80.3	-0.2	-0.2
4	1	4	1.4983	-4.0897	82.5	82.5	80.4	80.4	-2.1	-2.1
5	1	5	1.4160	-3.9471	83.8	83.8	82.6	82.6	-1.2	-1.2
6	1	6	1.3336	-3.8044	84.0	84.0	83.8	83.8	-0.2	-0.2
7	1	7	1.2513	-3.6618	84.1	84.1	84.0	84.0	-0.1	-0.1
8	1	8	1.1689	-3.5192	84.0	84.0	84.0	84.0	0.0	0.0
9	1	9	1.0866	-3.3765	83.7	83.7	83.8	83.8	0.1	0.1
10	1	10	1.0042	-3.2339	83.4	83.4	83.5	83.5	0.1	0.1
11	1	11	0.9219	-3.0913	83.9	83.9	83.2	83.2	-0.7	-0.7
12	1	12	0.8395	-2.9486	83.6	83.6	83.7	83.7	0.1	0.1
13	1	13	0.7572	-2.8060	83.3	83.3	83.5	83.4	0.2	0.1
14	1	14	0.6748	-2.6634	83.0	83.0	83.2	83.1	0.2	0.1
15	1	15	0.5925	-2.5207	83.4	83.4	82.9	82.9	-0.5	-0.5
16	1	16	0.5101	-2.3781	83.0	83.0	83.2	83.2	0.2	0.2
17	1	17	0.4278	-2.2354	82.7	82.7	82.8	82.8	0.1	0.1
18	1	18	0.3454	-2.0928	82.3	82.3	82.5	82.5	0.2	0.2
19	1	19	0.2631	-1.9502	82.0	82.0	82.2	82.1	0.2	0.1
20	1	20	0.1807	-1.8075	81.9	81.9	81.9	81.9	0.0	0.0
21	1	21	0.0984	-1.6649	81.8	81.8	81.8	81.8	0.0	0.0
22	1	22	0.0161	-1.5223	81.7	81.7	81.7	81.7	0.0	0.0
23	1	23	-0.0663	-1.3796	81.4	81.4	81.6	81.4	0.2	0.0
24	1	24	-0.1486	-1.2370	80.9	80.9	81.2	80.9	0.3	0.0
25	1	25	-0.2310	-1.0944	80.6	80.6	81.0	80.6	0.4	0.0
26	1	26	-0.3133	-0.9517	79.4	79.4	79.9	79.4	0.5	0.0
27	1	27	-0.3957	-0.8091	77.4	77.4	77.9	77.5	0.5	0.1
28	1	28	-0.4780	-0.6665	75.0	75.0	75.8	75.6	0.8	0.6
29	1	29	-0.5604	-0.5238	73.4	73.4	74.3	74.3	0.9	0.9
30	1	30	-0.6427	-0.3812	73.3	73.3	73.3	73.3	0.0	0.0
31	1	31	-0.7251	-0.2386	74.7	74.7	74.7	74.7	0.0	0.0
32	1	32	-0.8074	-0.0959	77.0	77.0	77.0	77.0	0.0	0.0
33	1	33	-0.8898	0.0467	79.1	79.1	79.1	79.1	0.0	0.0
34	1	34	-0.9721	0.1893	80.4	80.4	80.4	80.4	0.0	0.0
35	1	35	-1.0545	0.3320	81.1	81.1	81.1	81.1	0.0	0.0
36	1	36	-1.1368	0.4746	81.9	81.9	81.9	81.9	0.0	0.0
37	1	37	-1.2192	0.6172	82.5	82.5	82.5	82.5	0.0	0.0
38	1	38	-1.3015	0.7599	82.9	82.9	82.9	82.9	0.0	0.0
39	1	39	-1.3839	0.9025	83.3	83.3	83.3	83.3	0.0	0.0
40	1	40	-1.4662	1.0451	83.8	83.8	83.8	83.8	0.0	0.0
41	1	41	-1.5486	1.1878	84.5	84.5	84.5	84.5	0.0	0.0
42	1	42	-1.6309	1.3304	85.3	85.3	85.3	85.3	0.0	0.0
43	1	43	-1.7133	1.4730	85.6	85.6	85.6	85.6	0.0	0.0
44	1	44	-1.7956	1.6157	86.1	86.1	86.1	86.1	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project RSA-5	2018 Lmax Full Use of the Shifted Runway RSA-2	2018 Lmax With Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
45	1	45	-1.8780	1.7583	86.2	86.2	86.2	86.2	0.0	0.0
46	1	46	-1.9603	1.9009	86.9	86.9	86.9	86.9	0.0	0.0
47	1	47	-2.0427	2.0436	87.0	87.0	87.0	87.0	0.0	0.0
48	1	48	-2.1250	2.1862	87.2	87.2	87.2	87.2	0.0	0.0
49	1	49	-2.2074	2.3288	87.3	87.3	87.3	87.3	0.0	0.0
50	1	50	-2.2897	2.4715	87.4	87.4	87.4	87.4	0.0	0.0
51	1	51	-2.3721	2.6141	87.5	87.5	87.5	87.5	0.0	0.0
52	1	52	-2.4544	2.7568	87.5	87.5	87.5	87.5	0.0	0.0
53	1	53	-2.5368	2.8994	87.6	87.6	87.6	87.6	0.0	0.0
54	1	54	-2.6191	3.0420	87.0	87.0	87.0	87.0	0.0	0.0
55	1	55	-2.7015	3.1847	85.4	85.4	85.4	85.4	0.0	0.0
56	1	56	-2.7838	3.3273	84.5	84.5	84.5	84.5	0.0	0.0
57	1	57	-2.8662	3.4699	84.6	84.6	84.6	84.6	0.0	0.0
58	1	58	-2.9485	3.6126	84.6	84.6	84.6	84.6	0.0	0.0
59	1	59	-3.0309	3.7552	86.4	86.4	86.4	86.4	0.0	0.0
60	1	60	-3.1132	3.8978	87.8	87.8	87.8	87.8	0.0	0.0
61	1	61	-3.1956	4.0405	88.2	88.2	88.2	88.2	0.0	0.0
62	2	1	1.8880	-4.4352	82.9	82.9	84.4	82.7	1.5	-0.2
63	2	2	1.8057	-4.2926	83.0	83.0	82.8	82.8	-0.2	-0.2
64	2	3	1.7233	-4.1500	83.2	83.2	82.9	82.9	-0.3	-0.3
65	2	4	1.6410	-4.0073	85.0	85.0	83.3	83.3	-1.7	-1.7
66	2	5	1.5586	-3.8647	86.3	86.3	85.1	85.1	-1.2	-1.2
67	2	6	1.4763	-3.7221	86.7	86.7	86.3	86.3	-0.4	-0.4
68	2	7	1.3939	-3.5794	86.8	86.8	86.6	86.6	-0.2	-0.2
69	2	8	1.3116	-3.4368	86.9	86.9	86.7	86.7	-0.2	-0.2
70	2	9	1.2292	-3.2942	87.0	87.0	86.8	86.8	-0.2	-0.2
71	2	10	1.1469	-3.1515	87.1	87.1	87.0	86.9	-0.1	-0.2
72	2	11	1.0645	-3.0089	87.2	87.2	87.1	87.1	-0.1	-0.1
73	2	12	0.9822	-2.8663	87.3	87.3	87.2	87.2	-0.1	-0.1
74	2	13	0.8998	-2.7236	87.4	87.4	87.3	87.2	-0.1	-0.2
75	2	14	0.8175	-2.5810	87.4	87.4	87.3	87.3	-0.1	-0.1
76	2	15	0.7351	-2.4384	87.1	87.1	87.1	87.1	0.0	0.0
77	2	16	0.6528	-2.2957	87.2	87.2	87.0	87.0	-0.2	-0.2
78	2	17	0.5704	-2.1531	87.1	87.1	87.1	87.1	0.0	0.0
79	2	18	0.4881	-2.0105	87.0	87.0	86.8	86.8	-0.2	-0.2
80	2	19	0.4057	-1.8678	86.9	86.9	86.9	86.9	0.0	0.0
81	2	20	0.3234	-1.7252	86.5	86.5	86.7	86.7	0.2	0.2
82	2	21	0.2410	-1.5826	86.3	86.3	86.3	86.3	0.0	0.0
83	2	22	0.1587	-1.4399	86.2	86.2	86.2	86.2	0.0	0.0
84	2	23	0.0763	-1.2973	86.1	86.1	86.1	86.1	0.0	0.0
85	2	24	-0.0060	-1.1547	85.9	85.9	85.9	85.9	0.0	0.0
86	2	25	-0.0884	-1.0120	85.6	85.6	85.8	85.6	0.2	0.0
87	2	26	-0.1707	-0.8694	83.9	83.9	84.2	83.9	0.3	0.0
88	2	27	-0.2531	-0.7268	81.4	81.4	82.2	81.4	0.8	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
89	2	28	-0.3354	-0.5841	79.3	79.3	80.3	79.3	1.0	0.0
90	2	29	-0.4178	-0.4415	77.0	77.0	78.0	77.8	1.0	0.8
91	2	30	-0.5001	-0.2989	76.8	76.8	76.8	76.8	0.0	0.0
92	2	31	-0.5825	-0.1562	77.9	77.9	77.9	77.9	0.0	0.0
93	2	32	-0.6648	-0.0136	80.7	80.7	80.7	80.7	0.0	0.0
94	2	33	-0.7472	0.1291	83.5	83.5	83.5	83.5	0.0	0.0
95	2	34	-0.8295	0.2717	85.3	85.3	85.3	85.3	0.0	0.0
96	2	35	-0.9119	0.4143	86.0	86.0	86.0	86.0	0.0	0.0
97	2	36	-0.9942	0.5570	86.7	86.7	86.7	86.7	0.0	0.0
98	2	37	-1.0766	0.6996	87.1	87.1	87.1	87.1	0.0	0.0
99	2	38	-1.1589	0.8422	87.6	87.6	87.6	87.6	0.0	0.0
100	2	39	-1.2413	0.9849	88.3	88.3	88.3	88.3	0.0	0.0
101	2	40	-1.3236	1.1275	88.8	88.8	88.8	88.8	0.0	0.0
102	2	41	-1.4060	1.2701	89.0	89.0	89.0	89.0	0.0	0.0
103	2	42	-1.4883	1.4128	89.7	89.7	89.7	89.7	0.0	0.0
104	2	43	-1.5707	1.5554	89.9	89.9	89.9	89.9	0.0	0.0
105	2	44	-1.6530	1.6980	90.1	90.1	90.1	90.1	0.0	0.0
106	2	45	-1.7354	1.8407	90.2	90.2	90.2	90.2	0.0	0.0
107	2	46	-1.8177	1.9833	90.3	90.3	90.3	90.3	0.0	0.0
108	2	47	-1.9001	2.1259	90.4	90.4	90.4	90.4	0.0	0.0
109	2	48	-1.9824	2.2686	90.4	90.4	90.4	90.4	0.0	0.0
110	2	49	-2.0648	2.4112	90.8	90.8	90.8	90.8	0.0	0.0
111	2	50	-2.1471	2.5538	91.1	91.1	91.1	91.1	0.0	0.0
112	2	51	-2.2295	2.6965	90.3	90.3	90.3	90.3	0.0	0.0
113	2	52	-2.3118	2.8391	90.2	90.2	90.2	90.2	0.0	0.0
114	2	53	-2.3942	2.9817	90.0	90.0	90.0	90.0	0.0	0.0
115	2	54	-2.4765	3.1244	89.1	89.1	89.1	89.1	0.0	0.0
116	2	55	-2.5589	3.2670	86.9	86.9	86.9	86.9	0.0	0.0
117	2	56	-2.6412	3.4096	86.5	86.5	86.5	86.5	0.0	0.0
118	2	57	-2.7236	3.5523	86.4	86.4	86.4	86.4	0.0	0.0
119	2	58	-2.8059	3.6949	86.2	86.2	86.2	86.2	0.0	0.0
120	2	59	-2.8883	3.8375	87.1	87.1	87.1	87.1	0.0	0.0
121	2	60	-2.9706	3.9802	88.4	88.4	88.4	88.4	0.0	0.0
122	2	61	-3.0530	4.1228	88.8	88.8	88.8	88.8	0.0	0.0
123	3	1	2.0307	-4.3529	85.2	85.2	85.9	85.0	0.7	-0.2
124	3	2	1.9483	-4.2103	85.4	85.4	85.2	85.2	-0.2	-0.2
125	3	3	1.8660	-4.0676	85.6	85.6	85.4	85.3	-0.2	-0.3
126	3	4	1.7836	-3.9250	86.8	86.8	85.5	85.5	-1.3	-1.3
127	3	5	1.7013	-3.7824	88.7	88.7	87.0	87.0	-1.7	-1.7
128	3	6	1.6189	-3.6397	89.3	89.3	88.8	88.7	-0.5	-0.6
129	3	7	1.5366	-3.4971	89.6	89.6	89.3	89.3	-0.3	-0.3
130	3	8	1.4542	-3.3545	89.8	89.8	89.5	89.5	-0.3	-0.3
131	3	9	1.3719	-3.2118	90.5	90.5	89.8	90.5	-0.7	0.0
132	3	10	1.2895	-3.0692	90.5	90.5	90.3	90.5	-0.2	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project RSA-5	Full Use of the Shifted Runway RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
133	3	11	1.2072	-2.9266	90.5	90.5	90.3	90.5	-0.2	0.0
134	3	12	1.1248	-2.7839	90.8	90.8	90.5	90.5	-0.3	-0.3
135	3	13	1.0425	-2.6413	91.0	91.0	90.7	90.7	-0.3	-0.3
136	3	14	0.9601	-2.4987	91.2	91.2	90.9	90.9	-0.3	-0.3
137	3	15	0.8778	-2.3560	91.4	91.4	91.1	91.1	-0.3	-0.3
138	3	16	0.7954	-2.2134	91.5	91.5	91.3	91.2	-0.2	-0.3
139	3	17	0.7131	-2.0707	91.7	91.7	91.4	91.4	-0.3	-0.3
140	3	18	0.6307	-1.9281	91.8	91.8	91.6	91.6	-0.2	-0.2
141	3	19	0.5484	-1.7855	91.9	91.9	91.7	91.7	-0.2	-0.2
142	3	20	0.4660	-1.6428	91.8	91.8	91.8	91.8	0.0	0.0
143	3	21	0.3837	-1.5002	91.7	91.7	91.5	91.7	-0.2	0.0
144	3	22	0.3013	-1.3576	91.9	91.9	91.6	91.9	-0.3	0.0
145	3	23	0.2190	-1.2149	92.2	92.2	91.8	92.2	-0.4	0.0
146	3	24	0.1366	-1.0723	92.4	92.4	92.1	92.4	-0.3	0.0
147	3	25	0.0543	-0.9297	92.3	92.3	92.0	92.3	-0.3	0.0
148	3	26	-0.0281	-0.7870	90.0	90.0	90.1	90.0	0.1	0.0
149	3	27	-0.1104	-0.6444	87.3	87.3	87.8	87.3	0.5	0.0
150	3	28	-0.1928	-0.5018	84.6	84.6	86.3	84.6	1.7	0.0
151	3	29	-0.2751	-0.3591	83.1	83.1	84.3	83.1	1.2	0.0
152	3	30	-0.3575	-0.2165	82.9	82.9	82.9	82.9	0.0	0.0
153	3	31	-0.4398	-0.0739	84.3	84.3	84.3	84.3	0.0	0.0
154	3	32	-0.5222	0.0688	86.2	86.2	86.3	86.2	0.1	0.0
155	3	33	-0.6045	0.2114	88.6	88.6	88.6	88.6	0.0	0.0
156	3	34	-0.6869	0.3540	91.8	91.8	91.8	91.8	0.0	0.0
157	3	35	-0.7692	0.4967	92.5	92.5	92.5	92.5	0.0	0.0
158	3	36	-0.8516	0.6393	92.8	92.8	92.8	92.8	0.0	0.0
159	3	37	-0.9339	0.7819	92.9	92.9	92.9	92.9	0.0	0.0
160	3	38	-1.0163	0.9246	93.4	93.4	93.4	93.4	0.0	0.0
161	3	39	-1.0986	1.0672	93.5	93.5	93.5	93.5	0.0	0.0
162	3	40	-1.1810	1.2098	93.7	93.7	93.7	93.7	0.0	0.0
163	3	41	-1.2633	1.3525	93.9	93.9	93.9	93.9	0.0	0.0
164	3	42	-1.3457	1.4951	93.9	93.9	93.9	93.9	0.0	0.0
165	3	43	-1.4280	1.6377	94.3	94.3	94.3	94.3	0.0	0.0
166	3	44	-1.5104	1.7804	94.7	94.7	94.7	94.7	0.0	0.0
167	3	45	-1.5927	1.9230	95.0	95.0	95.0	95.0	0.0	0.0
168	3	46	-1.6751	2.0656	95.0	95.0	95.0	95.0	0.0	0.0
169	3	47	-1.7574	2.2083	95.0	95.0	95.0	95.0	0.0	0.0
170	3	48	-1.8398	2.3509	94.8	94.8	94.8	94.8	0.0	0.0
171	3	49	-1.9221	2.4935	94.6	94.6	94.6	94.6	0.0	0.0
172	3	50	-2.0045	2.6362	94.3	94.3	94.3	94.3	0.0	0.0
173	3	51	-2.0868	2.7788	92.1	92.1	92.1	92.1	0.0	0.0
174	3	52	-2.1692	2.9215	91.4	91.4	91.4	91.4	0.0	0.0
175	3	53	-2.2515	3.0641	90.9	90.9	90.9	90.9	0.0	0.0
176	3	54	-2.3339	3.2067	89.9	89.9	89.9	89.9	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project RSA-5	Full Use of the Shifted Runway RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
177	3	55	-2.4162	3.3494	87.6	87.6	87.6	87.6	0.0	0.0
178	3	56	-2.4986	3.4920	86.9	86.9	86.9	86.9	0.0	0.0
179	3	57	-2.5809	3.6346	86.6	86.6	86.6	86.6	0.0	0.0
180	3	58	-2.6633	3.7773	86.3	86.3	86.3	86.3	0.0	0.0
181	3	59	-2.7456	3.9199	86.9	86.9	86.9	86.9	0.0	0.0
182	3	60	-2.8280	4.0625	88.3	88.3	88.3	88.3	0.0	0.0
183	3	61	-2.9103	4.2052	88.8	88.8	88.8	88.8	0.0	0.0
184	4	1	2.1733	-4.2705	86.3	86.3	86.5	86.1	0.2	-0.2
185	4	2	2.0910	-4.1279	86.6	86.6	86.4	86.4	-0.2	-0.2
186	4	3	2.0086	-3.9853	86.9	86.9	86.7	86.9	-0.2	0.0
187	4	4	1.9263	-3.8426	87.8	87.8	86.9	87.5	-0.9	-0.3
188	4	5	1.8439	-3.7000	90.1	90.1	88.0	88.0	-2.1	-2.1
189	4	6	1.7616	-3.5574	91.0	91.0	90.3	90.3	-0.7	-0.7
190	4	7	1.6792	-3.4147	91.4	91.4	91.0	91.0	-0.4	-0.4
191	4	8	1.5969	-3.2721	92.7	92.7	91.4	92.7	-1.3	0.0
192	4	9	1.5145	-3.1295	94.2	94.2	93.0	94.2	-1.2	0.0
193	4	10	1.4322	-2.9868	94.6	94.6	94.2	94.6	-0.4	0.0
194	4	11	1.3498	-2.8442	94.9	94.9	94.6	94.9	-0.3	0.0
195	4	12	1.2675	-2.7016	95.3	95.3	94.9	95.3	-0.4	0.0
196	4	13	1.1851	-2.5589	95.7	95.7	95.3	95.7	-0.4	0.0
197	4	14	1.1028	-2.4163	96.0	96.0	95.6	96.0	-0.4	0.0
198	4	15	1.0204	-2.2737	96.4	96.4	95.9	96.4	-0.5	0.0
199	4	16	0.9381	-2.1310	96.7	96.7	96.3	96.7	-0.4	0.0
200	4	17	0.8557	-1.9884	97.0	97.0	96.6	97.0	-0.4	0.0
201	4	18	0.7734	-1.8458	97.5	97.5	96.9	97.5	-0.6	0.0
202	4	19	0.6910	-1.7031	98.1	98.1	97.4	98.1	-0.7	0.0
203	4	20	0.6087	-1.5605	98.6	98.6	97.9	98.6	-0.7	0.0
204	4	21	0.5263	-1.4179	98.9	98.9	98.3	98.9	-0.6	0.0
205	4	22	0.4440	-1.2752	99.0	99.0	98.6	99.0	-0.4	0.0
206	4	23	0.3616	-1.1326	99.1	99.1	98.6	98.8	-0.5	-0.3
207	4	24	0.2793	-0.9900	99.9	99.9	98.9	99.9	-1.0	0.0
208	4	25	0.1969	-0.8473	100.2	100.2	99.1	100.2	-1.1	0.0
209	4	26	0.1146	-0.7047	98.2	98.2	97.6	98.2	-0.6	0.0
210	4	27	0.0322	-0.5621	95.8	95.8	95.9	95.8	0.1	0.0
211	4	28	-0.0501	-0.4194	94.7	94.7	95.7	94.7	1.0	0.0
212	4	29	-0.1325	-0.2768	93.0	93.0	94.5	93.0	1.5	0.0
213	4	30	-0.2148	-0.1342	92.8	92.8	92.8	92.8	0.0	0.0
214	4	31	-0.2972	0.0085	94.4	94.4	94.5	94.4	0.1	0.0
215	4	32	-0.3795	0.1511	95.5	95.5	95.6	95.5	0.1	0.0
216	4	33	-0.4619	0.2937	95.7	95.7	95.8	95.7	0.1	0.0
217	4	34	-0.5442	0.4364	99.1	99.1	99.1	99.1	0.0	0.0
218	4	35	-0.6266	0.5790	109.6	109.6	109.6	109.6	0.0	0.0
219	4	36	-0.7089	0.7217	100.1	100.1	100.1	100.1	0.0	0.0
220	4	37	-0.7913	0.8643	101.2	101.2	101.2	101.2	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
221	4	38	-0.8736	1.0069	101.6	101.6	101.6	101.6	0.0	0.0
222	4	39	-0.9560	1.1496	101.3	101.3	101.3	101.3	0.0	0.0
223	4	40	-1.0383	1.2922	100.4	100.4	100.4	100.4	0.0	0.0
224	4	41	-1.1207	1.4348	99.4	99.4	99.4	99.4	0.0	0.0
225	4	42	-1.2030	1.5775	98.5	98.5	98.5	98.5	0.0	0.0
226	4	43	-1.2854	1.7201	97.9	97.9	97.9	97.9	0.0	0.0
227	4	44	-1.3677	1.8627	97.3	97.3	97.3	97.3	0.0	0.0
228	4	45	-1.4501	2.0054	96.8	96.8	96.8	96.8	0.0	0.0
229	4	46	-1.5324	2.1480	96.3	96.3	96.3	96.3	0.0	0.0
230	4	47	-1.6148	2.2906	95.8	95.8	95.8	95.8	0.0	0.0
231	4	48	-1.6971	2.4333	95.4	95.4	95.4	95.4	0.0	0.0
232	4	49	-1.7795	2.5759	94.9	94.9	94.9	94.9	0.0	0.0
233	4	50	-1.8618	2.7185	94.4	94.4	94.4	94.4	0.0	0.0
234	4	51	-1.9442	2.8612	92.8	92.8	92.8	92.8	0.0	0.0
235	4	52	-2.0265	3.0038	91.5	91.5	91.5	91.5	0.0	0.0
236	4	53	-2.1089	3.1464	91.0	91.0	91.0	91.0	0.0	0.0
237	4	54	-2.1912	3.2891	90.2	90.2	90.2	90.2	0.0	0.0
238	4	55	-2.2736	3.4317	87.9	87.9	88.0	87.9	0.1	0.0
239	4	56	-2.3559	3.5743	86.9	86.9	86.9	86.9	0.0	0.0
240	4	57	-2.4383	3.7170	86.7	86.7	86.7	86.7	0.0	0.0
241	4	58	-2.5206	3.8596	86.4	86.4	86.4	86.4	0.0	0.0
242	4	59	-2.6030	4.0022	86.5	86.5	86.5	86.5	0.0	0.0
243	4	60	-2.6853	4.1449	88.2	88.2	88.2	88.2	0.0	0.0
244	4	61	-2.7677	4.2875	88.8	88.8	88.8	88.8	0.0	0.0
245	5	1	2.3159	-4.1882	86.3	86.3	86.5	86.0	0.2	-0.3
246	5	2	2.2336	-4.0456	86.6	86.6	86.4	86.4	-0.2	-0.2
247	5	3	2.1512	-3.9029	86.9	86.9	86.6	86.9	-0.3	0.0
248	5	4	2.0689	-3.7603	88.0	88.0	87.0	87.5	-1.0	-0.5
249	5	5	1.9865	-3.6177	90.2	90.2	88.3	88.3	-1.9	-1.9
250	5	6	1.9042	-3.4750	91.0	91.0	90.4	90.4	-0.6	-0.6
251	5	7	1.8218	-3.3324	91.5	91.5	91.1	91.1	-0.4	-0.4
252	5	8	1.7395	-3.1898	93.1	93.1	91.5	93.1	-1.6	0.0
253	5	9	1.6571	-3.0471	94.5	94.5	93.4	94.5	-1.1	0.0
254	5	10	1.5748	-2.9045	94.9	94.9	94.5	94.9	-0.4	0.0
255	5	11	1.4924	-2.7619	95.4	95.4	95.0	95.4	-0.4	0.0
256	5	12	1.4101	-2.6192	95.9	95.9	95.4	95.9	-0.5	0.0
257	5	13	1.3277	-2.4766	96.4	96.4	95.9	96.4	-0.5	0.0
258	5	14	1.2454	-2.3340	96.9	96.9	96.4	96.9	-0.5	0.0
259	5	15	1.1630	-2.1913	97.4	97.4	97.0	97.4	-0.4	0.0
260	5	16	1.0807	-2.0487	98.0	98.0	97.5	98.0	-0.5	0.0
261	5	17	0.9983	-1.9060	98.6	98.6	98.1	98.6	-0.5	0.0
262	5	18	0.9160	-1.7634	99.8	99.8	98.7	99.8	-1.1	0.0
263	5	19	0.8336	-1.6208	101.3	101.3	99.9	101.3	-1.4	0.0
264	5	20	0.7513	-1.4781	103.0	103.0	101.4	103.0	-1.6	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project RSA-5	Full Use of the Shifted Runway RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
265	5	21	0.6689	-1.3355	104.9	104.9	103.1	104.9	-1.8	0.0
266	5	22	0.5866	-1.1929	107.3	107.3	105.1	107.3	-2.2	0.0
267	5	23	0.5042	-1.0502	110.2	110.2	107.5	110.2	-2.7	0.0
268	5	24	0.4219	-0.9076	113.9	113.9	110.4	113.9	-3.5	0.0
269	5	25	0.3395	-0.7650	123.0	123.0	115.8	123.0	-7.2	0.0
270	5	26	0.2572	-0.6223	112.0	112.0	112.4	112.0	0.4	0.0
271	5	27	0.1748	-0.4797	110.2	110.2	110.2	110.2	0.0	0.0
272	5	28	0.0925	-0.3371	111.1	111.1	109.6	111.1	-1.5	0.0
273	5	29	0.0101	-0.1944	111.8	111.8	111.2	111.8	-0.6	0.0
274	5	30	-0.0722	-0.0518	111.7	111.7	111.8	111.7	0.1	0.0
275	5	31	-0.1546	0.0908	110.9	110.9	111.0	110.9	0.1	0.0
276	5	32	-0.2369	0.2335	109.5	109.5	109.2	109.5	-0.3	0.0
277	5	33	-0.3193	0.3761	109.9	109.9	109.5	109.9	-0.4	0.0
278	5	34	-0.4016	0.5187	118.6	118.6	118.6	118.6	0.0	0.0
279	5	35	-0.4840	0.6614	113.9	113.9	113.9	113.9	0.0	0.0
280	5	36	-0.5663	0.8040	110.5	110.5	110.5	110.5	0.0	0.0
281	5	37	-0.6487	0.9466	107.3	107.3	107.4	107.3	0.1	0.0
282	5	38	-0.7310	1.0893	104.9	104.9	104.9	104.9	0.0	0.0
283	5	39	-0.8134	1.2319	102.9	102.9	102.9	102.9	0.0	0.0
284	5	40	-0.8957	1.3745	101.1	101.1	101.1	101.1	0.0	0.0
285	5	41	-0.9781	1.5172	99.8	99.8	99.8	99.8	0.0	0.0
286	5	42	-1.0604	1.6598	98.6	98.6	98.6	98.6	0.0	0.0
287	5	43	-1.1428	1.8024	98.0	98.0	98.0	98.0	0.0	0.0
288	5	44	-1.2251	1.9451	97.4	97.4	97.4	97.4	0.0	0.0
289	5	45	-1.3075	2.0877	96.9	96.9	96.9	96.9	0.0	0.0
290	5	46	-1.3898	2.2303	96.4	96.4	96.4	96.4	0.0	0.0
291	5	47	-1.4722	2.3730	95.9	95.9	95.9	95.9	0.0	0.0
292	5	48	-1.5545	2.5156	95.4	95.4	95.4	95.4	0.0	0.0
293	5	49	-1.6369	2.6582	94.9	94.9	94.9	94.9	0.0	0.0
294	5	50	-1.7192	2.8009	94.5	94.5	94.5	94.5	0.0	0.0
295	5	51	-1.8016	2.9435	93.1	93.1	93.1	93.1	0.0	0.0
296	5	52	-1.8839	3.0862	91.5	91.5	91.5	91.5	0.0	0.0
297	5	53	-1.9663	3.2288	91.1	91.1	91.1	91.1	0.0	0.0
298	5	54	-2.0486	3.3714	90.3	90.3	90.3	90.3	0.0	0.0
299	5	55	-2.1310	3.5141	88.1	88.1	88.1	88.1	0.0	0.0
300	5	56	-2.2133	3.6567	87.0	87.0	87.0	87.0	0.0	0.0
301	5	57	-2.2957	3.7993	86.7	86.7	86.7	86.7	0.0	0.0
302	5	58	-2.3780	3.9420	86.3	86.3	86.3	86.3	0.0	0.0
303	5	59	-2.4604	4.0846	86.5	86.5	86.5	86.5	0.0	0.0
304	5	60	-2.5427	4.2272	88.1	88.1	88.1	88.1	0.0	0.0
305	5	61	-2.6251	4.3699	88.7	88.7	88.7	88.7	0.0	0.0
306	6	1	2.4586	-4.1058	86.3	86.3	86.6	86.1	0.3	-0.2
307	6	2	2.3762	-3.9632	86.6	86.6	86.4	86.4	-0.2	-0.2
308	6	3	2.2939	-3.8206	86.9	86.9	86.7	86.9	-0.2	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project RSA-5	Full Use of the Shifted Runway RSA-2	With Special Area Use Procedures RSA-3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
309	6	4	2.2115	-3.6779	88.0	88.0	87.0	87.5	-1.0	-0.5
310	6	5	2.1292	-3.5353	90.3	90.3	88.3	88.3	-2.0	-2.0
311	6	6	2.0468	-3.3927	91.1	91.1	90.4	90.4	-0.7	-0.7
312	6	7	1.9645	-3.2500	91.5	91.5	91.1	91.1	-0.4	-0.4
313	6	8	1.8821	-3.1074	93.1	93.1	91.5	93.1	-1.6	0.0
314	6	9	1.7998	-2.9648	94.5	94.5	93.4	94.5	-1.1	0.0
315	6	10	1.7174	-2.8221	95.0	95.0	94.6	95.0	-0.4	0.0
316	6	11	1.6351	-2.6795	95.4	95.4	95.0	95.4	-0.4	0.0
317	6	12	1.5527	-2.5369	95.9	95.9	95.5	95.9	-0.4	0.0
318	6	13	1.4704	-2.3942	96.4	96.4	95.9	96.4	-0.5	0.0
319	6	14	1.3880	-2.2516	96.9	96.9	96.4	96.9	-0.5	0.0
320	6	15	1.3057	-2.1090	97.4	97.4	96.9	97.4	-0.5	0.0
321	6	16	1.2233	-1.9663	97.9	97.9	97.4	97.9	-0.5	0.0
322	6	17	1.1410	-1.8237	98.5	98.5	98.0	98.5	-0.5	0.0
323	6	18	1.0586	-1.6811	99.7	99.7	98.6	99.7	-1.1	0.0
324	6	19	0.9763	-1.5384	101.0	101.0	99.8	101.0	-1.2	0.0
325	6	20	0.8939	-1.3958	102.9	102.9	101.3	102.9	-1.6	0.0
326	6	21	0.8116	-1.2532	105.0	105.0	103.2	105.0	-1.8	0.0
327	6	22	0.7292	-1.1105	107.4	107.4	105.2	107.4	-2.2	0.0
328	6	23	0.6469	-0.9679	110.1	110.1	107.4	110.1	-2.7	0.0
329	6	24	0.5645	-0.8253	114.8	114.8	110.7	114.8	-4.1	0.0
330	6	25	0.4822	-0.6826	120.2	120.2	115.0	120.2	-5.2	0.0
331	6	26	0.3998	-0.5400	107.5	107.5	107.0	107.5	-0.5	0.0
332	6	27	0.3175	-0.3974	107.0	107.0	105.6	107.0	-1.4	0.0
333	6	28	0.2351	-0.2547	108.4	108.4	107.2	108.4	-1.2	0.0
334	6	29	0.1528	-0.1121	108.6	108.6	108.5	108.6	-0.1	0.0
335	6	30	0.0704	0.0305	108.6	108.6	108.6	108.6	0.0	0.0
336	6	31	-0.0119	0.1732	108.6	108.6	108.6	108.6	0.0	0.0
337	6	32	-0.0943	0.3158	107.3	107.3	107.3	107.3	0.0	0.0
338	6	33	-0.1766	0.4584	106.5	106.5	106.1	106.5	-0.4	0.0
339	6	34	-0.2590	0.6011	113.9	113.9	113.9	113.9	0.0	0.0
340	6	35	-0.3413	0.7437	114.5	114.5	114.5	114.5	0.0	0.0
341	6	36	-0.4237	0.8864	110.1	110.1	110.1	110.1	0.0	0.0
342	6	37	-0.5060	1.0290	107.1	107.1	107.1	107.1	0.0	0.0
343	6	38	-0.5884	1.1716	104.7	104.7	104.7	104.7	0.0	0.0
344	6	39	-0.6707	1.3143	102.7	102.7	102.7	102.7	0.0	0.0
345	6	40	-0.7531	1.4569	101.0	101.0	101.0	101.0	0.0	0.0
346	6	41	-0.8354	1.5995	99.6	99.6	99.6	99.6	0.0	0.0
347	6	42	-0.9178	1.7422	98.5	98.5	98.5	98.5	0.0	0.0
348	6	43	-1.0001	1.8848	97.9	97.9	97.9	97.9	0.0	0.0
349	6	44	-1.0825	2.0274	97.3	97.3	97.3	97.3	0.0	0.0
350	6	45	-1.1648	2.1701	96.8	96.8	96.8	96.8	0.0	0.0
351	6	46	-1.2472	2.3127	96.3	96.3	96.3	96.3	0.0	0.0
352	6	47	-1.3295	2.4553	95.8	95.8	95.8	95.8	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
353	6	48	-1.4119	2.5980	95.3	95.3	95.3	95.3	0.0	0.0
354	6	49	-1.4942	2.7406	94.9	94.9	94.9	94.9	0.0	0.0
355	6	50	-1.5766	2.8832	94.4	94.4	94.4	94.4	0.0	0.0
356	6	51	-1.6589	3.0259	92.8	92.8	92.8	92.8	0.0	0.0
357	6	52	-1.7413	3.1685	91.4	91.4	91.4	91.4	0.0	0.0
358	6	53	-1.8236	3.3111	91.0	91.0	91.0	91.0	0.0	0.0
359	6	54	-1.9060	3.4538	90.2	90.2	90.2	90.2	0.0	0.0
360	6	55	-1.9883	3.5964	87.9	87.9	87.9	87.9	0.0	0.0
361	6	56	-2.0707	3.7390	86.9	86.9	86.9	86.9	0.0	0.0
362	6	57	-2.1530	3.8817	86.6	86.6	86.6	86.6	0.0	0.0
363	6	58	-2.2354	4.0243	86.3	86.3	86.3	86.3	0.0	0.0
364	6	59	-2.3177	4.1669	86.7	86.7	86.7	86.7	0.0	0.0
365	6	60	-2.4001	4.3096	88.3	88.3	88.2	88.3	-0.1	0.0
366	6	61	-2.4824	4.4522	88.8	88.8	88.8	88.8	0.0	0.0
367	7	1	2.6012	-4.0235	86.3	86.3	87.1	86.1	0.8	-0.2
368	7	2	2.5189	-3.8809	86.6	86.6	86.4	86.4	-0.2	-0.2
369	7	3	2.4365	-3.7382	86.9	86.9	86.6	86.9	-0.3	0.0
370	7	4	2.3542	-3.5956	87.8	87.8	86.9	87.4	-0.9	-0.4
371	7	5	2.2718	-3.4530	90.1	90.1	88.1	88.1	-2.0	-2.0
372	7	6	2.1895	-3.3103	90.9	90.9	90.3	90.3	-0.6	-0.6
373	7	7	2.1071	-3.1677	91.4	91.4	91.0	91.0	-0.4	-0.4
374	7	8	2.0248	-3.0251	93.0	93.0	91.5	93.0	-1.5	0.0
375	7	9	1.9424	-2.8824	94.5	94.5	93.3	94.5	-1.2	0.0
376	7	10	1.8601	-2.7398	94.9	94.9	94.5	94.9	-0.4	0.0
377	7	11	1.7777	-2.5972	95.4	95.4	95.0	95.4	-0.4	0.0
378	7	12	1.6954	-2.4545	95.8	95.8	95.4	95.8	-0.4	0.0
379	7	13	1.6130	-2.3119	96.2	96.2	95.8	96.2	-0.4	0.0
380	7	14	1.5307	-2.1693	96.7	96.7	96.2	96.7	-0.5	0.0
381	7	15	1.4483	-2.0266	97.3	97.3	96.8	97.3	-0.5	0.0
382	7	16	1.3660	-1.8840	97.9	97.9	97.4	97.9	-0.5	0.0
383	7	17	1.2836	-1.7413	98.5	98.5	98.0	98.5	-0.5	0.0
384	7	18	1.2013	-1.5987	99.6	99.6	98.6	99.6	-1.0	0.0
385	7	19	1.1189	-1.4561	100.7	100.7	99.5	100.7	-1.2	0.0
386	7	20	1.0366	-1.3134	101.5	101.5	100.3	101.5	-1.2	0.0
387	7	21	0.9542	-1.1708	101.5	101.5	100.5	101.5	-1.0	0.0
388	7	22	0.8719	-1.0282	100.7	100.7	100.1	100.7	-0.6	0.0
389	7	23	0.7895	-0.8855	99.2	99.2	98.9	99.1	-0.3	-0.1
390	7	24	0.7072	-0.7429	99.2	99.2	98.2	99.2	-1.0	0.0
391	7	25	0.6248	-0.6003	98.8	98.8	97.9	98.8	-0.9	0.0
392	7	26	0.5425	-0.4576	96.9	96.9	96.4	96.9	-0.5	0.0
393	7	27	0.4601	-0.3150	94.3	94.3	94.7	94.3	0.4	0.0
394	7	28	0.3778	-0.1724	93.1	93.1	94.3	93.1	1.2	0.0
395	7	29	0.2954	-0.0297	91.4	91.4	92.9	91.4	1.5	0.0
396	7	30	0.2131	0.1129	91.3	91.3	91.3	91.3	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
397	7	31	0.1307	0.2555	93.1	93.1	93.1	93.1	0.0	0.0
398	7	32	0.0484	0.3982	94.5	94.5	94.5	94.5	0.0	0.0
399	7	33	-0.0340	0.5408	94.9	94.9	94.9	94.9	0.0	0.0
400	7	34	-0.1163	0.6834	98.3	98.3	98.3	98.3	0.0	0.0
401	7	35	-0.1987	0.8261	99.0	99.0	99.0	99.0	0.0	0.0
402	7	36	-0.2810	0.9687	98.0	98.0	98.0	98.0	0.0	0.0
403	7	37	-0.3634	1.1113	97.4	97.4	97.4	97.4	0.0	0.0
404	7	38	-0.4457	1.2540	97.0	97.0	97.0	97.0	0.0	0.0
405	7	39	-0.5281	1.3966	96.7	96.7	96.7	96.7	0.0	0.0
406	7	40	-0.6104	1.5392	96.4	96.4	96.4	96.4	0.0	0.0
407	7	41	-0.6928	1.6819	95.9	95.9	95.9	95.9	0.0	0.0
408	7	42	-0.7751	1.8245	95.6	95.6	95.6	95.6	0.0	0.0
409	7	43	-0.8575	1.9671	95.3	95.3	95.3	95.3	0.0	0.0
410	7	44	-0.9398	2.1098	95.1	95.1	95.1	95.1	0.0	0.0
411	7	45	-1.0222	2.2524	94.9	94.9	94.9	94.9	0.0	0.0
412	7	46	-1.1045	2.3950	94.6	94.6	94.6	94.6	0.0	0.0
413	7	47	-1.1869	2.5377	94.3	94.3	94.3	94.3	0.0	0.0
414	7	48	-1.2692	2.6803	94.0	94.0	94.0	94.0	0.0	0.0
415	7	49	-1.3516	2.8229	93.7	93.7	93.7	93.7	0.0	0.0
416	7	50	-1.4339	2.9656	93.4	93.4	93.4	93.4	0.0	0.0
417	7	51	-1.5163	3.1082	91.6	91.6	91.6	91.6	0.0	0.0
418	7	52	-1.5986	3.2509	90.9	90.9	90.9	90.9	0.0	0.0
419	7	53	-1.6810	3.3935	90.6	90.6	90.6	90.6	0.0	0.0
420	7	54	-1.7633	3.5361	89.7	89.7	89.7	89.7	0.0	0.0
421	7	55	-1.8457	3.6788	87.5	87.5	87.5	87.5	0.0	0.0
422	7	56	-1.9280	3.8214	86.6	86.6	86.6	86.6	0.0	0.0
423	7	57	-2.0104	3.9640	86.3	86.3	86.3	86.3	0.0	0.0
424	7	58	-2.0927	4.1067	86.1	86.1	86.1	86.1	0.0	0.0
425	7	59	-2.1751	4.2493	86.6	86.6	86.6	86.6	0.0	0.0
426	7	60	-2.2574	4.3919	88.2	88.2	88.1	88.2	-0.1	0.0
427	7	61	-2.3398	4.5346	88.7	88.7	88.7	88.7	0.0	0.0
428	8	1	2.7438	-3.9411	86.3	86.3	87.7	86.1	1.4	-0.2
429	8	2	2.6615	-3.7985	86.6	86.6	86.3	86.3	-0.3	-0.3
430	8	3	2.5791	-3.6559	86.8	86.8	86.5	86.7	-0.3	-0.1
431	8	4	2.4968	-3.5132	87.5	87.5	86.8	87.2	-0.7	-0.3
432	8	5	2.4144	-3.3706	89.9	89.9	87.8	87.9	-2.1	-2.0
433	8	6	2.3321	-3.2280	91.0	91.0	90.2	90.2	-0.8	-0.8
434	8	7	2.2497	-3.0853	91.4	91.4	91.0	91.0	-0.4	-0.4
435	8	8	2.1674	-2.9427	92.5	92.5	91.5	92.5	-1.0	0.0
436	8	9	2.0850	-2.8001	94.3	94.3	92.8	94.3	-1.5	0.0
437	8	10	2.0027	-2.6574	94.8	94.8	94.4	94.8	-0.4	0.0
438	8	11	1.9203	-2.5148	95.3	95.3	94.9	95.3	-0.4	0.0
439	8	12	1.8380	-2.3722	95.6	95.6	95.2	95.6	-0.4	0.0
440	8	13	1.7556	-2.2295	95.7	95.7	95.3	95.7	-0.4	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
441	8	14	1.6733	-2.0869	95.8	95.8	95.4	95.8	-0.4	0.0
442	8	15	1.5909	-1.9443	95.7	95.7	95.3	95.7	-0.4	0.0
443	8	16	1.5086	-1.8016	95.2	95.2	94.9	95.2	-0.3	0.0
444	8	17	1.4262	-1.6590	94.6	94.6	94.4	94.6	-0.2	0.0
445	8	18	1.3439	-1.5164	94.2	94.2	93.9	94.0	-0.3	-0.2
446	8	19	1.2615	-1.3737	94.0	94.0	93.6	93.7	-0.4	-0.3
447	8	20	1.1792	-1.2311	93.7	93.7	93.3	93.4	-0.4	-0.3
448	8	21	1.0968	-1.0885	93.3	93.3	93.0	93.1	-0.3	-0.2
449	8	22	1.0145	-0.9458	92.6	92.6	92.3	92.6	-0.3	0.0
450	8	23	0.9321	-0.8032	92.4	92.4	91.9	92.4	-0.5	0.0
451	8	24	0.8498	-0.6606	91.8	91.8	91.5	91.8	-0.3	0.0
452	8	25	0.7674	-0.5179	91.1	91.1	90.9	91.1	-0.2	0.0
453	8	26	0.6851	-0.3753	88.9	88.9	89.1	88.9	0.2	0.0
454	8	27	0.6027	-0.2327	86.3	86.3	86.9	86.3	0.6	0.0
455	8	28	0.5204	-0.0900	83.7	83.7	85.3	83.7	1.6	0.0
456	8	29	0.4380	0.0526	90.1	90.1	90.1	90.1	0.0	0.0
457	8	30	0.3557	0.1952	87.6	87.6	87.6	87.6	0.0	0.0
458	8	31	0.2733	0.3379	86.2	86.2	86.2	86.2	0.0	0.0
459	8	32	0.1910	0.4805	87.2	87.2	87.2	87.2	0.0	0.0
460	8	33	0.1086	0.6231	89.3	89.3	89.3	89.3	0.0	0.0
461	8	34	0.0263	0.7658	91.0	91.0	91.0	91.0	0.0	0.0
462	8	35	-0.0561	0.9084	91.5	91.5	91.5	91.5	0.0	0.0
463	8	36	-0.1384	1.0511	91.3	91.3	91.3	91.3	0.0	0.0
464	8	37	-0.2208	1.1937	91.0	91.0	91.0	91.0	0.0	0.0
465	8	38	-0.3031	1.3363	90.9	90.9	90.9	90.9	0.0	0.0
466	8	39	-0.3855	1.4790	90.7	90.7	90.7	90.7	0.0	0.0
467	8	40	-0.4678	1.6216	90.8	90.8	90.8	90.8	0.0	0.0
468	8	41	-0.5502	1.7642	90.9	90.9	90.9	90.9	0.0	0.0
469	8	42	-0.6325	1.9069	90.7	90.7	90.7	90.7	0.0	0.0
470	8	43	-0.7149	2.0495	90.5	90.5	90.5	90.5	0.0	0.0
471	8	44	-0.7972	2.1921	90.3	90.3	90.3	90.3	0.0	0.0
472	8	45	-0.8796	2.3348	90.1	90.1	90.1	90.1	0.0	0.0
473	8	46	-0.9619	2.4774	89.9	89.9	89.9	89.9	0.0	0.0
474	8	47	-1.0443	2.6200	89.7	89.7	89.7	89.7	0.0	0.0
475	8	48	-1.1266	2.7627	89.5	89.5	89.5	89.5	0.0	0.0
476	8	49	-1.2090	2.9053	89.3	89.3	89.3	89.3	0.0	0.0
477	8	50	-1.2913	3.0479	89.1	89.1	89.1	89.1	0.0	0.0
478	8	51	-1.3737	3.1906	88.8	88.8	88.8	88.8	0.0	0.0
479	8	52	-1.4560	3.3332	88.6	88.6	88.6	88.6	0.0	0.0
480	8	53	-1.5384	3.4758	88.3	88.3	88.3	88.3	0.0	0.0
481	8	54	-1.6207	3.6185	87.8	87.8	87.8	87.8	0.0	0.0
482	8	55	-1.7031	3.7611	86.1	86.1	86.1	86.1	0.0	0.0
483	8	56	-1.7854	3.9037	84.6	84.6	84.6	84.6	0.0	0.0
484	8	57	-1.8678	4.0464	84.4	84.4	84.4	84.4	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
485	8	58	-1.9501	4.1890	84.2	84.2	84.2	84.2	0.0	0.0
486	8	59	-2.0325	4.3316	85.5	85.5	85.5	85.5	0.0	0.0
487	8	60	-2.1148	4.4743	87.2	87.2	87.2	87.2	0.0	0.0
488	8	61	-2.1972	4.6169	87.7	87.7	87.7	87.7	0.0	0.0
489	9	1	2.8865	-3.8588	86.3	86.3	87.7	86.0	1.4	-0.3
490	9	2	2.8041	-3.7162	86.5	86.5	86.2	86.2	-0.3	-0.3
491	9	3	2.7218	-3.5735	86.8	86.8	86.5	86.7	-0.3	-0.1
492	9	4	2.6394	-3.4309	87.0	87.0	86.7	87.0	-0.3	0.0
493	9	5	2.5571	-3.2883	89.5	89.5	87.3	87.8	-2.2	-1.7
494	9	6	2.4747	-3.1456	90.8	90.8	89.5	89.5	-1.3	-1.3
495	9	7	2.3924	-3.0030	91.2	91.2	90.8	90.8	-0.4	-0.4
496	9	8	2.3100	-2.8604	91.8	91.8	91.4	91.4	-0.4	-0.4
497	9	9	2.2277	-2.7177	93.9	93.9	91.6	93.9	-2.3	0.0
498	9	10	2.1453	-2.5751	93.3	93.3	93.0	93.3	-0.3	0.0
499	9	11	2.0630	-2.4325	91.9	91.9	91.7	91.9	-0.2	0.0
500	9	12	1.9806	-2.2898	91.4	91.4	91.2	91.4	-0.2	0.0
501	9	13	1.8983	-2.1472	91.1	91.1	90.8	90.8	-0.3	-0.3
502	9	14	1.8159	-2.0046	90.9	90.9	90.7	90.7	-0.2	-0.2
503	9	15	1.7336	-1.8619	90.7	90.7	90.5	90.5	-0.2	-0.2
504	9	16	1.6512	-1.7193	90.4	90.4	90.2	90.2	-0.2	-0.2
505	9	17	1.5689	-1.5766	90.1	90.1	89.9	89.9	-0.2	-0.2
506	9	18	1.4865	-1.4340	89.4	89.4	89.6	89.6	0.2	0.2
507	9	19	1.4042	-1.2914	89.0	89.0	88.8	88.8	-0.2	-0.2
508	9	20	1.3218	-1.1487	88.4	88.4	88.2	88.2	-0.2	-0.2
509	9	21	1.2395	-1.0061	87.6	87.6	87.8	87.8	0.2	0.2
510	9	22	1.1571	-0.8635	87.0	87.0	86.8	87.0	-0.2	0.0
511	9	23	1.0748	-0.7208	86.3	86.3	86.3	86.3	0.0	0.0
512	9	24	0.9924	-0.5782	85.6	85.6	85.6	85.6	0.0	0.0
513	9	25	0.9101	-0.4356	84.7	84.7	84.9	84.7	0.2	0.0
514	9	26	0.8277	-0.2929	83.1	83.1	83.4	83.1	0.3	0.0
515	9	27	0.7454	-0.1503	80.7	80.7	81.5	80.7	0.8	0.0
516	9	28	0.6630	-0.0077	78.7	78.7	79.7	78.7	1.0	0.0
517	9	29	0.5807	0.1350	76.4	76.4	77.5	77.2	1.1	0.8
518	9	30	0.4983	0.2776	76.3	76.3	76.3	76.3	0.0	0.0
519	9	31	0.4160	0.4202	77.6	77.6	77.6	77.6	0.0	0.0
520	9	32	0.3336	0.5629	80.4	80.4	80.4	80.4	0.0	0.0
521	9	33	0.2513	0.7055	83.0	83.0	83.0	83.0	0.0	0.0
522	9	34	0.1689	0.8481	84.7	84.7	84.7	84.7	0.0	0.0
523	9	35	0.0866	0.9908	85.1	85.1	85.1	85.1	0.0	0.0
524	9	36	0.0042	1.1334	85.4	85.4	85.4	85.4	0.0	0.0
525	9	37	-0.0781	1.2760	85.5	85.5	85.5	85.5	0.0	0.0
526	9	38	-0.1605	1.4187	85.5	85.5	85.5	85.5	0.0	0.0
527	9	39	-0.2428	1.5613	85.5	85.5	85.5	85.5	0.0	0.0
528	9	40	-0.3252	1.7039	85.8	85.8	85.8	85.8	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
529	9	41	-0.4075	1.8466	86.1	86.1	86.1	86.1	0.0	0.0
530	9	42	-0.4899	1.9892	86.2	86.2	86.2	86.2	0.0	0.0
531	9	43	-0.5722	2.1318	86.1	86.1	86.1	86.1	0.0	0.0
532	9	44	-0.6546	2.2745	86.3	86.3	86.3	86.3	0.0	0.0
533	9	45	-0.7369	2.4171	86.2	86.2	86.2	86.2	0.0	0.0
534	9	46	-0.8193	2.5597	86.1	86.1	86.1	86.1	0.0	0.0
535	9	47	-0.9016	2.7024	86.4	86.4	86.4	86.4	0.0	0.0
536	9	48	-0.9840	2.8450	86.3	86.3	86.3	86.3	0.0	0.0
537	9	49	-1.0663	2.9876	86.2	86.2	86.2	86.2	0.0	0.0
538	9	50	-1.1487	3.1303	86.0	86.0	86.0	86.0	0.0	0.0
539	9	51	-1.2310	3.2729	85.9	85.9	85.9	85.9	0.0	0.0
540	9	52	-1.3134	3.4156	85.8	85.8	85.8	85.8	0.0	0.0
541	9	53	-1.3957	3.5582	85.6	85.6	85.6	85.6	0.0	0.0
542	9	54	-1.4781	3.7008	85.3	85.3	85.3	85.3	0.0	0.0
543	9	55	-1.5604	3.8435	84.1	84.1	84.2	84.1	0.1	0.0
544	9	56	-1.6428	3.9861	82.0	82.0	82.0	82.0	0.0	0.0
545	9	57	-1.7251	4.1287	81.9	81.9	81.9	81.9	0.0	0.0
546	9	58	-1.8075	4.2714	81.9	81.9	81.9	81.9	0.0	0.0
547	9	59	-1.8898	4.4140	83.7	83.7	83.7	83.7	0.0	0.0
548	9	60	-1.9722	4.5566	85.0	85.0	85.0	85.0	0.0	0.0
549	9	61	-2.0545	4.6993	85.5	85.5	85.5	85.5	0.0	0.0
550	10	1	3.0291	-3.7764	86.0	86.0	87.7	85.8	1.7	-0.2
551	10	2	2.9468	-3.6338	86.4	86.4	86.2	86.2	-0.2	-0.2
552	10	3	2.8644	-3.4912	86.8	86.8	86.5	86.6	-0.3	-0.2
553	10	4	2.7821	-3.3485	86.9	86.9	86.6	86.9	-0.3	0.0
554	10	5	2.6997	-3.2059	89.1	89.1	87.2	87.7	-1.9	-1.4
555	10	6	2.6174	-3.0633	90.7	90.7	89.2	89.2	-1.5	-1.5
556	10	7	2.5350	-2.9206	90.8	90.8	90.4	90.4	-0.4	-0.4
557	10	8	2.4527	-2.7780	90.5	90.5	90.1	90.1	-0.4	-0.4
558	10	9	2.3703	-2.6354	89.9	89.9	89.5	89.9	-0.4	0.0
559	10	10	2.2880	-2.4927	89.0	89.0	88.8	88.8	-0.2	-0.2
560	10	11	2.2056	-2.3501	88.1	88.1	87.9	87.9	-0.2	-0.2
561	10	12	2.1233	-2.2075	87.8	87.8	87.6	87.6	-0.2	-0.2
562	10	13	2.0409	-2.0648	87.6	87.6	87.4	87.4	-0.2	-0.2
563	10	14	1.9586	-1.9222	87.3	87.3	87.2	87.2	-0.1	-0.1
564	10	15	1.8762	-1.7796	86.6	86.6	86.4	86.4	-0.2	-0.2
565	10	16	1.7939	-1.6369	86.1	86.1	86.2	86.2	0.1	0.1
566	10	17	1.7115	-1.4943	85.8	85.8	85.6	85.6	-0.2	-0.2
567	10	18	1.6292	-1.3517	85.0	85.0	85.2	85.2	0.2	0.2
568	10	19	1.5468	-1.2090	84.1	84.1	84.3	84.3	0.2	0.2
569	10	20	1.4645	-1.0664	83.4	83.4	83.4	83.5	0.0	0.1
570	10	21	1.3821	-0.9238	82.9	82.9	82.8	82.9	-0.1	0.0
571	10	22	1.2998	-0.7811	82.4	82.4	82.3	82.4	-0.1	0.0
572	10	23	1.2174	-0.6385	81.6	81.6	81.8	81.6	0.2	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax: No Project RSA-5	2018 Lmax: Full Use of the Shifted Runway RSA-2	2018 Lmax: With Special Area Use Procedures RSA-3	Change with: Full Use of Shift vs No Project	Change with: Special Use Area Procedures vs No Project
573	10	24	1.1351	-0.4959	80.8	80.8	81.0	80.8	0.2	0.0
574	10	25	1.0527	-0.3532	79.8	79.8	80.2	79.8	0.4	0.0
575	10	26	0.9704	-0.2106	78.7	78.7	79.1	78.7	0.4	0.0
576	10	27	0.8880	-0.0680	76.7	76.7	77.2	77.0	0.5	0.3
577	10	28	0.8057	0.0747	74.6	74.6	75.2	75.2	0.6	0.6
578	10	29	0.7233	0.2173	73.0	73.0	73.9	73.9	0.9	0.9
579	10	30	0.6410	0.3599	73.0	73.0	73.0	73.0	0.0	0.0
580	10	31	0.5586	0.5026	74.5	74.5	74.5	74.5	0.0	0.0
581	10	32	0.4763	0.6452	76.6	76.6	76.6	76.6	0.0	0.0
582	10	33	0.3939	0.7878	78.7	78.7	78.7	78.7	0.0	0.0
583	10	34	0.3116	0.9305	79.9	79.9	79.9	79.9	0.0	0.0
584	10	35	0.2292	1.0731	80.3	80.3	80.3	80.3	0.0	0.0
585	10	36	0.1469	1.2158	80.7	80.7	80.7	80.7	0.0	0.0
586	10	37	0.0645	1.3584	81.0	81.0	81.0	81.0	0.0	0.0
587	10	38	-0.0178	1.5010	81.1	81.1	81.1	81.1	0.0	0.0
588	10	39	-0.1002	1.6437	81.1	81.1	81.1	81.1	0.0	0.0
589	10	40	-0.1825	1.7863	81.1	81.1	81.1	81.1	0.0	0.0
590	10	41	-0.2649	1.9289	81.4	81.4	81.4	81.4	0.0	0.0
591	10	42	-0.3472	2.0716	81.7	81.7	81.7	81.7	0.0	0.0
592	10	43	-0.4296	2.2142	81.9	81.9	81.9	81.9	0.0	0.0
593	10	44	-0.5119	2.3568	82.3	82.3	82.3	82.3	0.0	0.0
594	10	45	-0.5943	2.4995	81.9	81.9	81.9	81.9	0.0	0.0
595	10	46	-0.6766	2.6421	82.1	82.1	82.1	82.1	0.0	0.0
596	10	47	-0.7590	2.7847	82.3	82.3	82.3	82.3	0.0	0.0
597	10	48	-0.8413	2.9274	82.4	82.4	82.4	82.4	0.0	0.0
598	10	49	-0.9237	3.0700	82.0	82.0	82.0	82.0	0.0	0.0
599	10	50	-1.0060	3.2126	82.2	82.2	82.2	82.2	0.0	0.0
600	10	51	-1.0884	3.3553	82.4	82.4	82.4	82.4	0.0	0.0
601	10	52	-1.1707	3.4979	82.6	82.6	82.6	82.6	0.0	0.0
602	10	53	-1.2531	3.6405	82.9	82.9	82.9	82.9	0.0	0.0
603	10	54	-1.3354	3.7832	82.5	82.5	82.5	82.5	0.0	0.0
604	10	55	-1.4178	3.9258	81.1	81.1	81.1	81.1	0.0	0.0
605	10	56	-1.5001	4.0684	79.4	79.4	79.4	79.4	0.0	0.0
606	10	57	-1.5825	4.2111	79.3	79.3	79.3	79.3	0.0	0.0
607	10	58	-1.6648	4.3537	80.2	80.2	80.2	80.2	0.0	0.0
608	10	59	-1.7472	4.4963	81.6	81.6	81.6	81.6	0.0	0.0
609	10	60	-1.8295	4.6390	82.5	82.5	82.5	82.5	0.0	0.0
610	10	61	-1.9119	4.7816	82.9	82.9	82.9	82.9	0.0	0.0
611	11	1	3.1717	-3.6941	86.0	86.0	87.8	86.0	1.8	0.0
612	11	2	3.0894	-3.5515	86.4	86.4	86.1	86.1	-0.3	-0.3
613	11	3	3.0070	-3.4088	86.7	86.7	86.4	86.5	-0.3	-0.2
614	11	4	2.9247	-3.2662	86.8	86.8	86.5	86.8	-0.3	0.0
615	11	5	2.8423	-3.1236	87.8	87.8	86.4	86.6	-1.4	-1.2
616	11	6	2.7600	-2.9809	89.0	89.0	87.3	87.3	-1.7	-1.7

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	**I**	**J**	**X (nm)**	**Y (nm)**	**Existing 2002/3 (Lmax)**	**No Project RSA-5**	**Full Use of the Shifted Runway RSA-2**	**With Special Area Use Procedures RSA-3**	**Full Use of Shift vs No Project**	**Special Use Area Procedures vs No Project**
617	11	7	2.6776	-2.8383	88.6	88.6	88.2	88.2	-0.4	-0.4
618	11	8	2.5953	-2.6957	87.9	87.9	87.6	87.6	-0.3	-0.3
619	11	9	2.5129	-2.5530	87.0	87.0	86.8	86.8	-0.2	-0.2
620	11	10	2.4306	-2.4104	86.1	86.1	86.0	86.0	-0.1	-0.1
621	11	11	2.3482	-2.2678	85.2	85.2	85.1	85.1	-0.1	-0.1
622	11	12	2.2659	-2.1251	84.3	84.3	84.1	84.1	-0.2	-0.2
623	11	13	2.1835	-1.9825	83.7	83.7	84.0	84.0	0.3	0.3
624	11	14	2.1012	-1.8399	83.0	83.0	83.1	83.1	0.1	0.1
625	11	15	2.0188	-1.6972	82.7	82.7	82.4	82.4	-0.3	-0.3
626	11	16	1.9365	-1.5546	82.1	82.1	82.2	82.2	0.1	0.1
627	11	17	1.8541	-1.4119	81.3	81.3	81.5	81.5	0.2	0.2
628	11	18	1.7718	-1.2693	80.6	80.6	80.8	80.8	0.2	0.2
629	11	19	1.6894	-1.1267	79.9	79.9	80.1	80.1	0.2	0.2
630	11	20	1.6071	-0.9840	79.2	79.2	79.4	79.4	0.2	0.2
631	11	21	1.5247	-0.8414	78.7	78.7	78.7	78.7	0.0	0.0
632	11	22	1.4424	-0.6988	78.1	78.1	78.1	78.1	0.0	0.0
633	11	23	1.3600	-0.5561	77.4	77.4	77.6	77.4	0.2	0.0
634	11	24	1.2777	-0.4135	76.4	76.4	76.9	76.6	0.5	0.2
635	11	25	1.1953	-0.2709	77.1	77.1	77.1	77.1	0.0	0.0
636	11	26	1.1130	-0.1282	75.4	75.4	75.4	75.4	0.0	0.0
637	11	27	1.0306	0.0144	73.7	73.7	74.3	74.3	0.6	0.6
638	11	28	0.9483	0.1570	72.4	72.4	73.0	73.0	0.6	0.6
639	11	29	0.8659	0.2997	70.9	70.9	71.5	71.5	0.6	0.6
640	11	30	0.7836	0.4423	70.7	70.7	70.7	70.7	0.0	0.0
641	11	31	0.7012	0.5849	72.4	72.4	72.4	72.4	0.0	0.0
642	11	32	0.6189	0.7276	73.7	73.7	73.7	73.7	0.0	0.0
643	11	33	0.5365	0.8702	74.8	74.8	74.8	74.8	0.0	0.0
644	11	34	0.4542	1.0128	75.6	75.6	75.6	75.6	0.0	0.0
645	11	35	0.3718	1.1555	76.0	76.0	76.0	76.0	0.0	0.0
646	11	36	0.2895	1.2981	76.3	76.3	76.3	76.3	0.0	0.0
647	11	37	0.2071	1.4407	76.9	76.9	76.9	76.9	0.0	0.0
648	11	38	0.1248	1.5834	77.2	77.2	77.2	77.2	0.0	0.0
649	11	39	0.0424	1.7260	77.2	77.2	77.2	77.2	0.0	0.0
650	11	40	-0.0399	1.8686	77.4	77.4	77.4	77.4	0.0	0.0
651	11	41	-0.1223	2.0113	77.7	77.7	77.7	77.7	0.0	0.0
652	11	42	-0.2046	2.1539	77.9	77.9	77.9	77.9	0.0	0.0
653	11	43	-0.2870	2.2965	78.2	78.2	78.2	78.2	0.0	0.0
654	11	44	-0.3693	2.4392	78.4	78.4	78.4	78.4	0.0	0.0
655	11	45	-0.4517	2.5818	78.2	78.2	78.2	78.2	0.0	0.0
656	11	46	-0.5340	2.7244	78.2	78.2	78.2	78.2	0.0	0.0
657	11	47	-0.6164	2.8671	78.4	78.4	78.4	78.4	0.0	0.0
658	11	48	-0.6987	3.0097	78.5	78.5	78.5	78.5	0.0	0.0
659	11	49	-0.7811	3.1523	78.1	78.1	78.1	78.1	0.0	0.0
660	11	50	-0.8634	3.2950	78.3	78.3	78.3	78.3	0.0	0.0

Table C-10
King County International Airport EA
Lmax Grid Point Analysis (1,000 grid)

						2018 Lmax			Change with	
Site	**I**	**J**	**X (nm)**	**Y (nm)**	**Existing 2002/3 (Lmax)**	**No Project RSA-5**	**Full Use of the Shifted Runway RSA-2**	**With Special Area Use Procedures RSA-3**	**Full Use of Shift vs No Project**	**Special Use Area Procedures vs No Project**
661	11	51	-0.9458	3.4376	78.5	78.5	78.5	78.5	0.0	0.0
662	11	52	-1.0281	3.5803	78.7	78.7	78.7	78.7	0.0	0.0
663	11	53	-1.1105	3.7229	78.9	78.9	78.9	78.9	0.0	0.0
664	11	54	-1.1928	3.8655	78.6	78.6	78.6	78.6	0.0	0.0
665	11	55	-1.2752	4.0082	77.7	77.7	77.7	77.7	0.0	0.0
666	11	56	-1.3575	4.1508	76.3	76.3	76.3	76.3	0.0	0.0
667	11	57	-1.4399	4.2934	77.1	77.1	77.1	77.1	0.0	0.0
668	11	58	-1.5222	4.4361	78.4	78.4	78.4	78.4	0.0	0.0
669	11	59	-1.6046	4.5787	79.5	79.5	79.5	79.5	0.0	0.0
670	11	60	-1.6869	4.7213	80.2	80.2	80.2	80.2	0.0	0.0
671	11	61	-1.7693	4.8640	80.4	80.4	80.4	80.4	0.0	0.0
SP	1	1	-0.5832	0.7732	110.3	110.3	110.3	110.3	0.0	0.0

Prepared December 31, 2003

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

						2018 DNL Level			Change with	
					Existing		Full Use of Shifted Rwy	Vith Special Are Use Procedures	Full Use of Shift vs	Special Use Area Procedures vs
Site	I	J	X (nm)	Y (nm)	2002/3 (DNL)	No Project RSA-5	RSA-2	RSA-3	No Project	No Project
1	1	1	-0.9119	0.4143	60.4	59.6	59.6	59.6	0.0	0.0
2	1	2	-0.9530	0.4856	60.3	59.5	59.6	59.5	0.1	0.0
3	1	3	-0.9942	0.5568	60.0	59.1	59.4	59.1	0.3	0.0
4	1	4	-1.0353	0.6281	59.7	58.6	59.0	58.7	0.4	0.1
5	1	5	-1.0765	0.6994	59.3	58.2	58.7	58.3	0.5	0.1
6	1	6	-1.1176	0.7707	59.0	57.9	58.3	57.9	0.4	0.0
7	1	7	-1.1588	0.8419	58.7	57.5	58.0	57.6	0.5	0.1
8	1	8	-1.1999	0.9132	58.4	57.3	57.6	57.3	0.3	0.0
9	1	9	-1.2411	0.9845	58.2	57.0	57.3	57.1	0.3	0.1
10	1	10	-1.2822	1.0558	58.0	56.8	57.1	56.9	0.3	0.1
11	1	11	-1.3234	1.1270	57.8	56.7	56.9	56.7	0.2	0.0
12	1	12	-1.3645	1.1983	57.7	56.6	56.7	56.6	0.1	0.0
13	1	13	-1.4057	1.2696	57.6	56.5	56.6	56.5	0.1	0.0
14	1	14	-1.4468	1.3409	57.4	56.4	56.5	56.4	0.1	0.0
15	1	15	-1.4880	1.4121	57.2	56.3	56.4	56.3	0.1	0.0
16	1	16	-1.5291	1.4834	57.1	56.2	56.3	56.2	0.1	0.0
17	1	17	-1.5703	1.5547	57.1	56.1	56.2	56.1	0.1	0.0
18	1	18	-1.6114	1.6260	57.0	56.1	56.1	56.1	0.0	0.0
19	1	19	-1.6526	1.6972	57.0	56.1	56.1	56.1	0.0	0.0
20	1	20	-1.6937	1.7685	56.9	56.0	56.1	56.0	0.1	0.0
21	1	21	-1.7349	1.8398	56.9	56.0	56.0	56.0	0.0	0.0
22	1	22	-1.7760	1.9111	56.9	56.0	56.0	56.0	0.0	0.0
23	1	23	-1.8172	1.9823	56.9	56.0	56.0	56.0	0.0	0.0
24	1	24	-1.8583	2.0536	56.9	56.0	56.0	56.0	0.0	0.0
25	1	25	-1.8995	2.1249	56.8	55.9	55.9	55.9	0.0	0.0
26	1	26	-1.9406	2.1961	56.7	55.8	55.8	55.8	0.0	0.0
27	1	27	-1.9818	2.2674	56.6	55.6	55.6	55.6	0.0	0.0
28	1	28	-2.0229	2.3387	56.4	55.5	55.5	55.5	0.0	0.0
29	2	1	-0.8406	0.4554	63.0	62.2	62.2	62.2	0.0	0.0
30	2	2	-0.8818	0.5267	62.8	62.0	62.1	62.0	0.1	0.0
31	2	3	-0.9229	0.5980	62.2	61.3	61.6	61.4	0.3	0.1
32	2	4	-0.9641	0.6693	61.7	60.7	61.1	60.7	0.4	0.0
33	2	5	-1.0052	0.7405	61.3	60.1	60.6	60.2	0.5	0.1
34	2	6	-1.0464	0.8118	60.8	59.6	60.1	59.7	0.5	0.1
35	2	7	-1.0875	0.8831	60.5	59.2	59.6	59.3	0.4	0.1
36	2	8	-1.1287	0.9544	60.2	58.9	59.3	59.0	0.4	0.1
37	2	9	-1.1698	1.0256	59.9	58.7	58.9	58.7	0.2	0.0
38	2	10	-1.2110	1.0969	59.7	58.5	58.7	58.5	0.2	0.0
39	2	11	-1.2521	1.1682	59.6	58.4	58.5	58.4	0.1	0.0
40	2	12	-1.2933	1.2395	59.4	58.3	58.4	58.3	0.1	0.0
41	2	13	-1.3344	1.3107	59.3	58.2	58.2	58.2	0.0	0.0
42	2	14	-1.3756	1.3820	59.1	58.1	58.1	58.1	0.0	0.0
43	2	15	-1.4167	1.4533	58.9	58.0	58.0	58.0	0.0	0.0
44	2	16	-1.4579	1.5246	58.8	57.8	57.9	57.8	0.1	0.0
45	2	17	-1.4990	1.5958	58.7	57.8	57.8	57.8	0.0	0.0
46	2	18	-1.5402	1.6671	58.6	57.7	57.7	57.7	0.0	0.0
47	2	19	-1.5813	1.7384	58.5	57.6	57.7	57.6	0.1	0.0
48	2	20	-1.6225	1.8097	58.5	57.6	57.6	57.6	0.0	0.0
49	2	21	-1.6636	1.8809	58.4	57.6	57.6	57.6	0.0	0.0
50	2	22	-1.7048	1.9522	58.4	57.5	57.5	57.5	0.0	0.0
51	2	23	-1.7459	2.0235	58.3	57.5	57.5	57.5	0.0	0.0
52	2	24	-1.7871	2.0947	58.2	57.4	57.4	57.4	0.0	0.0
53	2	25	-1.8282	2.1660	58.2	57.4	57.4	57.4	0.0	0.0
54	2	26	-1.8694	2.2373	58.0	57.2	57.2	57.2	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level Vith Special Arc Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
55	2	27	-1.9105	2.3086	57.8	57.0	57.0	57.0	0.0	0.0
56	2	28	-1.9517	2.3798	57.7	56.9	56.9	56.9	0.0	0.0
57	3	1	-0.7694	0.4966	66.6	66.0	66.0	66.0	0.0	0.0
58	3	2	-0.8105	0.5679	66.1	65.5	65.7	65.5	0.2	0.0
59	3	3	-0.8517	0.6391	65.0	64.1	64.5	64.2	0.4	0.1
60	3	4	-0.8928	0.7104	64.1	63.1	63.6	63.1	0.5	0.0
61	3	5	-0.9340	0.7817	63.4	62.2	62.7	62.3	0.5	0.1
62	3	6	-0.9751	0.8530	62.8	61.5	62.0	61.6	0.5	0.1
63	3	7	-1.0163	0.9242	62.4	61.1	61.5	61.1	0.4	0.0
64	3	8	-1.0574	0.9955	62.1	60.8	61.1	60.8	0.3	0.0
65	3	9	-1.0986	1.0668	61.8	60.5	60.8	60.6	0.3	0.1
66	3	10	-1.1397	1.1381	61.6	60.4	60.5	60.4	0.1	0.0
67	3	11	-1.1809	1.2093	61.5	60.2	60.3	60.3	0.1	0.1
68	3	12	-1.2220	1.2806	61.3	60.1	60.2	60.1	0.1	0.0
69	3	13	-1.2632	1.3519	61.2	60.0	60.1	60.0	0.1	0.0
70	3	14	-1.3043	1.4232	61.0	59.9	59.9	59.9	0.0	0.0
71	3	15	-1.3455	1.4944	60.7	59.8	59.8	59.8	0.0	0.0
72	3	16	-1.3866	1.5657	60.5	59.6	59.6	59.6	0.0	0.0
73	3	17	-1.4278	1.6370	60.3	59.5	59.5	59.5	0.0	0.0
74	3	18	-1.4689	1.7083	60.2	59.4	59.4	59.4	0.0	0.0
75	3	19	-1.5101	1.7795	60.1	59.3	59.3	59.3	0.0	0.0
76	3	20	-1.5512	1.8508	60.0	59.2	59.2	59.2	0.0	0.0
77	3	21	-1.5924	1.9221	59.9	59.1	59.1	59.1	0.0	0.0
78	3	22	-1.6335	1.9934	59.8	59.1	59.1	59.1	0.0	0.0
79	3	23	-1.6747	2.0646	59.7	59.0	59.0	59.0	0.0	0.0
80	3	24	-1.7158	2.1359	59.6	58.9	58.9	58.9	0.0	0.0
81	3	25	-1.7570	2.2072	59.5	58.8	58.8	58.8	0.0	0.0
82	3	26	-1.7981	2.2784	59.3	58.6	58.6	58.6	0.0	0.0
83	3	27	-1.8393	2.3497	59.1	58.4	58.4	58.4	0.0	0.0
84	3	28	-1.8804	2.4210	58.9	58.2	58.2	58.2	0.0	0.0
85	4	1	-0.6981	0.5377	72.6	72.3	72.3	72.3	0.0	0.0
86	4	2	-0.7392	0.6090	71.2	70.8	70.9	70.8	0.1	0.0
87	4	3	-0.7804	0.6803	68.6	67.9	68.4	68.0	0.5	0.1
88	4	4	-0.8215	0.7516	66.6	65.6	66.4	65.7	0.8	0.1
89	4	5	-0.8627	0.8228	65.5	64.3	65.0	64.4	0.7	0.1
90	4	6	-0.9038	0.8941	64.9	63.5	64.0	63.6	0.5	0.1
91	4	7	-0.9450	0.9654	64.4	63.0	63.4	63.1	0.4	0.1
92	4	8	-0.9861	1.0367	64.1	62.7	63.0	62.8	0.3	0.1
93	4	9	-1.0273	1.1079	63.9	62.6	62.7	62.6	0.1	0.0
94	4	10	-1.0684	1.1792	63.7	62.4	62.5	62.4	0.1	0.0
95	4	11	-1.1096	1.2505	63.5	62.3	62.3	62.3	0.0	0.0
96	4	12	-1.1507	1.3218	63.3	62.1	62.1	62.1	0.0	0.0
97	4	13	-1.1919	1.3930	63.1	62.0	62.0	62.0	0.0	0.0
98	4	14	-1.2330	1.4643	62.8	61.8	61.8	61.8	0.0	0.0
99	4	15	-1.2742	1.5356	62.4	61.6	61.6	61.6	0.0	0.0
100	4	16	-1.3153	1.6069	62.2	61.4	61.4	61.4	0.0	0.0
101	4	17	-1.3565	1.6781	61.9	61.2	61.2	61.2	0.0	0.0
102	4	18	-1.3976	1.7494	61.7	61.1	61.1	61.1	0.0	0.0
103	4	19	-1.4388	1.8207	61.6	60.9	60.9	60.9	0.0	0.0
104	4	20	-1.4799	1.8920	61.4	60.8	60.8	60.8	0.0	0.0
105	4	21	-1.5211	1.9632	61.2	60.7	60.7	60.7	0.0	0.0
106	4	22	-1.5622	2.0345	61.1	60.6	60.6	60.6	0.0	0.0
107	4	23	-1.6034	2.1058	61.0	60.5	60.5	60.5	0.0	0.0
108	4	24	-1.6445	2.1770	60.8	60.4	60.4	60.4	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

						2018 DNL Level			Change with	
					Existing		Full Use of Vith Special Are		Full Use of	Special Use Area
			X	Y	2002/3	No Project	Shifted Rwy Use Procedures		Shift vs	Procedures vs
Site	I	J	(nm)	(nm)	(DNL)	RSA-5	RSA-2	RSA-3	No Project	No Project
109	4	25	-1.6857	2.2483	60.7	60.2	60.2	60.2	0.0	0.0
110	4	26	-1.7268	2.3196	60.5	60.0	60.0	60.0	0.0	0.0
111	4	27	-1.7680	2.3909	60.2	59.7	59.7	59.7	0.0	0.0
112	4	28	-1.8091	2.4621	60.1	59.6	59.6	59.6	0.0	0.0
113	5	1	-0.6268	0.5789	85.0	85.0	85.0	85.0	0.0	0.0
114	5	2	-0.6680	0.6502	79.4	79.3	79.4	79.3	0.1	0.0
115	5	3	-0.7091	0.7214	71.5	70.9	71.7	71.0	0.8	0.1
116	5	4	-0.7503	0.7927	68.6	67.5	68.7	67.6	1.2	0.1
117	5	5	-0.7914	0.8640	67.4	66.1	67.0	66.2	0.9	0.1
118	5	6	-0.8326	0.9353	66.8	65.4	66.0	65.5	0.6	0.1
119	5	7	-0.8737	1.0065	66.4	65.1	65.3	65.1	0.2	0.0
120	5	8	-0.9149	1.0778	66.1	64.8	64.9	64.8	0.1	0.0
121	5	9	-0.9560	1.1491	65.8	64.6	64.7	64.6	0.1	0.0
122	5	10	-0.9972	1.2204	65.6	64.4	64.5	64.4	0.1	0.0
123	5	11	-1.0383	1.2916	65.3	64.2	64.2	64.2	0.0	0.0
124	5	12	-1.0795	1.3629	65.1	64.0	64.0	64.0	0.0	0.0
125	5	13	-1.1206	1.4342	64.8	63.8	63.8	63.8	0.0	0.0
126	5	14	-1.1618	1.5055	64.4	63.6	63.6	63.6	0.0	0.0
127	5	15	-1.2029	1.5767	64.0	63.3	63.3	63.3	0.0	0.0
128	5	16	-1.2441	1.6480	63.7	63.1	63.1	63.1	0.0	0.0
129	5	17	-1.2852	1.7193	63.4	62.8	62.9	62.8	0.1	0.0
130	5	18	-1.3264	1.7906	63.2	62.7	62.7	62.7	0.0	0.0
131	5	19	-1.3675	1.8618	63.0	62.5	62.5	62.5	0.0	0.0
132	5	20	-1.4087	1.9331	62.8	62.3	62.4	62.3	0.1	0.0
133	5	21	-1.4498	2.0044	62.6	62.2	62.2	62.2	0.0	0.0
134	5	22	-1.4910	2.0757	62.4	62.1	62.1	62.1	0.0	0.0
135	5	23	-1.5321	2.1469	62.2	62.0	62.0	62.0	0.0	0.0
136	5	24	-1.5733	2.2182	62.1	61.8	61.8	61.8	0.0	0.0
137	5	25	-1.6144	2.2895	61.9	61.7	61.7	61.7	0.0	0.0
138	5	26	-1.6556	2.3607	61.7	61.4	61.5	61.4	0.1	0.0
139	5	27	-1.6967	2.4320	61.5	61.2	61.2	61.2	0.0	0.0
140	5	28	-1.7379	2.5033	61.3	61.1	61.1	61.1	0.0	0.0
141	6	1	-0.5555	0.6200	86.9	86.8	86.9	86.8	0.1	0.0
142	6	2	-0.5967	0.6913	74.0	73.0	75.2	73.2	2.2	0.2
143	6	3	-0.6378	0.7626	70.9	69.8	73.2	70.2	3.4	0.4
144	6	4	-0.6790	0.8339	69.5	68.4	70.5	68.6	2.1	0.2
145	6	5	-0.7201	0.9051	68.9	67.8	68.6	67.9	0.8	0.1
146	6	6	-0.7613	0.9764	68.6	67.5	67.6	67.5	0.1	0.0
147	6	7	-0.8024	1.0477	68.2	67.2	67.2	67.2	0.0	0.0
148	6	8	-0.8436	1.1190	67.9	66.9	66.9	66.9	0.0	0.0
149	6	9	-0.8847	1.1902	67.6	66.6	66.6	66.6	0.0	0.0
150	6	10	-0.9259	1.2615	67.3	66.4	66.4	66.4	0.0	0.0
151	6	11	-0.9670	1.3328	67.0	66.1	66.1	66.1	0.0	0.0
152	6	12	-1.0082	1.4041	66.7	65.9	65.9	65.9	0.0	0.0
153	6	13	-1.0493	1.4753	66.4	65.6	65.6	65.6	0.0	0.0
154	6	14	-1.0905	1.5466	66.0	65.4	65.4	65.4	0.0	0.0
155	6	15	-1.1316	1.6179	65.6	65.1	65.1	65.1	0.0	0.0
156	6	16	-1.1728	1.6892	65.2	64.9	64.9	64.9	0.0	0.0
157	6	17	-1.2139	1.7604	65.0	64.6	64.6	64.6	0.0	0.0
158	6	18	-1.2551	1.8317	64.7	64.4	64.4	64.4	0.0	0.0
159	6	19	-1.2962	1.9030	64.5	64.3	64.3	64.3	0.0	0.0
160	6	20	-1.3374	1.9743	64.3	64.1	64.1	64.1	0.0	0.0
161	6	21	-1.3785	2.0455	64.0	63.9	63.9	63.9	0.0	0.0
162	6	22	-1.4197	2.1168	63.8	63.8	63.8	63.8	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level Vith Special Are Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
163	6	23	-1.4608	2.1881	63.7	63.6	63.6	63.6	0.0	0.0
164	6	24	-1.5020	2.2593	63.5	63.4	63.4	63.4	0.0	0.0
165	6	25	-1.5431	2.3306	63.3	63.2	63.2	63.2	0.0	0.0
166	6	26	-1.5843	2.4019	63.1	63.0	63.0	63.0	0.0	0.0
167	6	27	-1.6254	2.4732	62.8	62.7	62.7	62.7	0.0	0.0
168	6	28	-1.6666	2.5444	62.6	62.5	62.5	62.5	0.0	0.0
169	7	1	-0.4843	0.6612	81.9	80.3	84.0	80.6	3.7	0.3
170	7	2	-0.5254	0.7325	74.0	73.2	82.7	74.8	9.5	1.6
171	7	3	-0.5666	0.8037	71.9	71.1	77.7	72.2	6.6	1.1
172	7	4	-0.6077	0.8750	71.3	70.6	71.1	70.7	0.5	0.1
173	7	5	-0.6489	0.9463	70.9	70.3	70.3	70.3	0.0	0.0
174	7	6	-0.6900	1.0176	70.6	69.9	70.0	70.0	0.1	0.1
175	7	7	-0.7312	1.0888	70.2	69.6	69.6	69.6	0.0	0.0
176	7	8	-0.7723	1.1601	69.8	69.3	69.3	69.3	0.0	0.0
177	7	9	-0.8135	1.2314	69.5	69.0	69.0	69.0	0.0	0.0
178	7	10	-0.8546	1.3027	69.2	68.7	68.7	68.7	0.0	0.0
179	7	11	-0.8958	1.3739	68.8	68.4	68.4	68.4	0.0	0.0
180	7	12	-0.9369	1.4452	68.5	68.1	68.1	68.1	0.0	0.0
181	7	13	-0.9781	1.5165	68.2	67.8	67.8	67.8	0.0	0.0
182	7	14	-1.0192	1.5878	67.8	67.5	67.5	67.5	0.0	0.0
183	7	15	-1.0604	1.6590	67.4	67.2	67.2	67.2	0.0	0.0
184	7	16	-1.1015	1.7303	67.0	66.9	66.9	66.9	0.0	0.0
185	7	17	-1.1427	1.8016	66.7	66.6	66.6	66.6	0.0	0.0
186	7	18	-1.1838	1.8729	66.4	66.3	66.3	66.3	0.0	0.0
187	7	19	-1.2250	1.9441	66.1	66.1	66.1	66.1	0.0	0.0
188	7	20	-1.2661	2.0154	65.8	65.8	65.8	65.8	0.0	0.0
189	7	21	-1.3073	2.0867	65.6	65.6	65.6	65.6	0.0	0.0
190	7	22	-1.3484	2.1580	65.4	65.4	65.4	65.4	0.0	0.0
191	7	23	-1.3896	2.2292	65.1	65.2	65.2	65.2	0.0	0.0
192	7	24	-1.4307	2.3005	64.9	65.0	65.0	65.0	0.0	0.0
193	7	25	-1.4719	2.3718	64.7	64.7	64.7	64.7	0.0	0.0
194	7	26	-1.5130	2.4430	64.4	64.4	64.4	64.4	0.0	0.0
195	7	27	-1.5542	2.5143	64.2	64.2	64.2	64.2	0.0	0.0
196	7	28	-1.5953	2.5856	63.9	63.9	63.9	63.9	0.0	0.0
197	8	1	-0.4130	0.7023	78.0	77.7	100.7	87.2	23.0	9.5
198	8	2	-0.4541	0.7736	76.0	75.9	97.5	84.1	21.6	8.2
199	8	3	-0.4953	0.8449	75.0	74.9	75.2	74.9	0.3	0.0
200	8	4	-0.5364	0.9162	74.3	74.3	74.3	74.3	0.0	0.0
201	8	5	-0.5776	0.9874	73.7	73.6	73.7	73.6	0.1	0.0
202	8	6	-0.6187	1.0587	73.1	73.0	73.0	73.0	0.0	0.0
203	8	7	-0.6599	1.1300	72.5	72.3	72.3	72.3	0.0	0.0
204	8	8	-0.7010	1.2013	71.9	71.8	71.8	71.8	0.0	0.0
205	8	9	-0.7422	1.2725	71.4	71.2	71.2	71.2	0.0	0.0
206	8	10	-0.7833	1.3438	70.9	70.8	70.8	70.8	0.0	0.0
207	8	11	-0.8245	1.4151	70.5	70.3	70.3	70.3	0.0	0.0
208	8	12	-0.8656	1.4864	70.0	69.9	69.9	69.9	0.0	0.0
209	8	13	-0.9068	1.5576	69.6	69.4	69.4	69.4	0.0	0.0
210	8	14	-0.9479	1.6289	69.1	69.0	69.0	69.0	0.0	0.0
211	8	15	-0.9891	1.7002	68.7	68.6	68.6	68.6	0.0	0.0
212	8	16	-1.0302	1.7715	68.2	68.2	68.2	68.2	0.0	0.0
213	8	17	-1.0714	1.8427	67.9	67.9	67.9	67.9	0.0	0.0
214	8	18	-1.1125	1.9140	67.5	67.5	67.5	67.5	0.0	0.0
215	8	19	-1.1537	1.9853	67.2	67.2	67.2	67.2	0.0	0.0
216	8	20	-1.1948	2.0566	66.8	66.9	66.9	66.9	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

						2018 DNL Level			Change with	
					Existing		Full Use of	Vith Special Are	Full Use of	Special Use Area
			X	Y	2002/3	No Project	Shifted Rwy	Use Procedures	Shift vs	Procedures vs
Site	I	J	(nm)	(nm)	(DNL)	RSA-5	RSA-2	RSA-3	No Project	No Project
217	8	21	-1.2360	2.1278	66.5	66.6	66.6	66.6	0.0	0.0
218	8	22	-1.2771	2.1991	66.3	66.3	66.3	66.3	0.0	0.0
219	8	23	-1.3183	2.2704	66.0	66.1	66.1	66.1	0.0	0.0
220	8	24	-1.3594	2.3416	65.7	65.8	65.8	65.8	0.0	0.0
221	8	25	-1.4006	2.4129	65.5	65.5	65.6	65.5	0.1	0.0
222	8	26	-1.4417	2.4842	65.2	65.2	65.2	65.2	0.0	0.0
223	8	27	-1.4829	2.5555	64.9	64.9	64.9	64.9	0.0	0.0
224	8	28	-1.5240	2.6267	64.6	64.7	64.7	64.7	0.0	0.0
225	9	1	-0.3417	0.7435	80.4	78.8	81.6	79.0	2.8	0.2
226	9	2	-0.3829	0.8148	74.2	73.2	80.6	74.3	7.4	1.1
227	9	3	-0.4240	0.8860	72.0	71.4	77.1	72.3	5.7	0.9
228	9	4	-0.4652	0.9573	71.4	70.8	71.5	70.9	0.7	0.1
229	9	5	-0.5063	1.0286	70.9	70.3	70.4	70.4	0.1	0.1
230	9	6	-0.5475	1.0999	70.5	69.9	69.9	69.9	0.0	0.0
231	9	7	-0.5886	1.1711	70.0	69.5	69.5	69.5	0.0	0.0
232	9	8	-0.6298	1.2424	69.6	69.1	69.1	69.1	0.0	0.0
233	9	9	-0.6709	1.3137	69.3	68.8	68.8	68.8	0.0	0.0
234	9	10	-0.7121	1.3850	68.9	68.5	68.5	68.5	0.0	0.0
235	9	11	-0.7532	1.4562	68.6	68.1	68.1	68.1	0.0	0.0
236	9	12	-0.7944	1.5275	68.2	67.8	67.8	67.8	0.0	0.0
237	9	13	-0.8355	1.5988	67.9	67.5	67.5	67.5	0.0	0.0
238	9	14	-0.8767	1.6701	67.5	67.2	67.2	67.2	0.0	0.0
239	9	15	-0.9178	1.7413	67.1	66.9	66.9	66.9	0.0	0.0
240	9	16	-0.9590	1.8126	66.7	66.6	66.6	66.6	0.0	0.0
241	9	17	-1.0001	1.8839	66.4	66.3	66.4	66.3	0.1	0.0
242	9	18	-1.0413	1.9552	66.1	66.1	66.1	66.1	0.0	0.0
243	9	19	-1.0824	2.0264	65.9	65.9	65.9	65.9	0.0	0.0
244	9	20	-1.1236	2.0977	65.6	65.6	65.6	65.6	0.0	0.0
245	9	21	-1.1647	2.1690	65.4	65.4	65.4	65.4	0.0	0.0
246	9	22	-1.2059	2.2403	65.2	65.2	65.2	65.2	0.0	0.0
247	9	23	-1.2470	2.3115	65.0	65.0	65.0	65.0	0.0	0.0
248	9	24	-1.2882	2.3828	64.8	64.8	64.8	64.8	0.0	0.0
249	9	25	-1.3293	2.4541	64.6	64.6	64.6	64.6	0.0	0.0
250	9	26	-1.3705	2.5253	64.3	64.3	64.3	64.3	0.0	0.0
251	9	27	-1.4116	2.5966	64.1	64.1	64.1	64.1	0.0	0.0
252	9	28	-1.4528	2.6679	63.9	63.9	63.9	63.9	0.0	0.0
253	10	1	-0.2704	0.7846	74.2	72.8	73.6	72.8	0.8	0.0
254	10	2	-0.3116	0.8559	72.2	70.9	73.2	71.1	2.3	0.2
255	10	3	-0.3527	0.9272	70.2	69.1	72.2	69.5	3.1	0.4
256	10	4	-0.3939	0.9985	69.0	68.0	70.1	68.3	2.1	0.3
257	10	5	-0.4350	1.0697	68.6	67.7	68.5	67.8	0.8	0.1
258	10	6	-0.4762	1.1410	68.3	67.4	67.5	67.4	0.1	0.0
259	10	7	-0.5173	1.2123	67.9	67.0	67.0	67.0	0.0	0.0
260	10	8	-0.5585	1.2836	67.4	66.5	66.5	66.5	0.0	0.0
261	10	9	-0.5996	1.3548	67.0	66.1	66.1	66.1	0.0	0.0
262	10	10	-0.6408	1.4261	66.6	65.8	65.8	65.8	0.0	0.0
263	10	11	-0.6819	1.4974	66.3	65.5	65.5	65.5	0.0	0.0
264	10	12	-0.7231	1.5687	65.9	65.2	65.2	65.2	0.0	0.0
265	10	13	-0.7642	1.6399	65.6	64.9	64.9	64.9	0.0	0.0
266	10	14	-0.8054	1.7112	65.3	64.7	64.7	64.7	0.0	0.0
267	10	15	-0.8465	1.7825	64.9	64.5	64.5	64.5	0.0	0.0
268	10	16	-0.8877	1.8538	64.6	64.2	64.2	64.2	0.0	0.0
269	10	17	-0.9288	1.9250	64.3	64.0	64.0	64.0	0.0	0.0
270	10	18	-0.9700	1.9963	64.1	63.9	63.9	63.9	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	Full Use of Shifted Rwy RSA-2	Vith Special Are Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
271	10	19	-1.0111	2.0676	63.9	63.7	63.7	63.7	0.0	0.0
272	10	20	-1.0523	2.1389	63.7	63.6	63.6	63.6	0.0	0.0
273	10	21	-1.0934	2.2101	63.5	63.4	63.4	63.4	0.0	0.0
274	10	22	-1.1346	2.2814	63.4	63.3	63.3	63.3	0.0	0.0
275	10	23	-1.1757	2.3527	63.2	63.1	63.1	63.1	0.0	0.0
276	10	24	-1.2169	2.4239	63.0	63.0	63.0	63.0	0.0	0.0
277	10	25	-1.2580	2.4952	62.9	62.8	62.8	62.8	0.0	0.0
278	10	26	-1.2992	2.5665	62.6	62.6	62.6	62.6	0.0	0.0
279	10	27	-1.3403	2.6378	62.4	62.4	62.4	62.4	0.0	0.0
280	10	28	-1.3815	2.7090	62.2	62.2	62.2	62.2	0.0	0.0
281	11	1	-0.1992	0.8258	69.8	68.4	68.8	68.5	0.4	0.1
282	11	2	-0.2403	0.8971	68.9	67.7	68.6	67.7	0.9	0.0
283	11	3	-0.2815	0.9683	67.9	66.7	68.2	66.9	1.5	0.2
284	11	4	-0.3226	1.0396	67.1	66.0	67.4	66.1	1.4	0.1
285	11	5	-0.3638	1.1109	66.6	65.6	66.5	65.7	0.9	0.1
286	11	6	-0.4049	1.1822	66.3	65.4	65.9	65.4	0.5	0.0
287	11	7	-0.4461	1.2534	66.0	65.1	65.3	65.1	0.2	0.0
288	11	8	-0.4872	1.3247	65.5	64.6	64.7	64.6	0.1	0.0
289	11	9	-0.5284	1.3960	65.0	64.0	64.1	64.1	0.1	0.1
290	11	10	-0.5695	1.4673	64.6	63.6	63.6	63.6	0.0	0.0
291	11	11	-0.6107	1.5385	64.2	63.2	63.2	63.2	0.0	0.0
292	11	12	-0.6518	1.6098	63.8	62.9	62.9	62.9	0.0	0.0
293	11	13	-0.6930	1.6811	63.5	62.6	62.6	62.6	0.0	0.0
294	11	14	-0.7341	1.7524	63.2	62.4	62.4	62.4	0.0	0.0
295	11	15	-0.7753	1.8236	62.8	62.1	62.1	62.1	0.0	0.0
296	11	16	-0.8164	1.8949	62.5	61.9	61.9	61.9	0.0	0.0
297	11	17	-0.8576	1.9662	62.2	61.7	61.7	61.7	0.0	0.0
298	11	18	-0.8987	2.0375	62.1	61.6	61.6	61.6	0.0	0.0
299	11	19	-0.9399	2.1087	61.9	61.5	61.5	61.5	0.0	0.0
300	11	20	-0.9810	2.1800	61.7	61.3	61.3	61.3	0.0	0.0
301	11	21	-1.0222	2.2513	61.6	61.3	61.3	61.3	0.0	0.0
302	11	22	-1.0633	2.3225	61.5	61.1	61.2	61.1	0.1	0.0
303	11	23	-1.1045	2.3938	61.3	61.1	61.1	61.1	0.0	0.0
304	11	24	-1.1456	2.4651	61.2	61.0	61.0	61.0	0.0	0.0
305	11	25	-1.1868	2.5364	61.1	60.8	60.8	60.8	0.0	0.0
306	11	26	-1.2279	2.6076	60.9	60.7	60.7	60.7	0.0	0.0
307	11	27	-1.2691	2.6789	60.8	60.5	60.5	60.5	0.0	0.0
308	11	28	-1.3102	2.7502	60.6	60.4	60.4	60.4	0.0	0.0
309	12	1	-0.1279	0.8669	66.4	65.2	65.4	65.2	0.2	0.0
310	12	2	-0.1690	0.9382	66.0	64.8	65.4	64.9	0.6	0.1
311	12	3	-0.2102	1.0095	65.4	64.3	65.2	64.4	0.9	0.1
312	12	4	-0.2513	1.0808	64.9	63.9	64.8	64.0	0.9	0.1
313	12	5	-0.2925	1.1520	64.7	63.8	64.5	63.8	0.7	0.0
314	12	6	-0.3336	1.2233	64.5	63.7	64.1	63.7	0.4	0.0
315	12	7	-0.3748	1.2946	64.3	63.6	63.9	63.6	0.3	0.0
316	12	8	-0.4159	1.3659	63.9	63.2	63.4	63.2	0.2	0.0
317	12	9	-0.4571	1.4371	63.3	62.5	62.7	62.6	0.2	0.1
318	12	10	-0.4982	1.5084	62.8	61.9	62.0	61.9	0.1	0.0
319	12	11	-0.5394	1.5797	62.3	61.4	61.5	61.4	0.1	0.0
320	12	12	-0.5805	1.6510	61.9	61.0	61.0	61.0	0.0	0.0
321	12	13	-0.6217	1.7222	61.5	60.7	60.7	60.7	0.0	0.0
322	12	14	-0.6628	1.7935	61.2	60.4	60.4	60.4	0.0	0.0
323	12	15	-0.7040	1.8648	60.9	60.2	60.2	60.2	0.0	0.0
324	12	16	-0.7451	1.9361	60.6	60.0	60.0	60.0	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level Vith Special Area Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
325	12	17	-0.7863	2.0073	60.4	59.8	59.8	59.8	0.0	0.0
326	12	18	-0.8274	2.0786	60.2	59.6	59.6	59.6	0.0	0.0
327	12	19	-0.8686	2.1499	60.1	59.5	59.5	59.5	0.0	0.0
328	12	20	-0.9097	2.2212	59.9	59.4	59.4	59.4	0.0	0.0
329	12	21	-0.9509	2.2924	59.8	59.3	59.3	59.3	0.0	0.0
330	12	22	-0.9920	2.3637	59.7	59.2	59.2	59.2	0.0	0.0
331	12	23	-1.0332	2.4350	59.6	59.1	59.1	59.1	0.0	0.0
332	12	24	-1.0743	2.5062	59.5	59.1	59.1	59.1	0.0	0.0
333	12	25	-1.1155	2.5775	59.4	59.0	59.0	59.0	0.0	0.0
334	12	26	-1.1566	2.6488	59.3	58.8	58.8	58.8	0.0	0.0
335	12	27	-1.1978	2.7201	59.1	58.7	58.7	58.7	0.0	0.0
336	12	28	-1.2389	2.7913	59.0	58.6	58.6	58.6	0.0	0.0
337	13	1	-0.0566	0.9081	63.7	62.7	62.8	62.8	0.1	0.1
338	13	2	-0.0978	0.9794	63.5	62.6	62.9	62.6	0.3	0.0
339	13	3	-0.1389	1.0506	63.2	62.4	62.8	62.4	0.4	0.0
340	13	4	-0.1801	1.1219	63.0	62.2	62.8	62.3	0.6	0.1
341	13	5	-0.2212	1.1932	62.9	62.2	62.7	62.3	0.5	0.1
342	13	6	-0.2624	1.2645	62.8	62.2	62.6	62.3	0.4	0.1
343	13	7	-0.3035	1.3357	62.8	62.2	62.5	62.3	0.3	0.1
344	13	8	-0.3447	1.4070	62.5	62.0	62.3	62.1	0.3	0.1
345	13	9	-0.3858	1.4783	61.9	61.4	61.6	61.4	0.2	0.0
346	13	10	-0.4270	1.5496	61.2	60.6	60.7	60.6	0.1	0.0
347	13	11	-0.4681	1.6208	60.6	59.9	60.0	59.9	0.1	0.0
348	13	12	-0.5093	1.6921	60.2	59.4	59.5	59.4	0.1	0.0
349	13	13	-0.5504	1.7634	59.8	59.0	59.1	59.0	0.1	0.0
350	13	14	-0.5916	1.8347	59.5	58.8	58.8	58.8	0.0	0.0
351	13	15	-0.6327	1.9059	59.2	58.5	58.6	58.5	0.1	0.0
352	13	16	-0.6739	1.9772	59.0	58.4	58.4	58.4	0.0	0.0
353	13	17	-0.7150	2.0485	58.8	58.2	58.2	58.2	0.0	0.0
354	13	18	-0.7562	2.1198	58.6	58.1	58.1	58.1	0.0	0.0
355	13	19	-0.7973	2.1910	58.5	57.9	58.0	57.9	0.1	0.0
356	13	20	-0.8385	2.2623	58.4	57.8	57.8	57.8	0.0	0.0
357	13	21	-0.8796	2.3336	58.3	57.7	57.7	57.7	0.0	0.0
358	13	22	-0.9208	2.4048	58.2	57.7	57.7	57.7	0.0	0.0
359	13	23	-0.9619	2.4761	58.1	57.6	57.6	57.6	0.0	0.0
360	13	24	-1.0031	2.5474	58.0	57.5	57.5	57.5	0.0	0.0
361	13	25	-1.0442	2.6187	57.9	57.4	57.4	57.4	0.0	0.0
362	13	26	-1.0854	2.6899	57.8	57.3	57.3	57.3	0.0	0.0
363	13	27	-1.1265	2.7612	57.7	57.1	57.1	57.1	0.0	0.0
364	13	28	-1.1677	2.8325	57.5	57.0	57.0	57.0	0.0	0.0
365	14	1	0.0147	0.9492	61.6	60.9	60.9	60.9	0.0	0.0
366	14	2	-0.0265	1.0205	61.5	60.8	61.0	60.9	0.2	0.1
367	14	3	-0.0676	1.0918	61.5	60.8	61.1	60.8	0.3	0.0
368	14	4	-0.1088	1.1631	61.4	60.8	61.1	60.8	0.3	0.0
369	14	5	-0.1499	1.2343	61.4	60.9	61.3	61.0	0.4	0.1
370	14	6	-0.1911	1.3056	61.4	61.0	61.3	61.0	0.3	0.0
371	14	7	-0.2322	1.3769	61.3	61.0	61.3	61.0	0.3	0.0
372	14	8	-0.2734	1.4482	61.2	60.9	61.1	60.9	0.2	0.0
373	14	9	-0.3145	1.5194	60.6	60.3	60.5	60.3	0.2	0.0
374	14	10	-0.3557	1.5907	59.9	59.4	59.6	59.4	0.2	0.0
375	14	11	-0.3968	1.6620	59.2	58.6	58.8	58.7	0.2	0.1
376	14	12	-0.4380	1.7333	58.7	58.1	58.2	58.1	0.1	0.0
377	14	13	-0.4791	1.8045	58.3	57.6	57.7	57.7	0.1	0.1
378	14	14	-0.5203	1.8758	58.0	57.4	57.4	57.4	0.0	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level Vith Special Are Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
379	14	15	-0.5614	1.9471	57.7	57.1	57.2	57.2	0.1	0.1
380	14	16	-0.6026	2.0184	57.5	57.0	57.0	57.0	0.0	0.0
381	14	17	-0.6437	2.0896	57.4	56.8	56.9	56.8	0.1	0.0
382	14	18	-0.6849	2.1609	57.2	56.7	56.7	56.7	0.0	0.0
383	14	19	-0.7260	2.2322	57.1	56.6	56.6	56.6	0.0	0.0
384	14	20	-0.7672	2.3035	57.0	56.5	56.5	56.5	0.0	0.0
385	14	21	-0.8083	2.3747	57.0	56.5	56.5	56.5	0.0	0.0
386	14	22	-0.8495	2.4460	56.9	56.4	56.4	56.4	0.0	0.0
387	14	23	-0.8906	2.5173	56.8	56.3	56.3	56.3	0.0	0.0
388	14	24	-0.9318	2.5885	56.7	56.2	56.2	56.2	0.0	0.0
389	14	25	-0.9729	2.6598	56.7	56.2	56.2	56.2	0.0	0.0
390	14	26	-1.0141	2.7311	56.5	56.0	56.0	56.0	0.0	0.0
391	14	27	-1.0552	2.8024	56.4	55.9	55.9	55.9	0.0	0.0
392	14	28	-1.0964	2.8736	56.3	55.8	55.8	55.8	0.0	0.0
393	15	1	0.0859	0.9904	60.0	59.5	59.5	59.5	0.0	0.0
394	15	2	0.0448	1.0617	60.0	59.5	59.7	59.5	0.2	0.0
395	15	3	0.0036	1.1329	60.0	59.5	59.7	59.5	0.2	0.0
396	15	4	-0.0375	1.2042	60.0	59.6	59.9	59.6	0.3	0.0
397	15	5	-0.0787	1.2755	60.1	59.7	60.0	59.8	0.3	0.1
398	15	6	-0.1198	1.3468	60.1	59.9	60.1	59.9	0.2	0.0
399	15	7	-0.1610	1.4180	60.2	60.0	60.2	60.0	0.2	0.0
400	15	8	-0.2021	1.4893	60.1	59.9	60.1	60.0	0.2	0.1
401	15	9	-0.2433	1.5606	59.5	59.4	59.5	59.4	0.1	0.0
402	15	10	-0.2844	1.6319	58.7	58.4	58.6	58.5	0.2	0.1
403	15	11	-0.3256	1.7031	58.0	57.6	57.8	57.7	0.2	0.1
404	15	12	-0.3667	1.7744	57.5	57.0	57.2	57.1	0.2	0.1
405	15	13	-0.4079	1.8457	57.0	56.5	56.6	56.5	0.1	0.0
406	15	14	-0.4490	1.9170	56.7	56.2	56.3	56.2	0.1	0.0
407	15	15	-0.4902	1.9882	56.5	56.0	56.0	56.0	0.0	0.0
408	15	16	-0.5313	2.0595	56.3	55.8	55.9	55.8	0.1	0.0
409	15	17	-0.5725	2.1308	56.1	55.7	55.7	55.7	0.0	0.0
410	15	18	-0.6136	2.2021	56.0	55.6	55.6	55.6	0.0	0.0
411	15	19	-0.6548	2.2733	55.9	55.5	55.5	55.5	0.0	0.0
412	15	20	-0.6959	2.3446	55.8	55.4	55.4	55.4	0.0	0.0
413	15	21	-0.7371	2.4159	55.8	55.4	55.4	55.4	0.0	0.0
414	15	22	-0.7782	2.4871	55.7	55.3	55.3	55.3	0.0	0.0
415	15	23	-0.8194	2.5584	55.7	55.2	55.2	55.2	0.0	0.0
416	15	24	-0.8605	2.6297	55.6	55.2	55.2	55.2	0.0	0.0
417	15	25	-0.9017	2.7010	55.5	55.1	55.1	55.1	0.0	0.0
418	15	26	-0.9428	2.7722	55.4	55.0	55.0	55.0	0.0	0.0
419	15	27	-0.9840	2.8435	55.3	54.9	54.9	54.9	0.0	0.0
420	15	28	-1.0251	2.9148	55.2	54.8	54.8	54.8	0.0	0.0
421	16	1	0.1572	1.0315	58.7	58.4	58.4	58.4	0.0	0.0
422	16	2	0.1161	1.1028	58.8	58.5	58.6	58.5	0.1	0.0
423	16	3	0.0749	1.1741	58.8	58.6	58.8	58.6	0.2	0.0
424	16	4	0.0338	1.2454	58.9	58.7	58.9	58.7	0.2	0.0
425	16	5	-0.0074	1.3166	59.0	58.8	59.1	58.9	0.3	0.1
426	16	6	-0.0485	1.3879	59.1	59.0	59.2	59.0	0.2	0.0
427	16	7	-0.0897	1.4592	59.1	59.1	59.3	59.1	0.2	0.0
428	16	8	-0.1308	1.5305	59.1	59.1	59.2	59.1	0.1	0.0
429	16	9	-0.1720	1.6017	58.6	58.6	58.7	58.6	0.1	0.0
430	16	10	-0.2131	1.6730	57.8	57.7	57.8	57.7	0.1	0.0
431	16	11	-0.2543	1.7443	57.1	56.9	57.0	56.9	0.1	0.0
432	16	12	-0.2954	1.8156	56.5	56.3	56.4	56.3	0.1	0.0

Table C-11
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (DNL)	2018 DNL Level No Project RSA-5	2018 DNL Level Full Use of Shifted Rwy RSA-2	2018 DNL Level Vith Special Are Use Procedures RSA-3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
433	16	13	-0.3366	1.8868	56.0	55.7	55.8	55.7	0.1	0.0
434	16	14	-0.3777	1.9581	55.7	55.3	55.4	55.3	0.1	0.0
435	16	15	-0.4189	2.0294	55.4	55.1	55.2	55.1	0.1	0.0
436	16	16	-0.4600	2.1007	55.2	54.9	55.0	54.9	0.1	0.0
437	16	17	-0.5012	2.1719	55.1	54.8	54.8	54.8	0.0	0.0
438	16	18	-0.5423	2.2432	55.0	54.7	54.7	54.7	0.0	0.0
439	16	19	-0.5835	2.3145	54.9	54.6	54.6	54.6	0.0	0.0
440	16	20	-0.6246	2.3858	54.8	54.5	54.6	54.5	0.1	0.0
441	16	21	-0.6658	2.4570	54.8	54.5	54.5	54.5	0.0	0.0
442	16	22	-0.7069	2.5283	54.7	54.4	54.4	54.4	0.0	0.0
443	16	23	-0.7481	2.5996	54.7	54.4	54.4	54.4	0.0	0.0
444	16	24	-0.7892	2.6708	54.6	54.3	54.3	54.3	0.0	0.0
445	16	25	-0.8304	2.7421	54.6	54.3	54.3	54.3	0.0	0.0
446	16	26	-0.8715	2.8134	54.5	54.2	54.2	54.2	0.0	0.0
447	16	27	-0.9127	2.8847	54.4	54.1	54.1	54.1	0.0	0.0
448	16	28	-0.9538	2.9559	54.3	54.0	54.0	54.0	0.0	0.0
SP	1	1	-0.5832	0.7732	71.7	70.8	77.3	71.9	6.5	1.1

Prepared December 31, 2003

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

					Existing (2002/3)			2018 Future No Project			2018 With Full Use of Shifted Rwy (A2)			2018 W/ Special Area Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
1	1	1	-0.9119	0.4143	37.7	5.1	0.0	33.6	4.4	0.0	33.5	4.4	0.0	33.6	4.4	0.0
2	1	2	-0.9530	0.4856	37.6	5.2	0.0	33.7	4.4	0.0	34.3	4.4	0.0	33.8	4.4	0.0
3	1	3	-0.9942	0.5568	35.0	5.3	0.0	31.5	4.4	0.0	32.3	4.4	0.0	31.6	4.4	0.0
4	1	4	-1.0353	0.6281	30.2	3.3	0.1	27.3	2.5	0.0	28.4	2.5	0.0	27.4	2.5	0.0
5	1	5	-1.0765	0.6994	25.3	1.3	0.1	22.9	0.5	0.0	24.1	0.5	0.0	23.1	0.5	0.0
6	1	6	-1.1176	0.7707	18.1	1.3	0.1	16.3	0.5	0.0	17.6	0.5	0.0	16.6	0.5	0.0
7	1	7	-1.1588	0.8419	17.1	1.3	0.1	15.9	0.5	0.0	17.1	0.5	0.0	16.1	0.5	0.0
8	1	8	-1.1999	0.9132	16.0	1.3	0.1	15.4	0.6	0.0	16.4	0.6	0.0	15.6	0.6	0.0
9	1	9	-1.2411	0.9845	15.1	1.3	0.1	15.0	0.6	0.0	15.8	0.6	0.0	15.2	0.6	0.0
10	1	10	-1.2822	1.0558	14.3	1.3	0.1	14.5	0.6	0.0	15.2	0.6	0.0	14.7	0.6	0.0
11	1	11	-1.3234	1.1270	11.7	1.3	0.1	12.1	0.6	0.0	12.7	0.6	0.0	12.2	0.6	0.0
12	1	12	-1.3645	1.1983	7.5	1.3	0.1	7.8	0.6	0.0	8.2	0.6	0.0	8.0	0.6	0.0
13	1	13	-1.4057	1.2696	7.3	1.2	0.1	7.6	0.6	0.0	7.7	0.6	0.0	7.7	0.6	0.0
14	1	14	-1.4468	1.3409	7.1	1.2	0.1	7.3	0.6	0.0	7.4	0.6	0.0	7.4	0.6	0.0
15	1	15	-1.4880	1.4121	7.0	1.2	0.1	7.2	0.6	0.0	7.2	0.6	0.0	7.2	0.6	0.0
16	1	16	-1.5291	1.4834	7.0	1.2	0.1	7.1	0.6	0.0	7.1	0.6	0.0	7.1	0.6	0.0
17	1	17	-1.5703	1.5547	6.9	1.2	0.1	6.9	0.6	0.0	6.9	0.6	0.0	6.9	0.6	0.0
18	1	18	-1.6114	1.6260	6.9	1.2	0.1	6.7	0.6	0.0	6.7	0.6	0.0	6.7	0.6	0.0
19	1	19	-1.6526	1.6972	6.7	1.2	0.1	6.4	0.6	0.0	6.4	0.6	0.0	6.4	0.6	0.0
20	1	20	-1.6937	1.7685	6.5	1.2	0.1	6.2	0.6	0.0	6.2	0.6	0.0	6.2	0.6	0.0
21	1	21	-1.7349	1.8398	6.4	1.2	0.1	6.1	0.6	0.0	6.1	0.6	0.0	6.1	0.6	0.0
22	1	22	-1.7760	1.9111	6.3	1.2	0.1	6.0	0.6	0.0	6.0	0.6	0.0	6.0	0.6	0.0
23	1	23	-1.8172	1.9823	6.3	1.2	0.1	5.9	0.6	0.0	5.9	0.6	0.0	5.9	0.6	0.0
24	1	24	-1.8583	2.0536	6.2	1.1	0.1	5.8	0.5	0.0	5.8	0.5	0.0	5.8	0.5	0.0
25	1	25	-1.8995	2.1249	6.1	1.1	0.0	5.7	0.5	0.0	5.7	0.5	0.0	5.7	0.5	0.0
26	1	26	-1.9406	2.1961	6.0	1.1	0.0	5.5	0.5	0.0	5.5	0.5	0.0	5.5	0.5	0.0
27	1	27	-1.9818	2.2674	5.7	1.1	0.0	5.3	0.5	0.0	5.3	0.5	0.0	5.3	0.5	0.0
28	1	28	-2.0229	2.3387	5.5	1.1	0.0	5.1	0.5	0.0	5.1	0.5	0.0	5.1	0.5	0.0
29	2	1	-0.8406	0.4554	47.0	10.7	0.1	43.8	9.0	0.0	43.4	9.0	0.0	43.8	9.0	0.0
30	2	2	-0.8818	0.5267	46.2	10.4	0.2	43.1	9.0	0.0	44.9	9.1	0.0	43.2	9.0	0.0
31	2	3	-0.9229	0.5980	42.3	6.0	0.2	39.3	4.9	0.0	42.1	5.2	0.0	39.5	5.0	0.0
32	2	4	-0.9641	0.6693	40.8	5.7	0.2	38.4	4.9	0.1	41.4	5.1	0.1	38.5	5.0	0.1
33	2	5	-1.0052	0.7405	33.2	3.7	0.2	31.4	2.9	0.1	33.5	2.9	0.1	31.7	2.9	0.1
34	2	6	-1.0464	0.8118	27.8	1.7	0.2	26.7	0.9	0.1	28.5	0.9	0.1	27.0	0.9	0.1
35	2	7	-1.0875	0.8831	20.4	1.7	0.2	20.0	0.9	0.1	21.6	0.9	0.1	20.2	0.9	0.1
36	2	8	-1.1287	0.9544	19.1	1.7	0.2	19.4	0.9	0.1	20.7	0.9	0.1	19.6	0.9	0.1
37	2	9	-1.1698	1.0256	18.2	1.7	0.2	18.8	0.9	0.1	19.8	0.9	0.1	19.0	0.9	0.1
38	2	10	-1.2110	1.0969	17.2	1.7	0.2	18.2	0.9	0.1	19.0	0.9	0.1	18.4	0.9	0.1
39	2	11	-1.2521	1.1682	14.2	1.7	0.2	15.5	0.9	0.1	16.3	0.9	0.1	15.6	0.9	0.1
40	2	12	-1.2933	1.2395	11.9	1.6	0.2	13.2	0.9	0.1	13.6	0.9	0.1	13.3	0.9	0.1
41	2	13	-1.3344	1.3107	9.6	1.5	0.2	10.8	0.8	0.1	11.0	0.8	0.1	10.9	0.8	0.1
42	2	14	-1.3756	1.3820	9.5	1.4	0.2	10.6	0.8	0.1	10.7	0.8	0.1	10.7	0.8	0.1
43	2	15	-1.4167	1.4533	9.4	1.4	0.2	10.5	0.8	0.1	10.5	0.8	0.1	10.5	0.8	0.1
44	2	16	-1.4579	1.5246	9.3	1.4	0.2	10.2	0.8	0.1	10.3	0.8	0.1	10.3	0.8	0.1
45	2	17	-1.4990	1.5958	9.2	1.4	0.2	10.0	0.8	0.1	10.0	0.8	0.1	10.0	0.8	0.1
46	2	18	-1.5402	1.6671	9.0	1.5	0.2	9.6	0.8	0.1	9.6	0.8	0.1	9.6	0.8	0.1
47	2	19	-1.5813	1.7384	8.6	1.5	0.1	9.1	0.8	0.1	9.1	0.8	0.1	9.1	0.8	0.1
48	2	20	-1.6225	1.8097	8.4	1.4	0.1	8.8	0.8	0.1	8.8	0.8	0.1	8.8	0.8	0.1
49	2	21	-1.6636	1.8809	8.2	1.4	0.1	8.5	0.7	0.1	8.5	0.7	0.1	8.5	0.7	0.1
50	2	22	-1.7048	1.9522	8.1	1.4	0.1	8.3	0.7	0.1	8.3	0.7	0.1	8.3	0.7	0.1
51	2	23	-1.7459	2.0235	8.0	1.4	0.1	8.2	0.7	0.1	8.2	0.7	0.1	8.2	0.7	0.1
52	2	24	-1.7871	2.0947	7.8	1.4	0.1	8.0	0.7	0.1	8.0	0.7	0.1	8.0	0.7	0.1
53	2	25	-1.8282	2.1660	7.8	1.4	0.1	7.8	0.7	0.1	7.8	0.7	0.1	7.8	0.7	0.1
54	2	26	-1.8694	2.2373	7.6	1.3	0.1	7.6	0.7	0.1	7.6	0.7	0.1	7.6	0.7	0.1
55	2	27	-1.9105	2.3086	7.4	1.3	0.1	7.2	0.6	0.0	7.2	0.6	0.0	7.2	0.6	0.0
56	2	28	-1.9517	2.3798	7.3	1.3	0.1	7.0	0.6	0.0	7.0	0.6	0.0	7.0	0.6	0.0
57	3	1	-0.7694	0.4966	62.3	23.4	4.3	61.7	20.6	4.1	63.0	20.8	4.1	61.7	20.7	4.1
58	3	2	-0.8105	0.5679	58.0	20.9	2.4	57.0	18.5	2.1	63.6	18.8	2.1	57.1	18.6	2.1
59	3	3	-0.8517	0.6391	53.1	16.0	0.4	51.7	14.1	0.1	60.9	14.8	0.1	51.9	14.2	0.1
60	3	4	-0.8928	0.7104	49.4	9.3	0.4	48.3	7.9	0.1	55.8	8.6	0.1	48.7	8.1	0.1
61	3	5	-0.9340	0.7817	43.7	6.5	0.5	43.0	5.6	0.1	48.7	6.1	0.1	43.4	5.8	0.1
62	3	6	-0.9751	0.8530	35.4	4.4	0.5	35.4	3.6	0.1	39.3	3.9	0.1	35.7	3.7	0.1
63	3	7	-1.0163	0.9242	25.9	2.4	0.5	26.5	1.6	0.2	28.6	1.6	0.2	26.8	1.6	0.2
64	3	8	-1.0574	0.9955	22.8	2.4	0.4	23.8	1.6	0.2	25.4	1.6	0.2	24.1	1.6	0.2
65	3	9	-1.0986	1.0668	21.6	2.3	0.4	23.0	1.6	0.2	24.3	1.6	0.2	23.3	1.6	0.2
66	3	10	-1.1397	1.1381	20.7	2.3	0.4	22.3	1.5	0.2	23.2	1.5	0.2	22.5	1.5	0.2
67	3	11	-1.1809	1.2093	20.0	2.2	0.4	21.7	1.5	0.2	22.2	1.5	0.2	21.8	1.5	0.2
68	3	12	-1.2220	1.2806	15.4	2.1	0.4	17.1	1.5	0.2	17.4	1.5	0.2	17.1	1.5	0.2
69	3	13	-1.2632	1.3519	13.1	2.0	0.4	14.6	1.4	0.1	14.8	1.4	0.1	14.7	1.4	0.1
70	3	14	-1.3043	1.4232	12.9	1.9	0.4	14.3	1.3	0.1	14.4	1.3	0.1	14.4	1.3	0.1
71	3	15	-1.3455	1.4944	12.8	1.8	0.3	14.0	1.2	0.1	14.1	1.2	0.1	14.0	1.2	0.1
72	3	16	-1.3866	1.5657	12.7	1.7	0.3	13.8	1.1	0.1	13.8	1.1	0.1	13.8	1.1	0.1
73	3	17	-1.4278	1.6370	12.5	1.8	0.3	13.4	1.1	0.1	13.4	1.1	0.1	13.4	1.1	0.1
74	3	18	-1.4689	1.7083	12.2	1.8	0.3	12.9	1.1	0.1	12.9	1.1	0.1	12.9	1.1	0.1
75	3	19	-1.5101	1.7795	11.8	1.7	0.3	12.3	1.0	0.1	12.3	1.0	0.1	12.3	1.0	0.1
76	3	20	-1.5512	1.8508	11.5	1.7	0.2	11.8	1.0	0.1	11.8	1.0	0.1	11.8	1.0	0.1
77	3	21	-1.5924	1.9221	11.3	1.7	0.2	11.6	1.0	0.1	11.6	1.0	0.1	11.6	1.0	0.1
78	3	22	-1.6335	1.9934	11.1	1.7	0.2	11.3	1.0	0.1	11.3	1.0	0.1	11.3	1.0	0.1
79	3	23	-1.6747	2.0646	10.9	1.6	0.2	11.0	0.9	0.1	11.0	0.9	0.1	11.0	0.9	0.1
80	3	24	-1.7158	2.1359	10.7	1.6	0.2	10.8	0.9	0.1	10.8	0.9	0.1	10.8	0.9	0.1

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

					Existing (2002/3)			2018 Future No Project			2018 With Full Use of Shifted Rwy (A2)			2018 W/ Special Area Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
81	3	25	-1.7570	2.2072	10.5	1.6	0.2	10.5	0.9	0.1	10.5	0.9	0.1	10.5	0.9	0.1
82	3	26	-1.7981	2.2784	10.2	1.6	0.2	10.1	0.9	0.1	10.1	0.9	0.1	10.1	0.9	0.1
83	3	27	-1.8393	2.3497	9.9	1.5	0.2	9.7	0.8	0.1	9.7	0.8	0.1	9.7	0.8	0.1
84	3	28	-1.8804	2.4210	9.7	1.5	0.1	9.5	0.8	0.1	9.5	0.8	0.1	9.5	0.8	0.1
85	4	1	-0.6981	0.5377	87.1	31.3	12.7	91.5	27.6	12.2	95.1	28.0	12.2	91.5	27.7	12.2
86	4	2	-0.7392	0.6090	80.6	30.5	10.7	83.6	27.1	10.2	94.2	28.0	10.2	83.7	27.2	10.2
87	4	3	-0.7804	0.6803	69.2	25.2	4.7	70.1	22.6	4.2	89.4	23.7	4.2	70.4	22.8	4.2
88	4	4	-0.8215	0.7516	58.8	15.5	0.7	59.0	13.8	0.3	80.6	15.1	0.3	59.5	14.1	0.3
89	4	5	-0.8627	0.8228	51.1	8.3	0.7	51.5	7.3	0.3	65.1	8.5	0.3	52.1	7.6	0.3
90	4	6	-0.9038	0.8941	45.3	7.5	0.7	46.0	6.9	0.3	52.8	7.5	0.3	46.5	7.2	0.3
91	4	7	-0.9450	0.9654	35.1	3.4	0.7	36.3	2.8	0.3	40.1	3.0	0.3	36.7	2.9	0.3
92	4	8	-0.9861	1.0367	27.4	3.3	0.7	28.9	2.7	0.3	31.0	2.7	0.3	29.3	2.7	0.3
93	4	9	-1.0273	1.1079	26.5	3.2	0.7	28.3	2.6	0.3	29.4	2.6	0.3	28.5	2.6	0.3
94	4	10	-1.0684	1.1792	25.7	3.1	0.6	27.7	2.5	0.3	28.1	2.5	0.3	27.8	2.5	0.3
95	4	11	-1.1096	1.2505	24.7	3.0	0.6	26.8	2.4	0.3	27.2	2.4	0.3	26.9	2.4	0.3
96	4	12	-1.1507	1.3218	21.8	2.8	0.6	24.1	2.3	0.3	24.4	2.3	0.3	24.2	2.3	0.3
97	4	13	-1.1919	1.3930	17.3	2.6	0.6	19.5	2.2	0.3	19.7	2.2	0.3	19.6	2.2	0.3
98	4	14	-1.2330	1.4643	16.8	2.4	0.6	18.9	2.0	0.2	19.0	2.0	0.2	19.0	2.0	0.2
99	4	15	-1.2742	1.5356	16.5	2.3	0.5	18.5	1.8	0.2	18.6	1.8	0.2	18.5	1.8	0.2
100	4	16	-1.3153	1.6069	16.8	2.2	0.5	18.9	1.7	0.2	18.9	1.7	0.2	18.9	1.7	0.2
101	4	17	-1.3565	1.6781	17.0	2.2	0.5	19.1	1.6	0.2	19.1	1.6	0.2	19.1	1.6	0.2
102	4	18	-1.3976	1.7494	17.1	2.1	0.4	19.2	1.5	0.2	19.2	1.5	0.2	19.2	1.5	0.2
103	4	19	-1.4388	1.8207	16.8	2.1	0.4	18.9	1.4	0.2	18.9	1.4	0.2	18.9	1.4	0.2
104	4	20	-1.4799	1.8920	16.6	2.0	0.4	18.7	1.3	0.2	18.7	1.3	0.2	18.7	1.3	0.2
105	4	21	-1.5211	1.9632	16.4	2.0	0.4	18.5	1.3	0.2	18.5	1.3	0.2	18.5	1.3	0.2
106	4	22	-1.5622	2.0345	16.3	1.9	0.4	18.4	1.3	0.2	18.4	1.3	0.2	18.4	1.3	0.2
107	4	23	-1.6034	2.1058	16.2	1.9	0.3	18.2	1.2	0.2	18.2	1.2	0.2	18.2	1.2	0.2
108	4	24	-1.6445	2.1770	16.0	1.9	0.3	18.1	1.2	0.2	18.1	1.2	0.2	18.1	1.2	0.2
109	4	25	-1.6857	2.2483	15.8	1.8	0.3	17.8	1.2	0.2	17.8	1.2	0.2	17.8	1.2	0.2
110	4	26	-1.7268	2.3196	15.6	1.8	0.3	17.7	1.1	0.1	17.7	1.1	0.1	17.7	1.1	0.1
111	4	27	-1.7680	2.3909	15.5	1.8	0.2	17.4	1.1	0.1	17.4	1.1	0.1	17.4	1.1	0.1
112	4	28	-1.8091	2.4621	15.3	1.7	0.2	17.3	1.0	0.1	17.3	1.0	0.1	17.3	1.0	0.1
113	5	1	-0.6268	0.5789	128.0	42.4	22.8	141.5	39.3	21.0	149.8	40.9	21.3	141.6	39.5	21.0
114	5	2	-0.6680	0.6502	111.7	38.5	20.0	122.4	35.4	18.6	144.6	40.2	19.2	122.6	35.5	18.8
115	5	3	-0.7091	0.7214	91.7	32.2	7.0	99.3	29.5	6.4	134.6	36.4	6.9	99.9	29.8	6.6
116	5	4	-0.7503	0.7927	73.6	23.6	3.0	78.6	22.1	2.4	116.3	26.4	2.6	79.5	22.5	2.5
117	5	5	-0.7914	0.8640	62.7	11.8	1.0	67.3	11.1	0.4	92.7	13.0	0.4	68.1	11.5	0.4
118	5	6	-0.8326	0.9353	55.5	8.9	1.0	60.3	8.6	0.4	72.1	9.6	0.4	61.0	8.9	0.4
119	5	7	-0.8737	1.0065	45.8	4.5	0.9	50.6	4.4	0.4	54.2	4.6	0.4	50.9	4.5	0.4
120	5	8	-0.9149	1.0778	35.6	4.3	0.9	40.2	4.1	0.4	41.0	4.1	0.4	40.3	4.1	0.4
121	5	9	-0.9560	1.1491	35.1	4.2	0.9	39.9	4.0	0.4	40.4	4.0	0.4	40.0	4.0	0.4
122	5	10	-0.9972	1.2204	34.4	4.0	0.8	39.3	3.8	0.4	39.6	3.8	0.4	39.3	3.8	0.4
123	5	11	-1.0383	1.2916	33.5	4.0	0.8	38.7	3.6	0.4	38.9	3.6	0.4	38.8	3.6	0.4
124	5	12	-1.0795	1.3629	30.7	3.9	0.8	36.1	3.5	0.4	36.3	3.5	0.4	36.1	3.5	0.4
125	5	13	-1.1206	1.4342	25.9	3.7	0.7	31.4	3.2	0.3	31.6	3.2	0.3	31.5	3.2	0.3
126	5	14	-1.1618	1.5055	25.5	3.4	0.7	31.0	2.9	0.3	31.1	2.9	0.3	31.1	2.9	0.3
127	5	15	-1.2029	1.5767	25.2	3.2	0.7	30.7	2.7	0.3	30.7	2.7	0.3	30.7	2.7	0.3
128	5	16	-1.2441	1.6480	25.0	3.1	0.6	30.3	2.5	0.3	30.3	2.5	0.3	30.3	2.5	0.3
129	5	17	-1.2852	1.7193	24.8	3.1	0.6	29.9	2.3	0.3	29.9	2.3	0.3	29.9	2.3	0.3
130	5	18	-1.3264	1.7906	24.5	3.0	0.6	29.5	2.1	0.3	29.5	2.1	0.3	29.5	2.1	0.3
131	5	19	-1.3675	1.8618	24.3	2.9	0.5	29.2	2.0	0.3	29.2	2.0	0.3	29.2	2.0	0.3
132	5	20	-1.4087	1.9331	24.1	2.8	0.5	29.0	1.9	0.2	29.0	1.9	0.2	29.0	1.9	0.2
133	5	21	-1.4498	2.0044	23.9	2.7	0.5	28.8	1.7	0.2	28.8	1.8	0.2	28.8	1.7	0.2
134	5	22	-1.4910	2.0757	23.7	2.6	0.5	28.6	1.7	0.2	28.6	1.7	0.2	28.6	1.7	0.2
135	5	23	-1.5321	2.1469	23.4	2.6	0.5	28.2	1.6	0.2	28.2	1.6	0.2	28.2	1.6	0.2
136	5	24	-1.5733	2.2182	23.1	2.5	0.4	27.9	1.6	0.2	27.9	1.6	0.2	27.9	1.6	0.2
137	5	25	-1.6144	2.2895	22.9	2.5	0.4	27.6	1.6	0.2	27.6	1.6	0.2	27.6	1.6	0.2
138	5	26	-1.6556	2.3607	22.6	2.5	0.4	27.3	1.5	0.2	27.3	1.5	0.2	27.3	1.5	0.2
139	5	27	-1.6967	2.4320	22.4	2.4	0.3	27.0	1.4	0.2	27.0	1.4	0.2	27.0	1.4	0.2
140	5	28	-1.7379	2.5033	22.2	2.3	0.3	26.8	1.3	0.1	26.8	1.3	0.2	26.8	1.3	0.1
141	6	1	-0.5555	0.6200	178.3	64.0	31.4	207.7	65.6	28.5	224.7	76.7	29.9	208.0	65.8	28.6
142	6	2	-0.5967	0.6913	136.9	48.0	24.1	157.8	46.8	22.0	213.4	73.6	25.1	158.3	47.1	22.1
143	6	3	-0.6378	0.7626	100.0	37.8	8.1	113.6	36.4	6.9	190.7	61.4	8.8	114.7	37.1	7.3
144	6	4	-0.6790	0.8339	77.3	22.6	1.3	87.9	22.1	0.7	144.0	32.4	1.6	89.2	22.8	0.9
145	6	5	-0.7201	0.9051	72.8	13.8	1.2	83.0	13.5	0.6	106.8	16.6	0.7	83.8	13.9	0.6
146	6	6	-0.7613	0.9764	68.5	11.5	1.2	78.3	11.2	0.6	81.8	11.5	0.6	78.5	11.3	0.6
147	6	7	-0.8024	1.0477	59.1	7.2	1.1	68.7	7.0	0.6	69.5	7.1	0.6	68.7	7.0	0.6
148	6	8	-0.8436	1.1190	50.8	7.0	1.1	60.5	6.7	0.6	60.8	6.7	0.6	60.5	6.7	0.6
149	6	9	-0.8847	1.1902	48.3	6.8	1.1	57.6	6.4	0.5	57.8	6.4	0.5	57.6	6.4	0.5
150	6	10	-0.9259	1.2615	47.6	6.6	1.0	57.0	6.2	0.5	57.2	6.2	0.5	57.0	6.2	0.5
151	6	11	-0.9670	1.3328	46.8	6.3	1.0	56.3	5.9	0.5	56.4	5.9	0.5	56.3	5.9	0.5
152	6	12	-1.0082	1.4041	44.2	6.1	0.9	54.0	5.7	0.5	54.1	5.7	0.5	54.0	5.7	0.5
153	6	13	-1.0493	1.4753	39.4	5.8	0.8	49.3	5.4	0.4	49.4	5.4	0.4	49.3	5.4	0.4
154	6	14	-1.0905	1.5466	39.0	5.5	0.8	49.0	5.0	0.4	49.0	5.0	0.4	49.0	5.0	0.4
155	6	15	-1.1316	1.6179	38.7	5.3	0.8	48.6	4.7	0.4	48.6	4.7	0.4	48.6	4.7	0.4
156	6	16	-1.1728	1.6892	38.6	5.0	0.8	48.3	4.4	0.4	48.3	4.4	0.4	48.3	4.4	0.4
157	6	17	-1.2139	1.7604	38.5	5.0	0.7	48.1	4.4	0.4	48.1	4.4	0.4	48.1	4.4	0.4
158	6	18	-1.2551	1.8317	38.3	5.1	0.7	47.8	4.4	0.3	47.8	4.4	0.3	47.8	4.4	0.3
159	6	19	-1.2962	1.9030	38.3	5.1	0.6	47.7	4.4	0.3	47.8	4.4	0.3	47.8	4.4	0.3
160	6	20	-1.3374	1.9743	37.8	4.6	0.6	47.0	3.8	0.3	47.0	3.8	0.3	47.0	3.8	0.3

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

					Existing (2002/3)			2018 Future No Project			2018 With Full Use of Shifted Rwy (A2)			2018 W/ Special Area Use Procedures (A3)		
Site	I	J	X (nm)	Y (nm)	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA	TA 65 dBA	TA 75 dBA	TA 85 dBA
161	6	21	-1.3785	2.0455	37.2	4.3	0.6	46.2	3.3	0.3	46.2	3.3	0.3	46.2	3.3	0.3
162	6	22	-1.4197	2.1168	36.6	4.2	0.6	45.4	3.1	0.3	45.4	3.1	0.3	45.4	3.1	0.3
163	6	23	-1.4608	2.1881	36.0	4.1	0.5	44.7	3.0	0.3	44.7	3.0	0.3	44.7	3.0	0.3
164	6	24	-1.5020	2.2593	35.5	3.9	0.5	44.0	2.9	0.2	44.0	2.9	0.2	44.0	2.9	0.2
165	6	25	-1.5431	2.3306	34.9	3.9	0.5	43.2	2.8	0.2	43.2	2.8	0.2	43.2	2.8	0.2
166	6	26	-1.5843	2.4019	34.4	3.8	0.5	42.3	2.7	0.2	42.4	2.7	0.2	42.3	2.7	0.2
167	6	27	-1.6254	2.4732	33.4	3.7	0.4	41.2	2.6	0.2	41.2	2.6	0.2	41.2	2.6	0.2
168	6	28	-1.6666	2.5444	32.5	3.6	0.4	40.0	2.4	0.2	40.0	2.4	0.2	40.0	2.4	0.2
169	7	1	-0.4843	0.6612	204.7	91.2	38.1	244.1	102.6	37.7	324.1	145.4	58.1	244.9	103.1	37.9
170	7	2	-0.5254	0.7325	114.2	48.1	15.7	135.1	52.2	14.6	294.0	128.5	40.6	136.6	53.0	15.1
171	7	3	-0.5666	0.8037	102.4	42.9	8.6	121.0	46.3	7.7	215.0	88.4	17.5	122.9	47.3	8.3
172	7	4	-0.6077	0.8750	100.2	27.4	2.3	118.4	30.5	1.5	127.4	33.3	1.7	118.6	30.6	1.6
173	7	5	-0.6489	0.9463	98.5	22.1	2.2	116.1	25.1	1.5	118.1	25.5	1.5	116.1	25.2	1.5
174	7	6	-0.6900	1.0176	94.2	19.0	2.2	111.4	21.7	1.4	112.1	21.8	1.4	111.4	21.7	1.4
175	7	7	-0.7312	1.0888	82.5	14.3	2.1	99.3	17.0	1.4	99.5	17.1	1.4	99.3	17.1	1.4
176	7	8	-0.7723	1.1601	75.4	13.6	2.1	91.9	16.2	1.3	92.1	16.2	1.3	91.9	16.2	1.3
177	7	9	-0.8135	1.2314	73.5	13.0	2.0	89.7	15.4	1.3	89.8	15.5	1.3	89.7	15.4	1.3
178	7	10	-0.8546	1.3027	70.1	12.0	1.9	85.8	14.5	1.2	85.9	14.5	1.2	85.8	14.5	1.2
179	7	11	-0.8958	1.3739	68.4	11.7	1.8	83.9	14.0	1.1	84.0	14.0	1.1	84.0	14.0	1.1
180	7	12	-0.9369	1.4452	64.9	11.3	1.7	80.3	13.5	1.0	80.4	13.5	1.0	80.3	13.5	1.0
181	7	13	-0.9781	1.5165	59.7	10.9	1.6	75.2	13.0	0.9	75.4	13.0	0.9	75.3	13.0	0.9
182	7	14	-1.0192	1.5878	59.1	10.4	1.5	74.5	12.3	0.9	74.6	12.3	0.9	74.6	12.3	0.9
183	7	15	-1.0604	1.6590	58.2	9.8	1.4	73.5	11.4	0.8	73.5	11.4	0.8	73.5	11.4	0.8
184	7	16	-1.1015	1.7303	57.3	9.1	1.3	72.3	10.5	0.6	72.3	10.5	0.6	72.3	10.5	0.6
185	7	17	-1.1427	1.8016	56.6	8.8	1.2	71.2	9.8	0.5	71.2	9.8	0.5	71.2	9.8	0.5
186	7	18	-1.1838	1.8729	55.7	8.4	1.1	70.1	9.2	0.5	70.1	9.2	0.5	70.1	9.2	0.5
187	7	19	-1.2250	1.9441	54.8	8.1	1.0	68.9	8.8	0.5	68.9	8.8	0.5	68.9	8.8	0.5
188	7	20	-1.2661	2.0154	53.9	7.9	0.9	67.8	8.5	0.4	67.8	8.5	0.4	67.8	8.5	0.4
189	7	21	-1.3073	2.0867	52.9	7.6	0.9	66.6	8.1	0.4	66.6	8.1	0.4	66.6	8.1	0.4
190	7	22	-1.3484	2.1580	51.9	7.3	0.9	65.2	7.7	0.4	65.3	7.7	0.4	65.2	7.7	0.4
191	7	23	-1.3896	2.2292	51.0	7.1	0.8	64.2	7.4	0.4	64.2	7.4	0.4	64.2	7.4	0.4
192	7	24	-1.4307	2.3005	50.1	6.8	0.7	63.0	7.0	0.4	63.0	7.0	0.4	63.0	7.0	0.4
193	7	25	-1.4719	2.3718	49.2	6.6	0.6	61.8	6.7	0.3	61.8	6.7	0.3	61.8	6.7	0.3
194	7	26	-1.5130	2.4430	48.3	6.4	0.5	60.6	6.5	0.3	60.6	6.5	0.3	60.6	6.5	0.3
195	7	27	-1.5542	2.5143	47.3	6.2	0.5	59.2	6.2	0.3	59.2	6.2	0.3	59.2	6.2	0.3
196	7	28	-1.5953	2.5856	46.3	6.0	0.4	57.9	6.0	0.2	57.9	6.0	0.2	57.9	6.0	0.2
197	8	1	-0.4130	0.7023	113.6	55.0	15.5	134.6	62.4	16.7	279.3	144.0	61.3	135.8	63.1	17.1
198	8	2	-0.4541	0.7736	112.7	54.3	10.8	133.7	62.0	11.8	240.1	121.6	44.0	135.0	62.7	12.2
199	8	3	-0.4953	0.8449	112.2	46.5	6.1	133.4	54.0	6.9	137.0	55.3	7.3	133.4	54.0	6.9
200	8	4	-0.5364	0.9162	110.6	35.0	5.1	132.1	41.7	5.8	134.3	42.2	5.8	132.1	41.7	5.8
201	8	5	-0.5776	0.9874	108.1	33.3	4.4	127.9	39.8	5.0	128.9	39.9	5.0	127.9	39.8	5.0
202	8	6	-0.6187	1.0587	99.3	25.5	4.1	118.4	31.6	4.5	118.8	31.6	4.6	118.4	31.6	4.5
203	8	7	-0.6599	1.1300	85.7	23.0	3.8	104.5	28.5	4.0	104.7	28.6	4.0	104.5	28.5	4.0
204	8	8	-0.7010	1.2013	84.4	20.5	3.4	103.0	25.3	3.3	103.1	25.4	3.3	103.0	25.4	3.3
205	8	9	-0.7422	1.2725	82.2	19.6	3.3	100.3	24.2	3.1	100.4	24.2	3.1	100.4	24.2	3.1
206	8	10	-0.7833	1.3438	79.1	18.9	3.1	96.8	23.3	2.8	96.9	23.3	2.8	96.8	23.3	2.8
207	8	11	-0.8245	1.4151	74.9	17.9	2.8	92.0	22.1	2.5	92.0	22.1	2.5	92.0	22.1	2.5
208	8	12	-0.8656	1.4864	70.4	16.7	2.4	87.1	20.8	1.9	87.2	20.8	2.0	87.1	20.8	1.9
209	8	13	-0.9068	1.5576	64.5	15.5	2.1	81.1	19.4	1.5	81.2	19.4	1.5	81.1	19.4	1.5
210	8	14	-0.9479	1.6289	63.4	14.4	2.0	79.9	18.0	1.4	80.0	18.0	1.4	79.9	18.0	1.4
211	8	15	-0.9891	1.7002	62.6	12.9	1.9	78.8	16.0	1.3	78.8	16.0	1.3	78.8	16.0	1.3
212	8	16	-1.0302	1.7715	61.6	12.2	1.8	77.6	15.0	1.2	77.6	15.0	1.2	77.6	15.0	1.2
213	8	17	-1.0714	1.8427	60.7	11.6	1.7	76.2	14.0	1.1	76.2	14.0	1.1	76.2	14.0	1.1
214	8	18	-1.1125	1.9140	59.4	11.0	1.6	74.6	13.0	1.0	74.6	13.0	1.0	74.6	13.0	1.0
215	8	19	-1.1537	1.9853	58.6	10.2	1.5	73.6	12.1	1.0	73.6	12.1	1.0	73.6	12.1	1.0
216	8	20	-1.1948	2.0566	57.9	9.8	1.4	72.8	11.5	0.9	72.8	11.6	0.9	72.8	11.5	0.9
217	8	21	-1.2360	2.1278	57.2	9.5	1.3	71.8	11.0	0.8	71.8	11.0	0.8	71.8	11.0	0.8
218	8	22	-1.2771	2.1991	56.4	9.0	1.2	70.7	10.4	0.7	70.7	10.4	0.7	70.7	10.4	0.7
219	8	23	-1.3183	2.2704	55.6	8.6	1.1	69.7	9.7	0.6	69.7	9.7	0.6	69.7	9.7	0.6
220	8	24	-1.3594	2.3416	54.6	8.1	1.0	68.4	8.9	0.4	68.4	8.9	0.4	68.4	8.9	0.4
221	8	25	-1.4006	2.4129	53.9	7.8	0.9	67.5	8.5	0.4	67.5	8.6	0.4	67.5	8.5	0.4
222	8	26	-1.4417	2.4842	53.2	7.7	0.8	66.6	8.3	0.4	66.6	8.3	0.4	66.6	8.3	0.4
223	8	27	-1.4829	2.5555	52.4	7.5	0.8	65.4	8.0	0.3	65.5	8.0	0.3	65.4	8.0	0.3
224	8	28	-1.5240	2.6267	51.6	7.2	0.7	64.4	7.7	0.3	64.4	7.7	0.3	64.4	7.7	0.3
225	9	1	-0.3417	0.7435	218.3	88.2	17.9	260.1	100.3	16.4	319.4	131.7	31.2	260.8	100.7	16.7
226	9	2	-0.3829	0.8148	138.4	46.2	4.9	163.1	51.5	3.4	299.2	115.3	22.6	164.3	52.2	3.8
227	9	3	-0.4240	0.8860	114.5	32.1	2.8	134.7	36.5	2.2	238.8	80.3	11.4	136.7	37.6	2.7
228	9	4	-0.4652	0.9573	111.8	31.3	2.5	131.4	35.7	1.9	148.7	41.0	2.3	131.9	36.0	2.0
229	9	5	-0.5063	1.0286	107.5	27.7	2.2	126.6	32.0	1.6	129.5	32.4	1.6	126.7	32.0	1.6
230	9	6	-0.5475	1.0999	99.0	22.0	2.1	117.6	25.9	1.5	118.5	26.0	1.5	117.6	25.9	1.5
231	9	7	-0.5886	1.1711	87.2	20.5	2.0	105.7	24.1	1.4	106.0	24.1	1.4	105.7	24.1	1.4
232	9	8	-0.6298	1.2424	85.6	17.4	1.9	104.1	20.4	1.2	104.2	20.4	1.2	104.1	20.4	1.2
233	9	9	-0.6709	1.3137	83.1	16.1	1.7	101.2	18.8	1.0	101.3	18.8	1.0	101.2	18.8	1.0
234	9	10	-0.7121	1.3850	80.0	14.8	1.6	97.4	17.1	0.9	97.5	17.1	0.9	97.4	17.1	0.9
235	9	11	-0.7532	1.4562	76.4	13.3	1.5	93.3	15.4	0.8	93.4	15.4	0.8	93.3	15.4	0.8
236	9	12	-0.7944	1.5275	65.5	11.5	1.3	81.7	13.1	0.7	81.8	13.1	0.7	81.7	13.1	0.7
237	9	13	-0.8355	1.5988	63.2	10.8	1.3	79.2	12.3	0.6	79.3	12.3	0.6	79.2	12.3	0.6
238	9	14	-0.8767	1.6701	61.6	10.2	1.2	77.3	11.7	0.5	77.4	11.7	0.6	77.3	11.7	0.5
239	9	15	-0.9178	1.7413	60.3	9.7	1.1	75.8	11.0	0.5	75.8	11.0	0.5	75.8	11.0	0.5
240	9	16	-0.9590	1.8126	59.7	9.1	1.1	74.8	10.3	0.5	74.9	10.3	0.5	74.8	10.3	0.5

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing (2002/3) TA 65 dBA	Existing (2002/3) TA 75 dBA	Existing (2002/3) TA 85 dBA	2018 Future No Project TA 65 dBA	2018 Future No Project TA 75 dBA	2018 Future No Project TA 85 dBA	2018 With Full Use of Shifted Rwy (A2) TA 65 dBA	2018 With Full Use of Shifted Rwy (A2) TA 75 dBA	2018 With Full Use of Shifted Rwy (A2) TA 85 dBA	2018 W/ Special Area Use Procedures (A3) TA 65 dBA	2018 W/ Special Area Use Procedures (A3) TA 75 dBA	2018 W/ Special Area Use Procedures (A3) TA 85 dBA
241	9	17	-1.0001	1.8839	59.1	8.8	1.0	73.9	9.8	0.5	73.9	9.8	0.5	73.9	9.8	0.5
242	9	18	-1.0413	1.9552	58.3	8.5	0.9	72.9	9.4	0.4	72.9	9.4	0.4	72.9	9.4	0.4
243	9	19	-1.0824	2.0264	57.4	8.2	0.9	71.8	9.0	0.4	71.8	9.0	0.4	71.8	9.0	0.4
244	9	20	-1.1236	2.0977	56.6	8.0	0.8	70.8	8.7	0.4	70.8	8.7	0.4	70.8	8.7	0.4
245	9	21	-1.1647	2.1690	55.8	7.8	0.7	69.7	8.5	0.4	69.7	8.5	0.4	69.7	8.5	0.4
246	9	22	-1.2059	2.2403	55.0	7.6	0.7	68.6	8.2	0.3	68.6	8.2	0.3	68.6	8.2	0.3
247	9	23	-1.2470	2.3115	54.1	7.5	0.6	67.6	8.0	0.3	67.6	8.0	0.3	67.6	8.0	0.3
248	9	24	-1.2882	2.3828	53.2	7.3	0.5	66.4	7.8	0.3	66.4	7.8	0.3	66.4	7.8	0.3
249	9	25	-1.3293	2.4541	52.4	7.1	0.5	65.3	7.6	0.3	65.3	7.6	0.3	65.3	7.6	0.3
250	9	26	-1.3705	2.5253	51.7	7.0	0.4	64.3	7.3	0.2	64.3	7.3	0.2	64.3	7.3	0.2
251	9	27	-1.4116	2.5966	50.9	6.8	0.4	63.2	7.0	0.2	63.2	7.0	0.2	63.2	7.0	0.2
252	9	28	-1.4528	2.6679	50.1	6.5	0.3	62.1	6.7	0.2	62.1	6.7	0.2	62.1	6.7	0.2
253	10	1	-0.2704	0.7846	180.0	48.5	5.6	208.7	50.2	2.6	222.7	59.7	3.8	209.0	50.3	2.8
254	10	2	-0.3116	0.8559	151.3	33.9	3.7	173.3	33.2	1.7	219.6	54.4	3.7	173.8	33.4	1.8
255	10	3	-0.3527	0.9272	119.5	25.3	1.9	136.3	24.9	0.7	204.9	44.9	2.2	137.4	25.5	1.1
256	10	4	-0.3939	0.9985	96.0	18.8	1.1	110.0	19.5	0.6	165.0	29.1	1.3	111.3	20.2	0.8
257	10	5	-0.4350	1.0697	84.8	13.6	1.1	98.3	14.7	0.5	124.5	17.2	0.6	99.2	15.1	0.5
258	10	6	-0.4762	1.1410	73.9	13.0	1.0	87.5	14.0	0.5	92.2	14.4	0.5	87.7	14.1	0.5
259	10	7	-0.5173	1.2123	72.8	11.6	1.0	86.4	12.4	0.5	87.4	12.5	0.5	86.5	12.4	0.5
260	10	8	-0.5585	1.2836	69.3	9.9	1.0	82.5	10.2	0.5	82.9	10.3	0.5	82.5	10.3	0.5
261	10	9	-0.5996	1.3548	66.6	7.7	0.9	79.4	7.6	0.4	79.6	7.6	0.4	79.4	7.6	0.4
262	10	10	-0.6408	1.4261	63.8	7.1	0.9	76.2	6.9	0.4	76.4	6.9	0.4	76.2	6.9	0.4
263	10	11	-0.6819	1.4974	60.9	6.4	0.8	72.9	6.1	0.4	73.0	6.1	0.4	73.0	6.1	0.4
264	10	12	-0.7231	1.5687	51.6	6.1	0.8	63.2	5.8	0.4	63.3	5.8	0.4	63.2	5.8	0.4
265	10	13	-0.7642	1.6399	47.9	5.9	0.7	59.0	5.6	0.3	59.2	5.6	0.3	59.1	5.6	0.3
266	10	14	-0.8054	1.7112	47.4	5.6	0.7	58.5	5.2	0.3	58.5	5.2	0.3	58.5	5.2	0.3
267	10	15	-0.8465	1.7825	47.6	5.3	0.6	58.6	4.9	0.3	58.6	4.9	0.3	58.6	4.9	0.3
268	10	16	-0.8877	1.8538	47.7	5.1	0.6	58.6	4.6	0.3	58.6	4.6	0.3	58.6	4.6	0.3
269	10	17	-0.9288	1.9250	47.6	5.0	0.6	58.3	4.4	0.3	58.3	4.4	0.3	58.3	4.4	0.3
270	10	18	-0.9700	1.9963	47.5	4.8	0.5	58.1	4.1	0.2	58.1	4.1	0.2	58.1	4.1	0.2
271	10	19	-1.0111	2.0676	47.2	4.7	0.5	57.7	4.0	0.2	57.7	4.0	0.2	57.7	4.0	0.2
272	10	20	-1.0523	2.1389	47.0	4.6	0.4	57.5	3.8	0.2	57.2	3.8	0.2	57.5	3.8	0.2
273	10	21	-1.0934	2.2101	46.1	4.5	0.4	56.3	3.7	0.2	56.3	3.7	0.2	56.3	3.7	0.2
274	10	22	-1.1346	2.2814	45.2	4.4	0.4	55.1	3.6	0.2	55.1	3.6	0.2	55.1	3.6	0.2
275	10	23	-1.1757	2.3527	44.0	4.3	0.4	53.6	3.5	0.2	53.6	3.5	0.2	53.6	3.5	0.2
276	10	24	-1.2169	2.4239	43.1	4.1	0.3	52.5	3.3	0.2	52.5	3.3	0.2	52.5	3.3	0.2
277	10	25	-1.2580	2.4952	42.2	4.0	0.3	51.3	3.2	0.2	51.3	3.2	0.2	51.3	3.2	0.2
278	10	26	-1.2992	2.5665	41.1	3.9	0.3	50.0	3.0	0.1	50.0	3.0	0.1	50.0	3.0	0.1
279	10	27	-1.3403	2.6378	40.0	3.8	0.2	48.4	2.9	0.1	48.4	2.9	0.1	48.4	2.9	0.1
280	10	28	-1.3815	2.7090	38.8	3.6	0.2	46.9	2.7	0.1	46.9	2.7	0.1	46.9	2.7	0.1
281	11	1	-0.1992	0.8258	130.5	18.6	2.1	144.6	15.3	0.7	151.9	17.0	0.9	144.7	15.4	0.7
282	11	2	-0.2403	0.8971	114.8	15.9	1.6	126.5	12.8	0.5	145.2	17.0	0.8	126.7	13.0	0.6
283	11	3	-0.2815	0.9683	97.4	13.7	0.9	107.0	11.5	0.3	138.1	16.4	0.7	107.5	11.8	0.5
284	11	4	-0.3226	1.0396	76.4	10.6	0.9	84.2	9.6	0.3	118.2	12.4	0.4	85.0	10.0	0.3
285	11	5	-0.3638	1.1109	61.6	9.8	0.8	69.3	9.8	0.3	92.1	11.4	0.3	70.0	10.1	0.3
286	11	6	-0.4049	1.1822	55.1	8.9	0.8	63.0	9.6	0.3	74.4	10.6	0.3	63.7	9.8	0.3
287	11	7	-0.4461	1.2534	53.7	8.2	0.8	61.8	8.9	0.3	66.2	9.1	0.3	62.2	9.0	0.3
288	11	8	-0.4872	1.3247	50.8	7.1	0.8	58.6	7.5	0.3	59.6	7.5	0.3	58.8	7.5	0.3
289	11	9	-0.5284	1.3960	46.4	5.4	0.7	53.6	5.3	0.3	54.1	5.3	0.3	53.6	5.3	0.3
290	11	10	-0.5695	1.4673	43.4	3.7	0.7	50.2	3.3	0.3	50.5	3.3	0.3	50.3	3.3	0.3
291	11	11	-0.6107	1.5385	35.0	3.2	0.6	41.6	2.7	0.3	41.8	2.7	0.3	41.6	2.7	0.3
292	11	12	-0.6518	1.6098	31.7	3.0	0.6	37.9	2.5	0.3	38.1	2.5	0.3	37.9	2.5	0.3
293	11	13	-0.6930	1.6811	27.8	2.7	0.6	33.3	2.3	0.2	33.5	2.3	0.2	33.4	2.3	0.2
294	11	14	-0.7341	1.7524	26.7	2.5	0.5	32.0	2.0	0.2	32.0	2.0	0.2	32.0	2.0	0.2
295	11	15	-0.7753	1.8236	26.2	2.2	0.5	31.3	1.7	0.2	31.4	1.7	0.2	31.4	1.7	0.2
296	11	16	-0.8164	1.8949	26.0	2.1	0.4	31.0	1.6	0.2	31.0	1.6	0.2	31.0	1.6	0.2
297	11	17	-0.8576	1.9662	25.9	2.2	0.4	30.8	1.5	0.2	30.8	1.5	0.2	30.8	1.5	0.2
298	11	18	-0.8987	2.0375	25.7	2.2	0.4	30.3	1.4	0.2	30.3	1.4	0.2	30.3	1.4	0.2
299	11	19	-0.9399	2.1087	25.2	2.2	0.3	29.7	1.4	0.2	29.7	1.3	0.2	29.7	1.4	0.2
300	11	20	-0.9810	2.1800	25.0	2.2	0.3	29.4	1.3	0.1	29.4	1.3	0.1	29.4	1.3	0.1
301	11	21	-1.0222	2.2513	24.9	2.1	0.3	29.2	1.3	0.1	29.2	1.3	0.1	29.2	1.3	0.1
302	11	22	-1.0633	2.3225	24.6	2.1	0.3	28.8	1.2	0.1	28.8	1.2	0.1	28.8	1.2	0.1
303	11	23	-1.1045	2.3938	24.2	2.0	0.3	28.4	1.2	0.1	28.4	1.2	0.1	28.4	1.2	0.1
304	11	24	-1.1456	2.4651	23.9	2.0	0.2	28.0	1.1	0.1	28.0	1.1	0.1	28.0	1.1	0.1
305	11	25	-1.1868	2.5364	23.5	2.0	0.2	27.6	1.1	0.1	27.6	1.1	0.1	27.6	1.1	0.1
306	11	26	-1.2279	2.6076	23.1	1.9	0.2	27.1	1.1	0.1	27.1	1.1	0.1	27.1	1.1	0.1
307	11	27	-1.2691	2.6789	22.8	1.9	0.2	26.8	1.0	0.1	26.8	1.0	0.1	26.8	1.0	0.1
308	11	28	-1.3102	2.7502	22.5	1.9	0.1	26.4	1.0	0.1	26.4	1.0	0.1	26.4	1.0	0.1
309	12	1	-0.1279	0.8669	86.5	8.3	0.6	92.6	4.8	0.2	95.3	5.1	0.2	92.6	4.8	0.2
310	12	2	-0.1690	0.9382	77.9	7.6	0.6	82.7	4.4	0.2	91.9	5.1	0.2	82.8	4.4	0.2
311	12	3	-0.2102	1.0095	71.2	6.5	0.6	75.1	4.0	0.2	91.8	4.9	0.2	75.4	4.2	0.2
312	12	4	-0.2513	1.0808	60.3	5.1	0.6	64.4	3.6	0.2	83.4	4.9	0.2	64.8	3.8	0.2
313	12	5	-0.2925	1.1520	56.3	5.3	0.6	60.9	4.6	0.2	72.6	5.7	0.2	61.4	4.9	0.2
314	12	6	-0.3336	1.2233	51.8	6.5	0.6	56.5	6.7	0.2	62.9	7.2	0.2	57.0	6.9	0.2
315	12	7	-0.3748	1.2946	47.7	7.0	0.5	52.4	7.3	0.2	55.4	7.4	0.2	52.8	7.4	0.2
316	12	8	-0.4159	1.3659	44.3	6.4	0.5	49.0	6.6	0.2	50.9	6.6	0.2	49.3	6.6	0.2
317	12	9	-0.4571	1.4371	40.6	4.9	0.5	45.1	4.8	0.2	46.2	4.8	0.2	45.3	4.8	0.2
318	12	10	-0.4982	1.5084	36.3	2.9	0.4	40.3	2.3	0.2	40.8	2.3	0.2	40.4	2.3	0.2
319	12	11	-0.5394	1.5797	26.9	2.3	0.4	30.5	1.6	0.2	30.8	1.6	0.2	30.6	1.6	0.2
320	12	12	-0.5805	1.6510	23.3	2.2	0.4	26.3	1.5	0.1	26.6	1.5	0.1	26.4	1.5	0.1

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

					Existing (2002/3)			2018 Future No Project			2018 With Full Use of Shifted Rwy (A2)			2018 W/ Special Area Use Procedures (A3)		
Site	**I**	**J**	**X (nm)**	**Y (nm)**	**TA 65 dBA**	**TA 75 dBA**	**TA 85 dBA**	**TA 65 dBA**	**TA 75 dBA**	**TA 85 dBA**	**TA 65 dBA**	**TA 75 dBA**	**TA 85 dBA**	**TA 65 dBA**	**TA 75 dBA**	**TA 85 dBA**
321	12	13	-0.6217	1.7222	18.9	2.0	0.4	21.0	1.4	0.1	21.2	1.4	0.1	21.1	1.4	0.1
322	12	14	-0.6628	1.7935	17.9	1.8	0.3	19.7	1.2	0.1	19.8	1.2	0.1	19.8	1.2	0.1
323	12	15	-0.7040	1.8648	17.0	1.7	0.3	18.5	1.1	0.1	18.6	1.1	0.1	18.6	1.1	0.1
324	12	16	-0.7451	1.9361	16.7	1.6	0.3	18.1	1.0	0.1	18.1	1.0	0.1	18.1	1.0	0.1
325	12	17	-0.7863	2.0073	16.4	1.6	0.2	17.6	0.9	0.1	17.6	0.9	0.1	17.6	0.9	0.1
326	12	18	-0.8274	2.0786	16.1	1.6	0.2	17.1	0.9	0.1	17.1	0.9	0.1	17.1	0.9	0.1
327	12	19	-0.8686	2.1499	16.2	1.6	0.2	17.1	0.9	0.1	17.1	0.9	0.1	17.1	0.9	0.1
328	12	20	-0.9097	2.2212	16.2	1.5	0.2	17.4	0.8	0.1	17.3	0.8	0.1	17.4	0.8	0.1
329	12	21	-0.9509	2.2924	16.3	1.5	0.2	17.5	0.8	0.1	17.5	0.8	0.1	17.5	0.8	0.1
330	12	22	-0.9920	2.3637	16.3	1.5	0.2	17.5	0.8	0.1	17.5	0.8	0.1	17.5	0.8	0.1
331	12	23	-1.0332	2.4350	16.2	1.4	0.1	17.5	0.8	0.1	17.5	0.8	0.1	17.5	0.8	0.1
332	12	24	-1.0743	2.5062	16.1	1.4	0.1	17.4	0.8	0.1	17.4	0.8	0.1	17.4	0.8	0.1
333	12	25	-1.1155	2.5775	15.8	1.4	0.1	17.2	0.7	0.1	17.2	0.7	0.1	17.2	0.7	0.1
334	12	26	-1.1566	2.6488	15.6	1.4	0.1	17.1	0.7	0.1	17.0	0.7	0.1	17.1	0.7	0.1
335	12	27	-1.1978	2.7201	15.4	1.3	0.1	16.9	0.7	0.0	16.9	0.7	0.0	16.9	0.7	0.0
336	12	28	-1.2389	2.7913	15.2	1.3	0.1	16.7	0.6	0.0	16.7	0.6	0.0	16.7	0.6	0.0
337	13	1	-0.0566	0.9081	49.1	4.8	0.3	49.2	2.4	0.1	50.8	2.5	0.1	49.2	2.4	0.1
338	13	2	-0.0978	0.9794	48.5	4.3	0.3	48.9	2.2	0.1	55.1	2.5	0.1	49.0	2.3	0.1
339	13	3	-0.1389	1.0506	50.4	3.4	0.3	51.8	1.8	0.1	58.8	2.4	0.1	52.0	1.9	0.1
340	13	4	-0.1801	1.1219	49.9	2.8	0.3	52.3	1.5	0.1	58.1	2.2	0.1	52.6	1.7	0.1
341	13	5	-0.2212	1.1932	48.5	2.6	0.3	51.8	1.9	0.1	56.9	2.3	0.1	52.1	2.1	0.1
342	13	6	-0.2624	1.2645	47.4	2.8	0.3	51.3	2.3	0.1	54.2	2.4	0.1	51.6	2.3	0.1
343	13	7	-0.3035	1.3357	44.1	5.5	0.3	48.2	5.5	0.1	50.2	5.5	0.1	48.5	5.5	0.1
344	13	8	-0.3447	1.4070	40.0	5.4	0.3	43.9	5.4	0.1	45.5	5.4	0.1	44.2	5.4	0.1
345	13	9	-0.3858	1.4783	36.6	3.9	0.3	40.6	3.6	0.1	41.8	3.6	0.1	40.8	3.6	0.1
346	13	10	-0.4270	1.5496	24.9	2.3	0.2	28.2	1.7	0.1	29.1	1.7	0.1	28.5	1.7	0.1
347	13	11	-0.4681	1.6208	21.0	1.9	0.2	23.8	1.2	0.1	24.3	1.2	0.1	23.9	1.2	0.1
348	13	12	-0.5093	1.6921	17.8	1.7	0.2	19.9	1.0	0.1	20.2	1.0	0.1	19.9	1.0	0.1
349	13	13	-0.5504	1.7634	14.0	1.6	0.2	15.2	0.9	0.1	15.3	0.9	0.1	15.2	0.9	0.1
350	13	14	-0.5916	1.8347	12.6	1.5	0.2	13.2	0.9	0.1	13.3	0.9	0.1	13.3	0.9	0.1
351	13	15	-0.6327	1.9059	11.7	1.4	0.2	12.0	0.8	0.1	12.0	0.8	0.1	12.0	0.8	0.1
352	13	16	-0.6739	1.9772	11.3	1.4	0.1	11.4	0.8	0.1	11.4	0.8	0.1	11.4	0.8	0.1
353	13	17	-0.7150	2.0485	11.2	1.4	0.1	11.0	0.8	0.0	11.0	0.8	0.0	11.0	0.8	0.0
354	13	18	-0.7562	2.1198	11.0	1.4	0.1	10.6	0.7	0.0	10.6	0.7	0.0	10.6	0.7	0.0
355	13	19	-0.7973	2.1910	10.6	1.4	0.1	10.0	0.7	0.0	10.0	0.7	0.0	10.0	0.7	0.0
356	13	20	-0.8385	2.2623	10.4	1.3	0.1	9.6	0.7	0.0	9.6	0.7	0.0	9.6	0.7	0.0
357	13	21	-0.8796	2.3336	10.1	1.3	0.1	9.2	0.7	0.0	9.2	0.7	0.0	9.2	0.7	0.0
358	13	22	-0.9208	2.4048	9.9	1.2	0.1	8.9	0.6	0.0	8.9	0.6	0.0	8.9	0.6	0.0
359	13	23	-0.9619	2.4761	9.8	1.2	0.0	8.9	0.6	0.0	8.9	0.6	0.0	8.9	0.6	0.0
360	13	24	-1.0031	2.5474	9.8	1.2	0.0	8.9	0.5	0.0	8.9	0.5	0.0	8.9	0.5	0.0
361	13	25	-1.0442	2.6187	9.7	1.1	0.0	8.7	0.5	0.0	8.7	0.5	0.0	8.7	0.5	0.0
362	13	26	-1.0854	2.6899	9.4	1.1	0.0	8.5	0.5	0.0	8.5	0.5	0.0	8.5	0.5	0.0
363	13	27	-1.1265	2.7612	9.1	1.1	0.0	8.2	0.5	0.0	8.2	0.5	0.0	8.2	0.5	0.0
364	13	28	-1.1677	2.8325	8.7	1.1	0.0	7.8	0.5	0.0	7.8	0.5	0.0	7.8	0.5	0.0
365	14	1	0.0147	0.9492	33.3	2.3	0.1	30.7	0.9	0.0	30.3	0.9	0.0	30.7	0.9	0.0
366	14	2	-0.0265	1.0205	34.1	2.0	0.1	32.2	0.8	0.0	33.6	1.0	0.0	32.2	0.9	0.0
367	14	3	-0.0676	1.0918	36.4	1.5	0.1	35.5	0.7	0.0	37.9	0.9	0.0	35.7	0.8	0.0
368	14	4	-0.1088	1.1631	40.1	1.5	0.1	40.9	0.7	0.0	43.4	0.9	0.0	41.1	0.8	0.0
369	14	5	-0.1499	1.2343	41.9	1.6	0.1	44.2	0.9	0.0	46.1	0.9	0.0	44.4	0.9	0.0
370	14	6	-0.1911	1.3056	41.0	2.2	0.1	44.0	1.6	0.0	45.5	1.6	0.0	44.2	1.6	0.0
371	14	7	-0.2322	1.3769	38.5	3.2	0.1	41.6	2.9	0.0	43.1	2.9	0.0	41.8	2.9	0.0
372	14	8	-0.2734	1.4482	34.6	3.7	0.1	37.7	3.5	0.0	39.0	3.5	0.0	38.0	3.5	0.0
373	14	9	-0.3145	1.5194	25.2	3.1	0.1	28.1	2.7	0.0	29.0	2.7	0.0	28.3	2.7	0.0
374	14	10	-0.3557	1.5907	20.2	1.9	0.1	22.7	1.3	0.0	23.5	1.3	0.0	22.9	1.3	0.0
375	14	11	-0.3968	1.6620	16.4	1.5	0.1	18.5	0.9	0.0	19.3	0.9	0.0	18.7	0.9	0.0
376	14	12	-0.4380	1.7333	13.8	1.3	0.1	15.4	0.7	0.0	15.8	0.7	0.0	15.5	0.7	0.0
377	14	13	-0.4791	1.8045	10.8	1.3	0.1	11.7	0.7	0.0	11.9	0.7	0.0	11.8	0.7	0.0
378	14	14	-0.5203	1.8758	9.0	1.2	0.1	9.4	0.6	0.0	9.5	0.6	0.0	9.5	0.6	0.0
379	14	15	-0.5614	1.9471	8.2	1.2	0.0	8.4	0.6	0.0	8.4	0.6	0.0	8.4	0.6	0.0
380	14	16	-0.6026	2.0184	7.8	1.1	0.0	7.9	0.6	0.0	7.9	0.6	0.0	7.9	0.6	0.0
381	14	17	-0.6437	2.0896	7.6	1.1	0.0	7.5	0.6	0.0	7.5	0.6	0.0	7.5	0.6	0.0
382	14	18	-0.6849	2.1609	7.4	1.1	0.0	7.1	0.5	0.0	7.1	0.5	0.0	7.1	0.5	0.0
383	14	19	-0.7260	2.2322	7.1	1.1	0.0	6.7	0.5	0.0	6.7	0.5	0.0	6.7	0.5	0.0
384	14	20	-0.7672	2.3035	6.8	1.1	0.0	6.3	0.5	0.0	6.3	0.5	0.0	6.3	0.5	0.0
385	14	21	-0.8083	2.3747	6.6	1.0	0.0	6.0	0.5	0.0	6.0	0.5	0.0	6.0	0.5	0.0
386	14	22	-0.8495	2.4460	6.5	1.0	0.0	5.9	0.4	0.0	5.9	0.4	0.0	5.9	0.4	0.0
387	14	23	-0.8906	2.5173	6.4	1.0	0.0	5.7	0.4	0.0	5.7	0.4	0.0	5.7	0.4	0.0
388	14	24	-0.9318	2.5885	6.2	0.9	0.0	5.6	0.4	0.0	5.6	0.4	0.0	5.6	0.4	0.0
389	14	25	-0.9729	2.6598	6.0	0.9	0.0	5.4	0.4	0.0	5.4	0.4	0.0	5.4	0.4	0.0
390	14	26	-1.0141	2.7311	5.8	0.9	0.0	5.1	0.4	0.0	5.1	0.4	0.0	5.1	0.4	0.0
391	14	27	-1.0552	2.8024	5.7	0.9	0.0	4.9	0.4	0.0	4.9	0.4	0.0	4.9	0.4	0.0
392	14	28	-1.0964	2.8736	5.6	0.9	0.0	4.6	0.3	0.0	4.6	0.3	0.0	4.6	0.3	0.0
393	15	1	0.0859	0.9904	25.5	1.1	0.0	22.0	0.4	0.0	22.0	0.4	0.0	22.0	0.4	0.0
394	15	2	0.0448	1.0617	26.3	1.1	0.0	23.5	0.4	0.0	24.1	0.4	0.0	23.6	0.4	0.0
395	15	3	0.0036	1.1329	27.0	1.1	0.0	25.0	0.4	0.0	25.8	0.4	0.0	25.1	0.4	0.0
396	15	4	-0.0375	1.2042	32.4	1.1	0.0	32.3	0.4	0.0	33.4	0.4	0.0	32.5	0.4	0.0
397	15	5	-0.0787	1.2755	34.5	1.1	0.0	35.7	0.4	0.0	36.8	0.4	0.0	35.9	0.4	0.0
398	15	6	-0.1198	1.3468	33.9	1.6	0.0	35.7	1.0	0.0	36.9	1.0	0.0	36.0	1.0	0.0
399	15	7	-0.1610	1.4180	30.0	1.8	0.0	32.2	1.3	0.0	33.3	1.3	0.0	32.4	1.3	0.0
400	15	8	-0.2021	1.4893	24.9	2.8	0.0	27.1	2.5	0.0	27.9	2.5	0.0	27.2	2.5	0.0

Table C-12
King County International Airport EA
TA Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing (2002/3) TA 65 dBA	TA 75 dBA	TA 85 dBA	2018 Future No Project TA 65 dBA	TA 75 dBA	TA 85 dBA	2018 With Full Use of Shifted Rwy (A2) TA 65 dBA	TA 75 dBA	TA 85 dBA	2018 W/ Special Area Use Procedures (A3) TA 65 dBA	TA 75 dBA	TA 85 dBA
401	15	9	-0.2433	1.5606	20.4	2.3	0.0	22.5	1.9	0.0	23.3	1.9	0.0	22.7	1.9	0.0
402	15	10	-0.2844	1.6319	16.0	1.5	0.0	17.7	0.9	0.0	18.4	0.9	0.0	17.8	0.9	0.0
403	15	11	-0.3256	1.7031	13.0	1.2	0.0	14.3	0.6	0.0	14.8	0.6	0.0	14.4	0.6	0.0
404	15	12	-0.3667	1.7744	10.6	1.0	0.0	11.3	0.4	0.0	11.5	0.4	0.0	11.4	0.4	0.0
405	15	13	-0.4079	1.8457	8.2	1.0	0.0	8.4	0.4	0.0	8.6	0.4	0.0	8.5	0.4	0.0
406	15	14	-0.4490	1.9170	6.5	0.9	0.0	6.2	0.4	0.0	6.3	0.4	0.0	6.3	0.4	0.0
407	15	15	-0.4902	1.9882	5.8	0.9	0.0	5.4	0.4	0.0	5.4	0.4	0.0	5.4	0.4	0.0
408	15	16	-0.5313	2.0595	5.5	0.9	0.0	5.0	0.4	0.0	5.0	0.4	0.0	5.0	0.4	0.0
409	15	17	-0.5725	2.1308	5.3	0.8	0.0	4.7	0.4	0.0	4.7	0.4	0.0	4.7	0.4	0.0
410	15	18	-0.6136	2.2021	5.1	0.8	0.0	4.4	0.3	0.0	4.4	0.3	0.0	4.4	0.3	0.0
411	15	19	-0.6548	2.2733	4.9	0.8	0.0	4.1	0.3	0.0	4.1	0.3	0.0	4.1	0.3	0.0
412	15	20	-0.6959	2.3446	4.8	0.8	0.0	4.0	0.3	0.0	4.0	0.3	0.0	4.0	0.3	0.0
413	15	21	-0.7371	2.4159	4.7	0.8	0.0	3.9	0.3	0.0	3.9	0.3	0.0	3.9	0.3	0.0
414	15	22	-0.7782	2.4871	4.6	0.7	0.0	3.8	0.3	0.0	3.8	0.3	0.0	3.8	0.3	0.0
415	15	23	-0.8194	2.5584	4.6	0.7	0.0	3.7	0.3	0.0	3.7	0.3	0.0	3.7	0.3	0.0
416	15	24	-0.8605	2.6297	4.5	0.7	0.0	3.6	0.3	0.0	3.6	0.3	0.0	3.6	0.3	0.0
417	15	25	-0.9017	2.7010	4.4	0.7	0.0	3.5	0.3	0.0	3.5	0.3	0.0	3.5	0.3	0.0
418	15	26	-0.9428	2.7722	4.3	0.7	0.0	3.4	0.3	0.0	3.4	0.3	0.0	3.4	0.3	0.0
419	15	27	-0.9840	2.8435	4.1	0.7	0.0	3.2	0.3	0.0	3.2	0.3	0.0	3.2	0.3	0.0
420	15	28	-1.0251	2.9148	4.0	0.6	0.0	3.0	0.2	0.0	3.0	0.2	0.0	3.0	0.2	0.0
421	16	1	0.1572	1.0315	19.0	0.7	0.0	15.9	0.2	0.0	15.9	0.2	0.0	15.8	0.2	0.0
422	16	2	0.1161	1.1028	19.3	0.8	0.0	16.6	0.2	0.0	16.9	0.2	0.0	16.6	0.2	0.0
423	16	3	0.0749	1.1741	21.8	0.8	0.0	20.0	0.2	0.0	20.6	0.2	0.0	20.1	0.2	0.0
424	16	4	0.0338	1.2454	25.5	0.8	0.0	25.0	0.2	0.0	25.8	0.2	0.0	25.1	0.2	0.0
425	16	5	-0.0074	1.3166	25.9	0.8	0.0	26.7	0.2	0.0	27.5	0.2	0.0	26.8	0.2	0.0
426	16	6	-0.0485	1.3879	24.5	1.1	0.0	25.9	0.6	0.0	26.7	0.6	0.0	26.1	0.6	0.0
427	16	7	-0.0897	1.4592	21.6	1.5	0.0	23.3	1.0	0.0	24.0	1.0	0.0	23.4	1.0	0.0
428	16	8	-0.1308	1.5305	18.9	1.5	0.0	20.7	1.1	0.0	21.4	1.1	0.0	20.9	1.1	0.0
429	16	9	-0.1720	1.6017	17.0	1.4	0.0	18.7	0.9	0.0	19.4	0.9	0.0	18.8	0.9	0.0
430	16	10	-0.2131	1.6730	13.1	1.2	0.0	14.4	0.7	0.0	15.0	0.7	0.0	14.5	0.7	0.0
431	16	11	-0.2543	1.7443	10.1	0.8	0.0	10.8	0.3	0.0	11.1	0.3	0.0	10.9	0.3	0.0
432	16	12	-0.2954	1.8156	8.3	0.7	0.0	8.6	0.3	0.0	8.8	0.3	0.0	8.8	0.3	0.0
433	16	13	-0.3366	1.8868	5.7	0.7	0.0	5.3	0.3	0.0	5.5	0.3	0.0	5.4	0.3	0.0
434	16	14	-0.3777	1.9581	4.3	0.7	0.0	3.7	0.3	0.0	3.8	0.3	0.0	3.8	0.3	0.0
435	16	15	-0.4189	2.0294	3.8	0.6	0.0	3.0	0.3	0.0	3.0	0.3	0.0	3.0	0.3	0.0
436	16	16	-0.4600	2.1007	3.6	0.6	0.0	2.8	0.2	0.0	2.8	0.2	0.0	2.8	0.2	0.0
437	16	17	-0.5012	2.1719	3.6	0.6	0.0	2.7	0.2	0.0	2.7	0.2	0.0	2.7	0.2	0.0
438	16	18	-0.5423	2.2432	3.7	0.6	0.0	2.7	0.2	0.0	2.7	0.2	0.0	2.7	0.2	0.0
439	16	19	-0.5835	2.3145	3.7	0.6	0.0	2.7	0.2	0.0	2.7	0.2	0.0	2.7	0.2	0.0
440	16	20	-0.6246	2.3858	3.7	0.5	0.0	2.6	0.2	0.0	2.6	0.2	0.0	2.6	0.2	0.0
441	16	21	-0.6658	2.4570	3.6	0.5	0.0	2.6	0.2	0.0	2.6	0.2	0.0	2.6	0.2	0.0
442	16	22	-0.7069	2.5283	3.5	0.5	0.0	2.5	0.2	0.0	2.5	0.2	0.0	2.5	0.2	0.0
443	16	23	-0.7481	2.5996	3.5	0.5	0.0	2.4	0.2	0.0	2.4	0.2	0.0	2.4	0.2	0.0
444	16	24	-0.7892	2.6708	3.5	0.5	0.0	2.4	0.2	0.0	2.4	0.2	0.0	2.4	0.2	0.0
445	16	25	-0.8304	2.7421	3.5	0.5	0.0	2.4	0.2	0.0	2.4	0.2	0.0	2.4	0.2	0.0
446	16	26	-0.8715	2.8134	3.4	0.5	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
447	16	27	-0.9127	2.8847	3.3	0.5	0.0	2.3	0.2	0.0	2.3	0.2	0.0	2.3	0.2	0.0
448	16	28	-0.9538	2.9559	3.2	0.4	0.0	2.2	0.2	0.0	2.2	0.2	0.0	2.2	0.2	0.0
SP	1	1	-0.5832	0.7732	97.8	40.4	8.2	114.2	41.9	7.2	238.3	93.0	16.9	116.2	43.0	7.8

Prepared December 31, 2003

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

						2018 Lmax			Change with	
					Existing		Full Use of Vith Special Are		Full Use of	Special Use Area
			X	Y	2002/3	No Project	Shifted Rwy Use Procedures		Shift vs	Procedures vs
Site	I	J	(nm)	(nm)	(Lmax)		A2	A3	No Project	No Project
1	1	1	-0.9119	0.4143	86.0	86.0	86.0	86.0	0.0	0.0
2	1	2	-0.9530	0.4856	86.4	86.4	86.4	86.4	0.0	0.0
3	1	3	-0.9942	0.5568	86.7	86.7	86.7	86.7	0.0	0.0
4	1	4	-1.0353	0.6281	86.9	86.9	86.9	86.9	0.0	0.0
5	1	5	-1.0765	0.6994	87.1	87.1	87.1	87.1	0.0	0.0
6	1	6	-1.1176	0.7707	87.3	87.3	87.3	87.3	0.0	0.0
7	1	7	-1.1588	0.8419	87.6	87.6	87.6	87.6	0.0	0.0
8	1	8	-1.1999	0.9132	88.0	88.0	88.0	88.0	0.0	0.0
9	1	9	-1.2411	0.9845	88.3	88.3	88.3	88.3	0.0	0.0
10	1	10	-1.2822	1.0558	88.4	88.4	88.4	88.4	0.0	0.0
11	1	11	-1.3234	1.1270	88.8	88.8	88.8	88.8	0.0	0.0
12	1	12	-1.3645	1.1983	88.9	88.9	88.9	88.9	0.0	0.0
13	1	13	-1.4057	1.2696	89.0	89.0	89.0	89.0	0.0	0.0
14	1	14	-1.4468	1.3409	89.3	89.3	89.3	89.3	0.0	0.0
15	1	15	-1.4880	1.4121	89.7	89.7	89.7	89.7	0.0	0.0
16	1	16	-1.5291	1.4834	89.8	89.8	89.8	89.8	0.0	0.0
17	1	17	-1.5703	1.5547	89.9	89.9	89.9	89.9	0.0	0.0
18	1	18	-1.6114	1.6260	90.0	90.0	90.0	90.0	0.0	0.0
19	1	19	-1.6526	1.6972	90.1	90.1	90.1	90.1	0.0	0.0
20	1	20	-1.6937	1.7685	90.1	90.1	90.1	90.1	0.0	0.0
21	1	21	-1.7349	1.8398	90.2	90.2	90.2	90.2	0.0	0.0
22	1	22	-1.7760	1.9111	90.3	90.3	90.3	90.3	0.0	0.0
23	1	23	-1.8172	1.9823	90.3	90.3	90.3	90.3	0.0	0.0
24	1	24	-1.8583	2.0536	90.3	90.3	90.3	90.3	0.0	0.0
25	1	25	-1.8995	2.1249	90.4	90.4	90.4	90.4	0.0	0.0
26	1	26	-1.9406	2.1961	90.4	90.4	90.4	90.4	0.0	0.0
27	1	27	-1.9818	2.2674	90.4	90.4	90.4	90.4	0.0	0.0
28	1	28	-2.0229	2.3387	90.6	90.6	90.6	90.6	0.0	0.0
29	2	1	-0.8406	0.4554	89.1	89.1	89.1	89.1	0.0	0.0
30	2	2	-0.8818	0.5267	89.3	89.3	89.3	89.3	0.0	0.0
31	2	3	-0.9229	0.5980	89.6	89.6	89.6	89.6	0.0	0.0
32	2	4	-0.9641	0.6693	89.7	89.7	89.7	89.7	0.0	0.0
33	2	5	-1.0052	0.7405	90.0	90.0	90.0	90.0	0.0	0.0
34	2	6	-1.0464	0.8118	90.1	90.1	90.1	90.1	0.0	0.0
35	2	7	-1.0875	0.8831	90.3	90.3	90.3	90.3	0.0	0.0
36	2	8	-1.1287	0.9544	90.6	90.6	90.6	90.6	0.0	0.0
37	2	9	-1.1698	1.0256	90.7	90.7	90.7	90.7	0.0	0.0
38	2	10	-1.2110	1.0969	91.0	91.0	91.0	91.0	0.0	0.0
39	2	11	-1.2521	1.1682	91.4	91.4	91.4	91.4	0.0	0.0
40	2	12	-1.2933	1.2395	91.5	91.5	91.5	91.5	0.0	0.0
41	2	13	-1.3344	1.3107	91.6	91.6	91.6	91.6	0.0	0.0
42	2	14	-1.3756	1.3820	91.7	91.7	91.7	91.7	0.0	0.0
43	2	15	-1.4167	1.4533	91.8	91.8	91.8	91.8	0.0	0.0
44	2	16	-1.4579	1.5246	91.9	91.9	91.9	91.9	0.0	0.0
45	2	17	-1.4990	1.5958	91.9	91.9	91.9	91.9	0.0	0.0
46	2	18	-1.5402	1.6671	92.0	92.0	92.0	92.0	0.0	0.0
47	2	19	-1.5813	1.7384	92.0	92.0	92.0	92.0	0.0	0.0
48	2	20	-1.6225	1.8097	92.1	92.1	92.1	92.1	0.0	0.0
49	2	21	-1.6636	1.8809	92.1	92.1	92.1	92.1	0.0	0.0
50	2	22	-1.7048	1.9522	92.2	92.2	92.2	92.2	0.0	0.0
51	2	23	-1.7459	2.0235	92.4	92.4	92.4	92.4	0.0	0.0
52	2	24	-1.7871	2.0947	92.6	92.6	92.6	92.6	0.0	0.0
53	2	25	-1.8282	2.1660	92.8	92.8	92.8	92.8	0.0	0.0
54	2	26	-1.8694	2.2373	92.9	92.9	92.9	92.9	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax Vith Special Area Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
55	2	27	-1.9105	2.3086	93.1	93.1	93.1	93.1	0.0	0.0
56	2	28	-1.9517	2.3798	93.2	93.2	93.2	93.2	0.0	0.0
57	3	1	-0.7694	0.4966	92.5	92.5	92.5	92.5	0.0	0.0
58	3	2	-0.8105	0.5679	92.7	92.7	92.7	92.7	0.0	0.0
59	3	3	-0.8517	0.6391	92.8	92.8	92.8	92.8	0.0	0.0
60	3	4	-0.8928	0.7104	92.9	92.9	92.9	92.9	0.0	0.0
61	3	5	-0.9340	0.7817	92.9	92.9	92.9	92.9	0.0	0.0
62	3	6	-0.9751	0.8530	93.0	93.0	93.0	93.0	0.0	0.0
63	3	7	-1.0163	0.9242	93.3	93.3	93.3	93.3	0.0	0.0
64	3	8	-1.0574	0.9955	93.5	93.5	93.5	93.5	0.0	0.0
65	3	9	-1.0986	1.0668	93.5	93.5	93.5	93.5	0.0	0.0
66	3	10	-1.1397	1.1381	93.6	93.6	93.6	93.6	0.0	0.0
67	3	11	-1.1809	1.2093	93.7	93.7	93.7	93.7	0.0	0.0
68	3	12	-1.2220	1.2806	93.8	93.8	93.8	93.8	0.0	0.0
69	3	13	-1.2632	1.3519	93.9	93.9	93.9	93.9	0.0	0.0
70	3	14	-1.3043	1.4232	93.9	93.9	93.9	93.9	0.0	0.0
71	3	15	-1.3455	1.4944	93.9	93.9	93.9	93.9	0.0	0.0
72	3	16	-1.3866	1.5657	94.1	94.1	94.1	94.1	0.0	0.0
73	3	17	-1.4278	1.6370	94.3	94.3	94.3	94.3	0.0	0.0
74	3	18	-1.4689	1.7083	94.5	94.5	94.5	94.5	0.0	0.0
75	3	19	-1.5101	1.7795	94.7	94.7	94.7	94.7	0.0	0.0
76	3	20	-1.5512	1.8508	94.8	94.8	94.8	94.8	0.0	0.0
77	3	21	-1.5924	1.9221	95.0	95.0	95.0	95.0	0.0	0.0
78	3	22	-1.6335	1.9934	95.0	95.0	95.0	95.0	0.0	0.0
79	3	23	-1.6747	2.0646	95.0	95.0	95.0	95.0	0.0	0.0
80	3	24	-1.7158	2.1359	95.0	95.0	95.0	95.0	0.0	0.0
81	3	25	-1.7570	2.2072	95.0	95.0	95.0	95.0	0.0	0.0
82	3	26	-1.7981	2.2784	94.9	94.9	94.9	94.9	0.0	0.0
83	3	27	-1.8393	2.3497	94.8	94.8	94.8	94.8	0.0	0.0
84	3	28	-1.8804	2.4210	94.7	94.7	94.7	94.7	0.0	0.0
85	4	1	-0.6981	0.5377	96.2	96.2	96.2	96.2	0.0	0.0
86	4	2	-0.7392	0.6090	96.2	96.2	96.2	96.2	0.0	0.0
87	4	3	-0.7804	0.6803	96.1	96.1	96.1	96.1	0.0	0.0
88	4	4	-0.8215	0.7516	96.0	96.0	96.0	96.0	0.0	0.0
89	4	5	-0.8627	0.8228	96.1	96.1	96.1	96.1	0.0	0.0
90	4	6	-0.9038	0.8941	96.2	96.2	96.2	96.2	0.0	0.0
91	4	7	-0.9450	0.9654	96.2	96.2	96.2	96.2	0.0	0.0
92	4	8	-0.9861	1.0367	96.3	96.3	96.3	96.3	0.0	0.0
93	4	9	-1.0273	1.1079	96.6	96.6	96.6	96.6	0.0	0.0
94	4	10	-1.0684	1.1792	96.9	96.9	96.9	96.9	0.0	0.0
95	4	11	-1.1096	1.2505	97.0	97.0	97.0	97.0	0.0	0.0
96	4	12	-1.1507	1.3218	97.1	97.1	97.1	97.1	0.0	0.0
97	4	13	-1.1919	1.3930	97.1	97.1	97.1	97.1	0.0	0.0
98	4	14	-1.2330	1.4643	97.1	97.1	97.1	97.1	0.0	0.0
99	4	15	-1.2742	1.5356	97.1	97.1	97.1	97.1	0.0	0.0
100	4	16	-1.3153	1.6069	97.1	97.1	97.1	97.1	0.0	0.0
101	4	17	-1.3565	1.6781	97.0	97.0	97.0	97.0	0.0	0.0
102	4	18	-1.3976	1.7494	97.0	97.0	97.0	97.0	0.0	0.0
103	4	19	-1.4388	1.8207	96.9	96.9	96.9	96.9	0.0	0.0
104	4	20	-1.4799	1.8920	96.7	96.7	96.7	96.7	0.0	0.0
105	4	21	-1.5211	1.9632	96.6	96.6	96.6	96.6	0.0	0.0
106	4	22	-1.5622	2.0345	96.4	96.4	96.4	96.4	0.0	0.0
107	4	23	-1.6034	2.1058	96.2	96.2	96.2	96.2	0.0	0.0
108	4	24	-1.6445	2.1770	96.0	96.0	96.0	96.0	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax Vith Special Area Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
109	4	25	-1.6857	2.2483	95.8	95.8	95.8	95.8	0.0	0.0
110	4	26	-1.7268	2.3196	95.5	95.5	95.5	95.5	0.0	0.0
111	4	27	-1.7680	2.3909	95.3	95.3	95.3	95.3	0.0	0.0
112	4	28	-1.8091	2.4621	95.0	95.0	95.0	95.0	0.0	0.0
113	5	1	-0.6268	0.5789	109.5	109.5	109.5	109.5	0.0	0.0
114	5	2	-0.6680	0.6502	104.0	104.0	104.0	104.0	0.0	0.0
115	5	3	-0.7091	0.7214	100.1	100.1	100.1	100.1	0.0	0.0
116	5	4	-0.7503	0.7927	100.7	100.7	100.7	100.7	0.0	0.0
117	5	5	-0.7914	0.8640	101.2	101.2	101.2	101.2	0.0	0.0
118	5	6	-0.8326	0.9353	101.4	101.4	101.4	101.4	0.0	0.0
119	5	7	-0.8737	1.0065	101.5	101.5	101.6	101.5	0.1	0.0
120	5	8	-0.9149	1.0778	101.5	101.5	101.5	101.5	0.0	0.0
121	5	9	-0.9560	1.1491	101.3	101.3	101.3	101.3	0.0	0.0
122	5	10	-0.9972	1.2204	100.9	100.9	100.9	100.9	0.0	0.0
123	5	11	-1.0383	1.2916	100.4	100.4	100.4	100.4	0.0	0.0
124	5	12	-1.0795	1.3629	99.9	99.9	99.9	99.9	0.0	0.0
125	5	13	-1.1206	1.4342	99.4	99.4	99.4	99.4	0.0	0.0
126	5	14	-1.1618	1.5055	98.8	98.8	98.8	98.8	0.0	0.0
127	5	15	-1.2029	1.5767	98.5	98.5	98.5	98.5	0.0	0.0
128	5	16	-1.2441	1.6480	98.2	98.2	98.2	98.2	0.0	0.0
129	5	17	-1.2852	1.7193	97.9	97.9	97.9	97.9	0.0	0.0
130	5	18	-1.3264	1.7906	97.5	97.5	97.5	97.5	0.0	0.0
131	5	19	-1.3675	1.8618	97.3	97.3	97.3	97.3	0.0	0.0
132	5	20	-1.4087	1.9331	97.0	97.0	97.0	97.0	0.0	0.0
133	5	21	-1.4498	2.0044	96.8	96.8	96.8	96.8	0.0	0.0
134	5	22	-1.4910	2.0757	96.5	96.5	96.5	96.5	0.0	0.0
135	5	23	-1.5321	2.1469	96.3	96.3	96.3	96.3	0.0	0.0
136	5	24	-1.5733	2.2182	96.0	96.0	96.0	96.0	0.0	0.0
137	5	25	-1.6144	2.2895	95.8	95.8	95.8	95.8	0.0	0.0
138	5	26	-1.6556	2.3607	95.6	95.6	95.6	95.6	0.0	0.0
139	5	27	-1.6967	2.4320	95.4	95.4	95.4	95.4	0.0	0.0
140	5	28	-1.7379	2.5033	95.1	95.1	95.1	95.1	0.0	0.0
141	6	1	-0.5555	0.6200	111.5	111.5	111.5	111.5	0.0	0.0
142	6	2	-0.5967	0.6913	109.0	109.0	109.0	109.0	0.0	0.0
143	6	3	-0.6378	0.7626	108.7	108.7	108.7	108.7	0.0	0.0
144	6	4	-0.6790	0.8339	107.9	107.9	107.9	107.9	0.0	0.0
145	6	5	-0.7201	0.9051	106.8	106.8	106.9	106.8	0.1	0.0
146	6	6	-0.7613	0.9764	105.7	105.7	105.7	105.7	0.0	0.0
147	6	7	-0.8024	1.0477	104.6	104.6	104.6	104.6	0.0	0.0
148	6	8	-0.8436	1.1190	103.6	103.6	103.6	103.6	0.0	0.0
149	6	9	-0.8847	1.1902	102.7	102.7	102.7	102.7	0.0	0.0
150	6	10	-0.9259	1.2615	101.8	101.8	101.8	101.8	0.0	0.0
151	6	11	-0.9670	1.3328	101.0	101.0	101.0	101.0	0.0	0.0
152	6	12	-1.0082	1.4041	100.2	100.2	100.2	100.2	0.0	0.0
153	6	13	-1.0493	1.4753	99.6	99.6	99.6	99.6	0.0	0.0
154	6	14	-1.0905	1.5466	99.0	99.0	99.0	99.0	0.0	0.0
155	6	15	-1.1316	1.6179	98.6	98.6	98.6	98.6	0.0	0.0
156	6	16	-1.1728	1.6892	98.2	98.2	98.3	98.2	0.1	0.0
157	6	17	-1.2139	1.7604	97.9	97.9	97.9	97.9	0.0	0.0
158	6	18	-1.2551	1.8317	97.6	97.6	97.6	97.6	0.0	0.0
159	6	19	-1.2962	1.9030	97.4	97.4	97.4	97.4	0.0	0.0
160	6	20	-1.3374	1.9743	97.1	97.1	97.1	97.1	0.0	0.0
161	6	21	-1.3785	2.0455	96.9	96.9	96.9	96.9	0.0	0.0
162	6	22	-1.4197	2.1168	96.6	96.6	96.6	96.6	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax With Special Area Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
163	6	23	-1.4608	2.1881	96.4	96.4	96.4	96.4	0.0	0.0
164	6	24	-1.5020	2.2593	96.1	96.1	96.1	96.1	0.0	0.0
165	6	25	-1.5431	2.3306	95.8	95.8	95.9	95.8	0.1	0.0
166	6	26	-1.5843	2.4019	95.6	95.6	95.6	95.6	0.0	0.0
167	6	27	-1.6254	2.4732	95.4	95.4	95.4	95.4	0.0	0.0
168	6	28	-1.6666	2.5444	95.2	95.2	95.2	95.2	0.0	0.0
169	7	1	-0.4843	0.6612	113.8	113.8	113.9	113.8	0.1	0.0
170	7	2	-0.5254	0.7325	112.3	112.3	112.3	112.3	0.0	0.0
171	7	3	-0.5666	0.8037	110.5	110.5	110.5	110.5	0.0	0.0
172	7	4	-0.6077	0.8750	108.8	108.8	108.8	108.8	0.0	0.0
173	7	5	-0.6489	0.9463	107.3	107.3	107.4	107.3	0.1	0.0
174	7	6	-0.6900	1.0176	106.0	106.0	106.1	106.0	0.1	0.0
175	7	7	-0.7312	1.0888	104.9	104.9	104.9	104.9	0.0	0.0
176	7	8	-0.7723	1.1601	103.9	103.9	103.9	103.9	0.0	0.0
177	7	9	-0.8135	1.2314	102.9	102.9	102.9	102.9	0.0	0.0
178	7	10	-0.8546	1.3027	102.0	102.0	102.0	102.0	0.0	0.0
179	7	11	-0.8958	1.3739	101.1	101.1	101.1	101.1	0.0	0.0
180	7	12	-0.9369	1.4452	100.4	100.4	100.4	100.4	0.0	0.0
181	7	13	-0.9781	1.5165	99.8	99.8	99.8	99.8	0.0	0.0
182	7	14	-1.0192	1.5878	99.1	99.1	99.1	99.1	0.0	0.0
183	7	15	-1.0604	1.6590	98.6	98.6	98.6	98.6	0.0	0.0
184	7	16	-1.1015	1.7303	98.3	98.3	98.3	98.3	0.0	0.0
185	7	17	-1.1427	1.8016	98.0	98.0	98.0	98.0	0.0	0.0
186	7	18	-1.1838	1.8729	97.7	97.7	97.7	97.7	0.0	0.0
187	7	19	-1.2250	1.9441	97.4	97.4	97.4	97.4	0.0	0.0
188	7	20	-1.2661	2.0154	97.1	97.1	97.1	97.1	0.0	0.0
189	7	21	-1.3073	2.0867	96.9	96.9	96.9	96.9	0.0	0.0
190	7	22	-1.3484	2.1580	96.6	96.6	96.6	96.6	0.0	0.0
191	7	23	-1.3896	2.2292	96.4	96.4	96.4	96.4	0.0	0.0
192	7	24	-1.4307	2.3005	96.1	96.1	96.1	96.1	0.0	0.0
193	7	25	-1.4719	2.3718	95.9	95.9	95.9	95.9	0.0	0.0
194	7	26	-1.5130	2.4430	95.6	95.6	95.6	95.6	0.0	0.0
195	7	27	-1.5542	2.5143	95.4	95.4	95.4	95.4	0.0	0.0
196	7	28	-1.5953	2.5856	95.2	95.2	95.2	95.2	0.0	0.0
197	8	1	-0.4130	0.7023	115.3	115.3	135.6	129.8	20.3	14.5
198	8	2	-0.4541	0.7736	112.7	112.7	132.0	126.2	19.3	13.5
199	8	3	-0.4953	0.8449	110.6	110.6	110.6	110.6	0.0	0.0
200	8	4	-0.5364	0.9162	108.9	108.9	108.9	108.9	0.0	0.0
201	8	5	-0.5776	0.9874	107.4	107.4	107.4	107.4	0.0	0.0
202	8	6	-0.6187	1.0587	106.1	106.1	106.1	106.1	0.0	0.0
203	8	7	-0.6599	1.1300	105.0	105.0	105.0	105.0	0.0	0.0
204	8	8	-0.7010	1.2013	103.9	103.9	104.0	103.9	0.1	0.0
205	8	9	-0.7422	1.2725	103.0	103.0	103.0	103.0	0.0	0.0
206	8	10	-0.7833	1.3438	102.1	102.1	102.1	102.1	0.0	0.0
207	8	11	-0.8245	1.4151	101.3	101.3	101.3	101.3	0.0	0.0
208	8	12	-0.8656	1.4864	100.5	100.5	100.5	100.5	0.0	0.0
209	8	13	-0.9068	1.5576	99.8	99.8	99.8	99.8	0.0	0.0
210	8	14	-0.9479	1.6289	99.1	99.1	99.1	99.1	0.0	0.0
211	8	15	-0.9891	1.7002	98.6	98.6	98.6	98.6	0.0	0.0
212	8	16	-1.0302	1.7715	98.3	98.3	98.3	98.3	0.0	0.0
213	8	17	-1.0714	1.8427	98.0	98.0	98.0	98.0	0.0	0.0
214	8	18	-1.1125	1.9140	97.7	97.7	97.7	97.7	0.0	0.0
215	8	19	-1.1537	1.9853	97.4	97.4	97.4	97.4	0.0	0.0
216	8	20	-1.1948	2.0566	97.2	97.2	97.2	97.2	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

						2018 Lmax			Change with	
Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	No Project	Full Use of Shifted Rwy A2	Vith Special Are Use Procedures A3	Full Use of Shift vs No Project	Special Use Area Procedures vs No Project
217	8	21	-1.2360	2.1278	96.9	96.9	96.9	96.9	0.0	0.0
218	8	22	-1.2771	2.1991	96.6	96.6	96.6	96.6	0.0	0.0
219	8	23	-1.3183	2.2704	96.4	96.4	96.4	96.4	0.0	0.0
220	8	24	-1.3594	2.3416	96.1	96.1	96.1	96.1	0.0	0.0
221	8	25	-1.4006	2.4129	95.9	95.9	95.9	95.9	0.0	0.0
222	8	26	-1.4417	2.4842	95.6	95.6	95.6	95.6	0.0	0.0
223	8	27	-1.4829	2.5555	95.4	95.4	95.4	95.4	0.0	0.0
224	8	28	-1.5240	2.6267	95.2	95.2	95.2	95.2	0.0	0.0
225	9	1	-0.3417	0.7435	114.4	114.4	114.5	114.4	0.1	0.0
226	9	2	-0.3829	0.8148	112.1	112.1	112.1	112.1	0.0	0.0
227	9	3	-0.4240	0.8860	110.1	110.1	110.1	110.1	0.0	0.0
228	9	4	-0.4652	0.9573	108.5	108.5	108.5	108.5	0.0	0.0
229	9	5	-0.5063	1.0286	107.1	107.1	107.1	107.1	0.0	0.0
230	9	6	-0.5475	1.0999	105.8	105.8	105.8	105.8	0.0	0.0
231	9	7	-0.5886	1.1711	104.7	104.7	104.7	104.7	0.0	0.0
232	9	8	-0.6298	1.2424	103.7	103.7	103.7	103.7	0.0	0.0
233	9	9	-0.6709	1.3137	102.7	102.7	102.7	102.7	0.0	0.0
234	9	10	-0.7121	1.3850	101.8	101.8	101.8	101.8	0.0	0.0
235	9	11	-0.7532	1.4562	101.0	101.0	101.0	101.0	0.0	0.0
236	9	12	-0.7944	1.5275	100.3	100.3	100.3	100.3	0.0	0.0
237	9	13	-0.8355	1.5988	99.6	99.6	99.6	99.6	0.0	0.0
238	9	14	-0.8767	1.6701	98.9	98.9	98.9	98.9	0.0	0.0
239	9	15	-0.9178	1.7413	98.5	98.5	98.5	98.5	0.0	0.0
240	9	16	-0.9590	1.8126	98.2	98.2	98.2	98.2	0.0	0.0
241	9	17	-1.0001	1.8839	97.9	97.9	97.9	97.9	0.0	0.0
242	9	18	-1.0413	1.9552	97.6	97.6	97.6	97.6	0.0	0.0
243	9	19	-1.0824	2.0264	97.3	97.3	97.3	97.3	0.0	0.0
244	9	20	-1.1236	2.0977	97.1	97.1	97.1	97.1	0.0	0.0
245	9	21	-1.1647	2.1690	96.8	96.8	96.8	96.8	0.0	0.0
246	9	22	-1.2059	2.2403	96.5	96.5	96.5	96.5	0.0	0.0
247	9	23	-1.2470	2.3115	96.3	96.3	96.3	96.3	0.0	0.0
248	9	24	-1.2882	2.3828	96.0	96.0	96.0	96.0	0.0	0.0
249	9	25	-1.3293	2.4541	95.8	95.8	95.8	95.8	0.0	0.0
250	9	26	-1.3705	2.5253	95.6	95.6	95.6	95.6	0.0	0.0
251	9	27	-1.4116	2.5966	95.3	95.3	95.3	95.3	0.0	0.0
252	9	28	-1.4528	2.6679	95.1	95.1	95.1	95.1	0.0	0.0
253	10	1	-0.2704	0.7846	105.4	105.4	105.4	105.4	0.0	0.0
254	10	2	-0.3116	0.8559	105.2	105.2	105.2	105.2	0.0	0.0
255	10	3	-0.3527	0.9272	104.9	104.9	104.9	104.9	0.0	0.0
256	10	4	-0.3939	0.9985	104.4	104.4	104.4	104.4	0.0	0.0
257	10	5	-0.4350	1.0697	103.9	103.9	103.9	103.9	0.0	0.0
258	10	6	-0.4762	1.1410	103.3	103.3	103.3	103.3	0.0	0.0
259	10	7	-0.5173	1.2123	102.7	102.7	102.7	102.7	0.0	0.0
260	10	8	-0.5585	1.2836	102.1	102.1	102.1	102.1	0.0	0.0
261	10	9	-0.5996	1.3548	101.4	101.4	101.5	101.4	0.1	0.0
262	10	10	-0.6408	1.4261	100.8	100.8	100.8	100.8	0.0	0.0
263	10	11	-0.6819	1.4974	100.2	100.2	100.2	100.2	0.0	0.0
264	10	12	-0.7231	1.5687	99.6	99.6	99.6	99.6	0.0	0.0
265	10	13	-0.7642	1.6399	99.0	99.0	99.0	99.0	0.0	0.0
266	10	14	-0.8054	1.7112	98.4	98.4	98.4	98.4	0.0	0.0
267	10	15	-0.8465	1.7825	98.1	98.1	98.1	98.1	0.0	0.0
268	10	16	-0.8877	1.8538	97.8	97.8	97.8	97.8	0.0	0.0
269	10	17	-0.9288	1.9250	97.6	97.6	97.6	97.6	0.0	0.0
270	10	18	-0.9700	1.9963	97.3	97.3	97.3	97.3	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax Vith Special Area Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
271	10	19	-1.0111	2.0676	97.1	97.1	97.1	97.1	0.0	0.0
272	10	20	-1.0523	2.1389	96.8	96.8	96.8	96.8	0.0	0.0
273	10	21	-1.0934	2.2101	96.6	96.6	96.6	96.6	0.0	0.0
274	10	22	-1.1346	2.2814	96.4	96.4	96.4	96.4	0.0	0.0
275	10	23	-1.1757	2.3527	96.1	96.1	96.1	96.1	0.0	0.0
276	10	24	-1.2169	2.4239	95.9	95.9	95.9	95.9	0.0	0.0
277	10	25	-1.2580	2.4952	95.7	95.7	95.7	95.7	0.0	0.0
278	10	26	-1.2992	2.5665	95.5	95.5	95.5	95.5	0.0	0.0
279	10	27	-1.3403	2.6378	95.2	95.2	95.2	95.2	0.0	0.0
280	10	28	-1.3815	2.7090	95.0	95.0	95.0	95.0	0.0	0.0
281	11	1	-0.1992	0.8258	99.0	99.0	99.0	99.0	0.0	0.0
282	11	2	-0.2403	0.8971	98.5	98.5	98.5	98.5	0.0	0.0
283	11	3	-0.2815	0.9683	98.0	98.0	98.0	98.0	0.0	0.0
284	11	4	-0.3226	1.0396	97.7	97.7	97.7	97.7	0.0	0.0
285	11	5	-0.3638	1.1109	97.5	97.5	97.5	97.5	0.0	0.0
286	11	6	-0.4049	1.1822	97.2	97.2	97.2	97.2	0.0	0.0
287	11	7	-0.4461	1.2534	97.0	97.0	97.0	97.0	0.0	0.0
288	11	8	-0.4872	1.3247	96.9	96.9	96.9	96.9	0.0	0.0
289	11	9	-0.5284	1.3960	96.8	96.8	96.8	96.8	0.0	0.0
290	11	10	-0.5695	1.4673	96.6	96.6	96.6	96.6	0.0	0.0
291	11	11	-0.6107	1.5385	96.4	96.4	96.4	96.4	0.0	0.0
292	11	12	-0.6518	1.6098	96.2	96.2	96.2	96.2	0.0	0.0
293	11	13	-0.6930	1.6811	96.0	96.0	96.0	96.0	0.0	0.0
294	11	14	-0.7341	1.7524	95.7	95.7	95.7	95.7	0.0	0.0
295	11	15	-0.7753	1.8236	95.6	95.6	95.6	95.6	0.0	0.0
296	11	16	-0.8164	1.8949	95.5	95.5	95.5	95.5	0.0	0.0
297	11	17	-0.8576	1.9662	95.4	95.4	95.4	95.4	0.0	0.0
298	11	18	-0.8987	2.0375	95.3	95.3	95.3	95.3	0.0	0.0
299	11	19	-0.9399	2.1087	95.1	95.1	95.1	95.1	0.0	0.0
300	11	20	-0.9810	2.1800	95.0	95.0	95.0	95.0	0.0	0.0
301	11	21	-1.0222	2.2513	94.9	94.9	94.9	94.9	0.0	0.0
302	11	22	-1.0633	2.3225	94.8	94.8	94.8	94.8	0.0	0.0
303	11	23	-1.1045	2.3938	94.7	94.7	94.7	94.7	0.0	0.0
304	11	24	-1.1456	2.4651	94.5	94.5	94.5	94.5	0.0	0.0
305	11	25	-1.1868	2.5364	94.4	94.4	94.4	94.4	0.0	0.0
306	11	26	-1.2279	2.6076	94.2	94.2	94.2	94.2	0.0	0.0
307	11	27	-1.2691	2.6789	94.1	94.1	94.1	94.1	0.0	0.0
308	11	28	-1.3102	2.7502	93.9	93.9	93.9	93.9	0.0	0.0
309	12	1	-0.1279	0.8669	95.2	95.2	95.2	95.2	0.0	0.0
310	12	2	-0.1690	0.9382	95.0	95.0	95.0	95.0	0.0	0.0
311	12	3	-0.2102	1.0095	94.7	94.7	94.7	94.7	0.0	0.0
312	12	4	-0.2513	1.0808	94.4	94.4	94.4	94.4	0.0	0.0
313	12	5	-0.2925	1.1520	94.1	94.1	94.1	94.1	0.0	0.0
314	12	6	-0.3336	1.2233	93.9	93.9	93.9	93.9	0.0	0.0
315	12	7	-0.3748	1.2946	93.9	93.9	93.9	93.9	0.0	0.0
316	12	8	-0.4159	1.3659	93.8	93.8	93.8	93.8	0.0	0.0
317	12	9	-0.4571	1.4371	93.6	93.6	93.6	93.6	0.0	0.0
318	12	10	-0.4982	1.5084	93.5	93.5	93.5	93.5	0.0	0.0
319	12	11	-0.5394	1.5797	93.4	93.4	93.4	93.4	0.0	0.0
320	12	12	-0.5805	1.6510	93.3	93.3	93.3	93.3	0.0	0.0
321	12	13	-0.6217	1.7222	93.1	93.1	93.1	93.1	0.0	0.0
322	12	14	-0.6628	1.7935	93.0	93.0	93.0	93.0	0.0	0.0
323	12	15	-0.7040	1.8648	92.9	92.9	92.9	92.9	0.0	0.0
324	12	16	-0.7451	1.9361	92.8	92.8	92.8	92.8	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax Vith Special Are Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
325	12	17	-0.7863	2.0073	92.6	92.6	92.6	92.6	0.0	0.0
326	12	18	-0.8274	2.0786	92.5	92.5	92.5	92.5	0.0	0.0
327	12	19	-0.8686	2.1499	92.3	92.3	92.3	92.3	0.0	0.0
328	12	20	-0.9097	2.2212	92.2	92.2	92.2	92.2	0.0	0.0
329	12	21	-0.9509	2.2924	92.1	92.1	92.1	92.1	0.0	0.0
330	12	22	-0.9920	2.3637	91.9	91.9	91.9	91.9	0.0	0.0
331	12	23	-1.0332	2.4350	91.8	91.8	91.8	91.8	0.0	0.0
332	12	24	-1.0743	2.5062	91.8	91.8	91.8	91.8	0.0	0.0
333	12	25	-1.1155	2.5775	91.7	91.7	91.7	91.7	0.0	0.0
334	12	26	-1.1566	2.6488	91.7	91.7	91.7	91.7	0.0	0.0
335	12	27	-1.1978	2.7201	91.6	91.6	91.6	91.6	0.0	0.0
336	12	28	-1.2389	2.7913	91.5	91.5	91.5	91.5	0.0	0.0
337	13	1	-0.0566	0.9081	91.5	91.5	91.5	91.5	0.0	0.0
338	13	2	-0.0978	0.9794	91.5	91.5	91.5	91.5	0.0	0.0
339	13	3	-0.1389	1.0506	91.3	91.3	91.3	91.3	0.0	0.0
340	13	4	-0.1801	1.1219	91.2	91.2	91.2	91.2	0.0	0.0
341	13	5	-0.2212	1.1932	91.0	91.0	91.0	91.0	0.0	0.0
342	13	6	-0.2624	1.2645	90.9	90.9	90.9	90.9	0.0	0.0
343	13	7	-0.3035	1.3357	90.9	90.9	90.9	90.9	0.0	0.0
344	13	8	-0.3447	1.4070	90.8	90.8	90.8	90.8	0.0	0.0
345	13	9	-0.3858	1.4783	90.7	90.7	90.7	90.7	0.0	0.0
346	13	10	-0.4270	1.5496	90.7	90.7	90.7	90.7	0.0	0.0
347	13	11	-0.4681	1.6208	90.9	90.9	90.9	90.9	0.0	0.0
348	13	12	-0.5093	1.6921	91.0	91.0	91.0	91.0	0.0	0.0
349	13	13	-0.5504	1.7634	90.9	90.9	90.9	90.9	0.0	0.0
350	13	14	-0.5916	1.8347	90.8	90.8	90.8	90.8	0.0	0.0
351	13	15	-0.6327	1.9059	90.7	90.7	90.7	90.7	0.0	0.0
352	13	16	-0.6739	1.9772	90.6	90.6	90.6	90.6	0.0	0.0
353	13	17	-0.7150	2.0485	90.5	90.5	90.5	90.5	0.0	0.0
354	13	18	-0.7562	2.1198	90.5	90.5	90.5	90.5	0.0	0.0
355	13	19	-0.7973	2.1910	90.4	90.4	90.4	90.4	0.0	0.0
356	13	20	-0.8385	2.2623	90.3	90.3	90.3	90.3	0.0	0.0
357	13	21	-0.8796	2.3336	90.2	90.2	90.2	90.2	0.0	0.0
358	13	22	-0.9208	2.4048	90.1	90.1	90.1	90.1	0.0	0.0
359	13	23	-0.9619	2.4761	90.0	90.0	90.0	90.0	0.0	0.0
360	13	24	-1.0031	2.5474	89.9	89.9	89.9	89.9	0.0	0.0
361	13	25	-1.0442	2.6187	89.7	89.7	89.7	89.7	0.0	0.0
362	13	26	-1.0854	2.6899	89.6	89.6	89.6	89.6	0.0	0.0
363	13	27	-1.1265	2.7612	89.5	89.5	89.5	89.5	0.0	0.0
364	13	28	-1.1677	2.8325	89.4	89.4	89.4	89.4	0.0	0.0
365	14	1	0.0147	0.9492	88.1	88.1	88.1	88.1	0.0	0.0
366	14	2	-0.0265	1.0205	88.2	88.2	88.2	88.2	0.0	0.0
367	14	3	-0.0676	1.0918	88.2	88.2	88.2	88.2	0.0	0.0
368	14	4	-0.1088	1.1631	88.2	88.2	88.2	88.2	0.0	0.0
369	14	5	-0.1499	1.2343	88.1	88.1	88.1	88.1	0.0	0.0
370	14	6	-0.1911	1.3056	88.1	88.1	88.1	88.1	0.0	0.0
371	14	7	-0.2322	1.3769	88.1	88.1	88.0	88.1	-0.1	0.0
372	14	8	-0.2734	1.4482	88.2	88.2	88.2	88.2	0.0	0.0
373	14	9	-0.3145	1.5194	88.4	88.4	88.4	88.4	0.0	0.0
374	14	10	-0.3557	1.5907	88.3	88.3	88.3	88.3	0.0	0.0
375	14	11	-0.3968	1.6620	88.2	88.2	88.2	88.2	0.0	0.0
376	14	12	-0.4380	1.7333	88.3	88.3	88.3	88.3	0.0	0.0
377	14	13	-0.4791	1.8045	88.4	88.4	88.4	88.4	0.0	0.0
378	14	14	-0.5203	1.8758	88.3	88.3	88.3	88.3	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax With Special Area Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
379	14	15	-0.5614	1.9471	88.2	88.2	88.2	88.2	0.0	0.0
380	14	16	-0.6026	2.0184	88.2	88.2	88.2	88.2	0.0	0.0
381	14	17	-0.6437	2.0896	88.3	88.3	88.3	88.3	0.0	0.0
382	14	18	-0.6849	2.1609	88.5	88.5	88.5	88.5	0.0	0.0
383	14	19	-0.7260	2.2322	88.5	88.5	88.5	88.5	0.0	0.0
384	14	20	-0.7672	2.3035	88.4	88.4	88.4	88.4	0.0	0.0
385	14	21	-0.8083	2.3747	88.3	88.3	88.3	88.3	0.0	0.0
386	14	22	-0.8495	2.4460	88.3	88.3	88.3	88.3	0.0	0.0
387	14	23	-0.8906	2.5173	88.2	88.2	88.2	88.2	0.0	0.0
388	14	24	-0.9318	2.5885	88.1	88.1	88.1	88.1	0.0	0.0
389	14	25	-0.9729	2.6598	88.0	88.0	88.0	88.0	0.0	0.0
390	14	26	-1.0141	2.7311	88.0	88.0	88.0	88.0	0.0	0.0
391	14	27	-1.0552	2.8024	87.9	87.9	87.9	87.9	0.0	0.0
392	14	28	-1.0964	2.8736	87.8	87.8	87.8	87.8	0.0	0.0
393	15	1	0.0859	0.9904	85.1	85.1	85.1	85.1	0.0	0.0
394	15	2	0.0448	1.0617	85.3	85.3	85.3	85.3	0.0	0.0
395	15	3	0.0036	1.1329	85.4	85.4	85.4	85.4	0.0	0.0
396	15	4	-0.0375	1.2042	85.4	85.4	85.4	85.4	0.0	0.0
397	15	5	-0.0787	1.2755	85.5	85.5	85.5	85.5	0.0	0.0
398	15	6	-0.1198	1.3468	85.5	85.5	85.5	85.5	0.0	0.0
399	15	7	-0.1610	1.4180	85.5	85.5	85.5	85.5	0.0	0.0
400	15	8	-0.2021	1.4893	85.5	85.5	85.5	85.5	0.0	0.0
401	15	9	-0.2433	1.5606	85.5	85.5	85.5	85.5	0.0	0.0
402	15	10	-0.2844	1.6319	85.7	85.7	85.7	85.7	0.0	0.0
403	15	11	-0.3256	1.7031	85.8	85.8	85.8	85.8	0.0	0.0
404	15	12	-0.3667	1.7744	86.0	86.0	86.0	86.0	0.0	0.0
405	15	13	-0.4079	1.8457	86.1	86.1	86.1	86.1	0.0	0.0
406	15	14	-0.4490	1.9170	86.3	86.3	86.3	86.3	0.0	0.0
407	15	15	-0.4902	1.9882	86.2	86.2	86.2	86.2	0.0	0.0
408	15	16	-0.5313	2.0595	86.1	86.1	86.1	86.1	0.0	0.0
409	15	17	-0.5725	2.1308	86.1	86.1	86.1	86.1	0.0	0.0
410	15	18	-0.6136	2.2021	86.2	86.2	86.2	86.2	0.0	0.0
411	15	19	-0.6548	2.2733	86.3	86.3	86.3	86.3	0.0	0.0
412	15	20	-0.6959	2.3446	86.2	86.2	86.2	86.2	0.0	0.0
413	15	21	-0.7371	2.4159	86.2	86.2	86.2	86.2	0.0	0.0
414	15	22	-0.7782	2.4871	86.1	86.1	86.1	86.1	0.0	0.0
415	15	23	-0.8194	2.5584	86.1	86.1	86.1	86.1	0.0	0.0
416	15	24	-0.8605	2.6297	86.2	86.2	86.2	86.2	0.0	0.0
417	15	25	-0.9017	2.7010	86.4	86.4	86.4	86.4	0.0	0.0
418	15	26	-0.9428	2.7722	86.4	86.4	86.4	86.4	0.0	0.0
419	15	27	-0.9840	2.8435	86.3	86.3	86.3	86.3	0.0	0.0
420	15	28	-1.0251	2.9148	86.3	86.3	86.3	86.3	0.0	0.0
421	16	1	0.1572	1.0315	82.6	82.6	82.6	82.6	0.0	0.0
422	16	2	0.1161	1.1028	82.8	82.8	82.8	82.8	0.0	0.0
423	16	3	0.0749	1.1741	82.9	82.9	82.9	82.9	0.0	0.0
424	16	4	0.0338	1.2454	83.1	83.1	83.1	83.1	0.0	0.0
425	16	5	-0.0074	1.3166	83.2	83.2	83.2	83.2	0.0	0.0
426	16	6	-0.0485	1.3879	83.2	83.2	83.2	83.2	0.0	0.0
427	16	7	-0.0897	1.4592	83.3	83.3	83.3	83.3	0.0	0.0
428	16	8	-0.1308	1.5305	83.3	83.3	83.3	83.3	0.0	0.0
429	16	9	-0.1720	1.6017	83.3	83.3	83.3	83.3	0.0	0.0
430	16	10	-0.2131	1.6730	83.3	83.3	83.3	83.3	0.0	0.0
431	16	11	-0.2543	1.7443	83.3	83.3	83.3	83.3	0.0	0.0
432	16	12	-0.2954	1.8156	83.5	83.5	83.5	83.5	0.0	0.0

Table C-13
King County International Airport EA
Lmax Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	Existing 2002/3 (Lmax)	2018 Lmax No Project	2018 Lmax Full Use of Shifted Rwy A2	2018 Lmax Vith Special Are Use Procedures A3	Change with Full Use of Shift vs No Project	Change with Special Use Area Procedures vs No Project
433	16	13	-0.3366	1.8868	83.6	83.6	83.6	83.6	0.0	0.0
434	16	14	-0.3777	1.9581	83.8	83.8	83.8	83.8	0.0	0.0
435	16	15	-0.4189	2.0294	83.9	83.9	83.9	83.9	0.0	0.0
436	16	16	-0.4600	2.1007	84.1	84.1	84.1	84.1	0.0	0.0
437	16	17	-0.5012	2.1719	84.2	84.2	84.2	84.2	0.0	0.0
438	16	18	-0.5423	2.2432	84.3	84.3	84.3	84.3	0.0	0.0
439	16	19	-0.5835	2.3145	84.5	84.5	84.5	84.5	0.0	0.0
440	16	20	-0.6246	2.3858	84.4	84.4	84.4	84.4	0.0	0.0
441	16	21	-0.6658	2.4570	84.1	84.1	84.1	84.1	0.0	0.0
442	16	22	-0.7069	2.5283	84.2	84.2	84.2	84.2	0.0	0.0
443	16	23	-0.7481	2.5996	84.3	84.3	84.3	84.3	0.0	0.0
444	16	24	-0.7892	2.6708	84.6	84.6	84.6	84.6	0.0	0.0
445	16	25	-0.8304	2.7421	84.5	84.5	84.5	84.5	0.0	0.0
446	16	26	-0.8715	2.8134	84.4	84.4	84.4	84.4	0.0	0.0
447	16	27	-0.9127	2.8847	84.4	84.4	84.4	84.4	0.0	0.0
448	16	28	-0.9538	2.9559	84.2	84.2	84.2	84.2	0.0	0.0
SP	1	1	-0.5832	0.7732	110.3	110.3	110.3	110.3	0.0	0.0

Prepared December 31, 2003

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*
1	1	1	-0.9119	0.4143	59.0	59.0	59.0	60.7	60.7	60.7
2	1	2	-0.9530	0.4856	58.6	58.9	58.7	60.9	60.9	60.9
3	1	3	-0.9942	0.5568	57.9	58.4	58.0	60.9	60.9	60.9
4	1	4	-1.0353	0.6281	57.0	57.8	57.1	60.9	60.9	60.9
5	1	5	-1.0765	0.6994	56.1	57.0	56.2	61.0	61.0	61.0
6	1	6	-1.1176	0.7707	55.1	56.2	55.3	61.0	61.0	61.0
7	1	7	-1.1588	0.8419	54.1	55.3	54.3	61.0	61.0	61.0
8	1	8	-1.1999	0.9132	53.2	54.3	53.4	61.0	61.0	61.0
9	1	9	-1.2411	0.9845	52.2	53.4	52.4	61.0	61.0	61.0
10	1	10	-1.2822	1.0558	51.3	52.4	51.6	61.0	61.0	61.0
11	1	11	-1.3234	1.1270	50.6	51.6	50.8	61.0	61.0	61.0
12	1	12	-1.3645	1.1983	49.8	50.8	50.1	60.9	60.9	60.9
13	1	13	-1.4057	1.2696	49.2	50.1	49.5	60.9	60.9	60.9
14	1	14	-1.4468	1.3409	48.8	49.5	49.1	60.9	60.9	60.9
15	1	15	-1.4880	1.4121	48.5	49.0	48.8	60.8	60.8	60.8
16	1	16	-1.5291	1.4834	48.3	48.7	48.6	60.7	60.8	60.8
17	1	17	-1.5703	1.5547	48.2	48.4	48.4	60.7	60.7	60.7
18	1	18	-1.6114	1.6260	48.1	48.3	48.4	60.6	60.6	60.6
19	1	19	-1.6526	1.6972	48.0	48.2	48.3	60.6	60.6	60.6
20	1	20	-1.6937	1.7685	48.0	48.2	48.3	60.6	60.6	60.6
21	1	21	-1.7349	1.8398	48.0	48.1	48.3	60.6	60.6	60.6
22	1	22	-1.7760	1.9111	48.0	48.1	48.3	60.5	60.5	60.5
23	1	23	-1.8172	1.9823	48.1	48.2	48.4	60.5	60.5	60.5
24	1	24	-1.8583	2.0536	48.1	48.2	48.4	60.5	60.5	60.5
25	1	25	-1.8995	2.1249	48.2	48.2	48.5	60.4	60.4	60.4
26	1	26	-1.9406	2.1961	48.2	48.3	48.6	60.2	60.2	60.2
27	1	27	-1.9818	2.2674	48.3	48.3	48.6	60.1	60.1	60.1
28	1	28	-2.0229	2.3387	48.4	48.4	48.7	60.0	60.0	60.0
29	2	1	-0.8406	0.4554	61.6	61.6	61.6	63.3	63.3	63.3
30	2	2	-0.8818	0.5267	61.1	61.4	61.2	63.4	63.4	63.4
31	2	3	-0.9229	0.5980	60.1	60.6	60.2	63.2	63.2	63.2
32	2	4	-0.9641	0.6693	58.9	59.7	59.0	63.1	63.1	63.1
33	2	5	-1.0052	0.7405	57.6	58.7	57.8	63.0	63.0	63.0
34	2	6	-1.0464	0.8118	56.3	57.6	56.5	63.0	63.0	63.0
35	2	7	-1.0875	0.8831	55.1	56.5	55.3	63.0	63.0	63.0
36	2	8	-1.1287	0.9544	53.9	55.3	54.2	62.9	62.9	62.9
37	2	9	-1.1698	1.0256	52.8	54.1	53.1	62.9	62.9	62.9
38	2	10	-1.2110	1.0969	51.9	53.1	52.1	62.9	62.9	62.9
39	2	11	-1.2521	1.1682	51.0	52.2	51.3	62.8	62.8	62.8
40	2	12	-1.2933	1.2395	50.4	51.3	50.7	62.8	62.8	62.8
41	2	13	-1.3344	1.3107	50.0	50.6	50.3	62.7	62.7	62.7
42	2	14	-1.3756	1.3820	49.7	50.2	50.0	62.7	62.7	62.7
43	2	15	-1.4167	1.4533	49.5	49.9	49.8	62.6	62.6	62.6
44	2	16	-1.4579	1.5246	49.4	49.7	49.7	62.4	62.4	62.4
45	2	17	-1.4990	1.5958	49.4	49.6	49.7	62.3	62.3	62.3
46	2	18	-1.5402	1.6671	49.4	49.5	49.7	62.3	62.3	62.3
47	2	19	-1.5813	1.7384	49.4	49.5	49.7	62.2	62.2	62.2
48	2	20	-1.6225	1.8097	49.4	49.5	49.7	62.2	62.2	62.2
49	2	21	-1.6636	1.8809	49.5	49.5	49.8	62.1	62.1	62.1
50	2	22	-1.7048	1.9522	49.5	49.6	49.8	62.1	62.1	62.1
51	2	23	-1.7459	2.0235	49.6	49.6	49.9	62.0	62.0	62.0
52	2	24	-1.7871	2.0947	49.7	49.7	50.0	61.9	62.0	62.0
53	2	25	-1.8282	2.1660	49.7	49.8	50.0	61.8	61.8	61.8
54	2	26	-1.8694	2.2373	49.8	49.8	50.1	61.6	61.6	61.6
55	2	27	-1.9105	2.3086	49.9	49.9	50.2	61.4	61.4	61.4

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*
56	2	28	-1.9517	2.3798	50.0	50.0	50.3	61.2	61.2	61.2
57	3	1	-0.7694	0.4966	65.5	65.6	65.6	66.8	66.8	66.8
58	3	2	-0.8105	0.5679	64.8	65.1	64.8	66.6	66.6	66.6
59	3	3	-0.8517	0.6391	63.0	63.7	63.0	66.0	66.0	66.0
60	3	4	-0.8928	0.7104	61.2	62.3	61.3	65.6	65.6	65.6
61	3	5	-0.9340	0.7817	59.3	60.7	59.5	65.4	65.4	65.4
62	3	6	-0.9751	0.8530	57.5	59.1	57.7	65.2	65.2	65.2
63	3	7	-1.0163	0.9242	55.9	57.5	56.2	65.1	65.1	65.1
64	3	8	-1.0574	0.9955	54.6	56.1	54.9	65.0	65.0	65.0
65	3	9	-1.0986	1.0668	53.3	54.9	53.7	65.0	65.0	65.0
66	3	10	-1.1397	1.1381	52.5	53.7	52.8	64.9	64.9	64.9
67	3	11	-1.1809	1.2093	51.9	52.7	52.2	64.8	64.8	64.8
68	3	12	-1.2220	1.2806	51.6	52.1	51.9	64.8	64.8	64.8
69	3	13	-1.2632	1.3519	51.3	51.7	51.6	64.6	64.6	64.6
70	3	14	-1.3043	1.4232	51.2	51.5	51.5	64.5	64.5	64.5
71	3	15	-1.3455	1.4944	51.2	51.4	51.5	64.4	64.4	64.4
72	3	16	-1.3866	1.5657	51.2	51.3	51.5	64.2	64.2	64.2
73	3	17	-1.4278	1.6370	51.2	51.3	51.5	64.1	64.1	64.1
74	3	18	-1.4689	1.7083	51.2	51.3	51.5	63.9	63.9	63.9
75	3	19	-1.5101	1.7795	51.3	51.4	51.6	63.8	63.8	63.8
76	3	20	-1.5512	1.8508	51.4	51.4	51.7	63.7	63.7	63.7
77	3	21	-1.5924	1.9221	51.4	51.5	51.8	63.6	63.6	63.6
78	3	22	-1.6335	1.9934	51.5	51.6	51.9	63.5	63.5	63.5
79	3	23	-1.6747	2.0646	51.6	51.6	51.9	63.5	63.5	63.5
80	3	24	-1.7158	2.1359	51.7	51.7	52.0	63.4	63.4	63.4
81	3	25	-1.7570	2.2072	51.8	51.8	52.1	63.2	63.2	63.2
82	3	26	-1.7981	2.2784	51.9	51.9	52.2	62.9	62.9	62.9
83	3	27	-1.8393	2.3497	51.9	52.0	52.3	62.6	62.6	62.6
84	3	28	-1.8804	2.4210	52.0	52.0	52.4	62.4	62.4	62.4
85	4	1	-0.6981	0.5377	72.1	72.2	72.1	72.6	72.6	72.6
86	4	2	-0.7392	0.6090	70.4	70.7	70.4	71.4	71.4	71.4
87	4	3	-0.7804	0.6803	67.0	67.8	67.1	69.5	69.5	69.5
88	4	4	-0.8215	0.7516	63.6	65.1	63.8	68.3	68.3	68.3
89	4	5	-0.8627	0.8228	60.7	62.7	61.0	67.8	67.8	67.8
90	4	6	-0.9038	0.8941	58.4	60.4	58.7	67.5	67.5	67.5
91	4	7	-0.9450	0.9654	56.4	58.4	56.8	67.4	67.4	67.4
92	4	8	-0.9861	1.0367	55.1	56.8	55.5	67.2	67.2	67.2
93	4	9	-1.0273	1.1079	54.3	55.4	54.7	67.1	67.1	67.1
94	4	10	-1.0684	1.1792	53.9	54.4	54.2	67.0	67.0	67.0
95	4	11	-1.1096	1.2505	53.6	54.0	53.9	66.9	66.9	66.9
96	4	12	-1.1507	1.3218	53.5	53.7	53.8	66.7	66.7	66.7
97	4	13	-1.1919	1.3930	53.5	53.6	53.8	66.6	66.6	66.6
98	4	14	-1.2330	1.4643	53.5	53.6	53.8	66.4	66.4	66.4
99	4	15	-1.2742	1.5356	53.5	53.6	53.8	66.1	66.1	66.1
100	4	16	-1.3153	1.6069	53.6	53.6	53.9	65.9	65.9	65.9
101	4	17	-1.3565	1.6781	53.6	53.7	54.0	65.7	65.7	65.7
102	4	18	-1.3976	1.7494	53.7	53.8	54.1	65.5	65.5	65.5
103	4	19	-1.4388	1.8207	53.8	53.9	54.2	65.3	65.3	65.3
104	4	20	-1.4799	1.8920	53.9	53.9	54.3	65.2	65.2	65.2
105	4	21	-1.5211	1.9632	54.0	54.0	54.4	65.0	65.0	65.0
106	4	22	-1.5622	2.0345	54.1	54.1	54.5	64.9	64.9	64.9
107	4	23	-1.6034	2.1058	54.2	54.2	54.5	64.7	64.7	64.7
108	4	24	-1.6445	2.1770	54.3	54.3	54.6	64.6	64.6	64.6
109	4	25	-1.6857	2.2483	54.4	54.4	54.7	64.4	64.4	64.4
110	4	26	-1.7268	2.3196	54.5	54.5	54.8	64.0	64.0	64.0

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*
111	4	27	-1.7680	2.3909	54.6	54.6	54.9	63.7	63.7	63.7
112	4	28	-1.8091	2.4621	54.6	54.6	55.0	63.4	63.5	63.5
113	5	1	-0.6268	0.5789	85.0	85.0	85.0	85.0	85.0	85.0
114	5	2	-0.6680	0.6502	79.2	79.3	79.2	79.5	79.5	79.5
115	5	3	-0.7091	0.7214	70.0	71.3	70.1	72.4	72.4	72.4
116	5	4	-0.7503	0.7927	64.7	67.5	65.1	70.6	70.6	70.6
117	5	5	-0.7914	0.8640	61.1	64.3	61.7	70.1	70.1	70.1
118	5	6	-0.8326	0.9353	58.5	61.3	59.1	69.9	69.9	69.9
119	5	7	-0.8737	1.0065	57.3	58.7	57.7	69.6	69.6	69.6
120	5	8	-0.9149	1.0778	56.7	57.3	57.1	69.4	69.4	69.4
121	5	9	-0.9560	1.1491	56.5	56.8	56.8	69.2	69.2	69.2
122	5	10	-0.9972	1.2204	56.4	56.6	56.7	69.0	69.0	69.0
123	5	11	-1.0383	1.2916	56.3	56.5	56.7	68.8	68.8	68.8
124	5	12	-1.0795	1.3629	56.4	56.5	56.7	68.5	68.5	68.5
125	5	13	-1.1206	1.4342	56.4	56.5	56.8	68.2	68.2	68.2
126	5	14	-1.1618	1.5055	56.5	56.6	56.9	68.0	68.0	68.0
127	5	15	-1.2029	1.5767	56.6	56.7	57.0	67.7	67.7	67.7
128	5	16	-1.2441	1.6480	56.7	56.7	57.1	67.3	67.3	67.3
129	5	17	-1.2852	1.7193	56.8	56.8	57.2	67.0	67.0	67.0
130	5	18	-1.3264	1.7906	56.9	56.9	57.3	66.8	66.8	66.8
131	5	19	-1.3675	1.8618	57.0	57.0	57.4	66.5	66.5	66.5
132	5	20	-1.4087	1.9331	57.1	57.1	57.5	66.3	66.3	66.3
133	5	21	-1.4498	2.0044	57.2	57.2	57.6	66.1	66.1	66.1
134	5	22	-1.4910	2.0757	57.3	57.3	57.7	65.9	65.9	65.9
135	5	23	-1.5321	2.1469	57.4	57.4	57.8	65.7	65.7	65.7
136	5	24	-1.5733	2.2182	57.5	57.5	57.8	65.5	65.5	65.5
137	5	25	-1.6144	2.2895	57.6	57.6	57.9	65.3	65.3	65.3
138	5	26	-1.6556	2.3607	57.6	57.6	58.0	64.9	64.9	64.9
139	5	27	-1.6967	2.4320	57.7	57.7	58.1	64.5	64.5	64.5
140	5	28	-1.7379	2.5033	57.8	57.8	58.2	64.2	64.2	64.2
141	6	1	-0.5555	0.6200	86.8	86.9	86.8	86.8	86.8	86.8
142	6	2	-0.5967	0.6913	72.3	75.5	72.6	74.4	74.4	74.4
143	6	3	-0.6378	0.7626	66.8	73.2	67.9	73.1	73.1	73.1
144	6	4	-0.6790	0.8339	62.2	69.0	63.8	72.6	72.6	72.6
145	6	5	-0.7201	0.9051	60.7	64.7	61.7	72.3	72.3	72.3
146	6	6	-0.7613	0.9764	60.3	61.0	60.7	71.9	71.9	71.9
147	6	7	-0.8024	1.0477	60.3	60.5	60.6	71.5	71.5	71.5
148	6	8	-0.8436	1.1190	60.3	60.4	60.7	71.2	71.2	71.2
149	6	9	-0.8847	1.1902	60.4	60.5	60.8	70.8	70.8	70.8
150	6	10	-0.9259	1.2615	60.5	60.5	60.8	70.5	70.5	70.5
151	6	11	-0.9670	1.3328	60.6	60.6	60.9	70.2	70.2	70.2
152	6	12	-1.0082	1.4041	60.7	60.7	61.0	69.8	69.8	69.8
153	6	13	-1.0493	1.4753	60.7	60.8	61.1	69.5	69.5	69.5
154	6	14	-1.0905	1.5466	60.8	60.8	61.2	69.1	69.1	69.1
155	6	15	-1.1316	1.6179	60.9	60.9	61.3	68.7	68.7	68.7
156	6	16	-1.1728	1.6892	61.0	61.0	61.3	68.3	68.3	68.3
157	6	17	-1.2139	1.7604	61.0	61.0	61.4	68.0	68.0	68.0
158	6	18	-1.2551	1.8317	61.1	61.1	61.5	67.7	67.7	67.7
159	6	19	-1.2962	1.9030	61.2	61.2	61.5	67.4	67.4	67.4
160	6	20	-1.3374	1.9743	61.1	61.1	61.5	67.1	67.1	67.1
161	6	21	-1.3785	2.0455	61.1	61.1	61.4	66.8	66.8	66.8
162	6	22	-1.4197	2.1168	61.0	61.0	61.4	66.6	66.6	66.6
163	6	23	-1.4608	2.1881	60.9	60.9	61.3	66.4	66.4	66.4
164	6	24	-1.5020	2.2593	60.9	60.9	61.2	66.1	66.1	66.1
165	6	25	-1.5431	2.3306	60.8	60.8	61.2	65.9	65.9	65.9

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (DNL)	South Flow A2 Special Use Area Procedures (DNL)	South Flow A3 Wide Bodies (DNL)	North Flow Conditions (2018) No Project (DNL)	North Flow A2 Special Use Area Procedures (DNL)	North Flow A3 Wide Bodies (DNL)
166	6	26	-1.5843	2.4019	60.7	60.7	61.1	65.4	65.4	65.4
167	6	27	-1.6254	2.4732	60.6	60.6	61.0	65.0	65.0	65.0
168	6	28	-1.6666	2.5444	60.5	60.5	60.9	64.7	64.7	64.7
169	7	1	-0.4843	0.6612	81.1	85.3	81.4	77.5	77.5	77.5
170	7	2	-0.5254	0.7325	71.0	84.0	74.3	75.9	75.9	75.9
171	7	3	-0.5666	0.8037	66.8	78.5	70.2	74.8	74.8	74.8
172	7	4	-0.6077	0.8750	66.5	68.0	67.0	74.2	74.2	74.2
173	7	5	-0.6489	0.9463	66.5	66.7	66.9	73.7	73.7	73.7
174	7	6	-0.6900	1.0176	66.5	66.6	66.9	73.2	73.2	73.2
175	7	7	-0.7312	1.0888	66.6	66.6	66.9	72.7	72.7	72.7
176	7	8	-0.7723	1.1601	66.5	66.5	66.8	72.2	72.2	72.2
177	7	9	-0.8135	1.2314	66.3	66.3	66.7	71.8	71.8	71.8
178	7	10	-0.8546	1.3027	66.2	66.2	66.5	71.3	71.3	71.3
179	7	11	-0.8958	1.3739	66.0	66.0	66.4	70.9	70.9	70.9
180	7	12	-0.9369	1.4452	65.8	65.9	66.2	70.5	70.5	70.5
181	7	13	-0.9781	1.5165	65.7	65.7	66.0	70.1	70.1	70.1
182	7	14	-1.0192	1.5878	65.5	65.5	65.9	69.7	69.7	69.7
183	7	15	-1.0604	1.6590	65.3	65.3	65.7	69.3	69.3	69.3
184	7	16	-1.1015	1.7303	65.1	65.1	65.5	68.8	68.8	68.8
185	7	17	-1.1427	1.8016	64.9	65.0	65.3	68.4	68.4	68.4
186	7	18	-1.1838	1.8729	64.8	64.8	65.1	68.1	68.1	68.1
187	7	19	-1.2250	1.9441	64.6	64.6	64.9	67.8	67.8	67.8
188	7	20	-1.2661	2.0154	64.4	64.4	64.8	67.5	67.5	67.5
189	7	21	-1.3073	2.0867	64.2	64.2	64.6	67.2	67.2	67.2
190	7	22	-1.3484	2.1580	64.0	64.0	64.4	66.9	66.9	66.9
191	7	23	-1.3896	2.2292	63.9	63.9	64.2	66.7	66.7	66.7
192	7	24	-1.4307	2.3005	63.7	63.7	64.0	66.4	66.4	66.4
193	7	25	-1.4719	2.3718	63.5	63.5	63.9	66.1	66.1	66.1
194	7	26	-1.5130	2.4430	63.3	63.3	63.7	65.7	65.7	65.7
195	7	27	-1.5542	2.5143	63.2	63.2	63.5	65.2	65.2	65.2
196	7	28	-1.5953	2.5856	63.0	63.0	63.4	64.9	64.9	64.9
197	8	1	-0.4130	0.7023	77.3	102.3	88.6	78.0	78.0	78.0
198	8	2	-0.4541	0.7736	75.2	99.1	85.5	76.5	76.5	76.5
199	8	3	-0.4953	0.8449	74.2	74.7	74.6	75.6	75.6	75.6
200	8	4	-0.5364	0.9162	73.5	73.6	73.9	74.9	74.9	74.9
201	8	5	-0.5776	0.9874	72.9	73.0	73.3	74.2	74.2	74.2
202	8	6	-0.6187	1.0587	72.2	72.2	72.6	73.6	73.6	73.6
203	8	7	-0.6599	1.1300	71.6	71.6	71.9	73.0	73.0	73.0
204	8	8	-0.7010	1.2013	71.0	71.0	71.4	72.5	72.5	72.5
205	8	9	-0.7422	1.2725	70.5	70.5	70.8	72.0	72.0	72.0
206	8	10	-0.7833	1.3438	70.0	70.0	70.3	71.5	71.5	71.5
207	8	11	-0.8245	1.4151	69.5	69.5	69.9	71.0	71.0	71.0
208	8	12	-0.8656	1.4864	69.1	69.1	69.4	70.6	70.6	70.6
209	8	13	-0.9068	1.5576	68.7	68.7	69.0	70.1	70.1	70.1
210	8	14	-0.9479	1.6289	68.3	68.3	68.6	69.7	69.7	69.7
211	8	15	-0.9891	1.7002	67.9	67.9	68.2	69.3	69.3	69.3
212	8	16	-1.0302	1.7715	67.5	67.5	67.9	68.8	68.8	68.8
213	8	17	-1.0714	1.8427	67.2	67.2	67.5	68.4	68.4	68.4
214	8	18	-1.1125	1.9140	66.9	66.9	67.2	68.0	68.0	68.0
215	8	19	-1.1537	1.9853	66.5	66.6	66.9	67.7	67.7	67.7
216	8	20	-1.1948	2.0566	66.3	66.3	66.6	67.4	67.4	67.4
217	8	21	-1.2360	2.1278	66.0	66.0	66.3	67.1	67.1	67.1
218	8	22	-1.2771	2.1991	65.7	65.7	66.1	66.8	66.8	66.8
219	8	23	-1.3183	2.2704	65.4	65.4	65.8	66.5	66.5	66.5
220	8	24	-1.3594	2.3416	65.2	65.2	65.5	66.3	66.3	66.3

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*
221	8	25	-1.4006	2.4129	64.9	64.9	65.3	66.0	66.0	66.0
222	8	26	-1.4417	2.4842	64.7	64.7	65.0	65.5	65.5	65.5
223	8	27	-1.4829	2.5555	64.4	64.4	64.8	65.1	65.1	65.1
224	8	28	-1.5240	2.6267	64.2	64.2	64.6	64.7	64.7	64.7
225	9	1	-0.3417	0.7435	79.5	82.8	79.8	76.5	76.5	76.5
226	9	2	-0.3829	0.8148	71.4	81.8	73.5	75.6	75.6	75.6
227	9	3	-0.4240	0.8860	67.4	77.8	70.3	74.9	74.9	74.9
228	9	4	-0.4652	0.9573	66.8	69.1	67.5	74.3	74.3	74.3
229	9	5	-0.5063	1.0286	66.7	66.9	67.1	73.7	73.7	73.7
230	9	6	-0.5475	1.0999	66.6	66.7	67.0	73.1	73.1	73.1
231	9	7	-0.5886	1.1711	66.5	66.6	66.9	72.5	72.5	72.5
232	9	8	-0.6298	1.2424	66.5	66.5	66.9	71.9	71.9	71.9
233	9	9	-0.6709	1.3137	66.4	66.4	66.8	71.4	71.4	71.4
234	9	10	-0.7121	1.3850	66.3	66.3	66.7	70.9	70.9	70.9
235	9	11	-0.7532	1.4562	66.1	66.1	66.5	70.4	70.4	70.4
236	9	12	-0.7944	1.5275	65.9	66.0	66.3	69.9	69.9	69.9
237	9	13	-0.8355	1.5988	65.8	65.8	66.2	69.5	69.5	69.5
238	9	14	-0.8767	1.6701	65.6	65.6	66.0	69.1	69.1	69.1
239	9	15	-0.9178	1.7413	65.4	65.4	65.8	68.6	68.7	68.7
240	9	16	-0.9590	1.8126	65.2	65.2	65.6	68.2	68.2	68.2
241	9	17	-1.0001	1.8839	65.1	65.1	65.4	67.8	67.8	67.8
242	9	18	-1.0413	1.9552	64.9	64.9	65.3	67.4	67.4	67.4
243	9	19	-1.0824	2.0264	64.7	64.7	65.1	67.1	67.1	67.1
244	9	20	-1.1236	2.0977	64.6	64.6	64.9	66.8	66.8	66.8
245	9	21	-1.1647	2.1690	64.4	64.4	64.8	66.5	66.5	66.5
246	9	22	-1.2059	2.2403	64.2	64.2	64.6	66.2	66.2	66.2
247	9	23	-1.2470	2.3115	64.1	64.1	64.4	66.0	66.0	66.0
248	9	24	-1.2882	2.3828	63.9	63.9	64.3	65.7	65.7	65.7
249	9	25	-1.3293	2.4541	63.7	63.7	64.1	65.5	65.5	65.5
250	9	26	-1.3705	2.5253	63.6	63.6	63.9	65.0	65.0	65.0
251	9	27	-1.4116	2.5966	63.4	63.4	63.8	64.6	64.6	64.6
252	9	28	-1.4528	2.6679	63.3	63.3	63.6	64.3	64.3	64.3
253	10	1	-0.2704	0.7846	72.6	73.8	72.7	73.2	73.2	73.2
254	10	2	-0.3116	0.8559	69.6	73.4	70.0	72.9	72.9	72.9
255	10	3	-0.3527	0.9272	65.6	72.0	66.8	72.6	72.6	72.6
256	10	4	-0.3939	0.9985	61.9	68.5	63.4	72.3	72.3	72.3
257	10	5	-0.4350	1.0697	60.8	64.8	61.8	72.1	72.1	72.1
258	10	6	-0.4762	1.1410	60.8	61.6	61.3	71.7	71.7	71.7
259	10	7	-0.5173	1.2123	60.9	61.1	61.3	71.2	71.2	71.2
260	10	8	-0.5585	1.2836	61.0	61.1	61.4	70.6	70.6	70.6
261	10	9	-0.5996	1.3548	61.1	61.2	61.5	70.0	70.0	70.0
262	10	10	-0.6408	1.4261	61.3	61.3	61.6	69.6	69.6	69.6
263	10	11	-0.6819	1.4974	61.3	61.3	61.7	69.1	69.1	69.1
264	10	12	-0.7231	1.5687	61.4	61.4	61.7	68.6	68.6	68.6
265	10	13	-0.7642	1.6399	61.4	61.4	61.8	68.2	68.2	68.2
266	10	14	-0.8054	1.7112	61.4	61.5	61.8	67.8	67.8	67.8
267	10	15	-0.8465	1.7825	61.5	61.5	61.9	67.4	67.4	67.4
268	10	16	-0.8877	1.8538	61.5	61.5	61.9	67.0	67.0	67.0
269	10	17	-0.9288	1.9250	61.6	61.6	61.9	66.7	66.7	66.7
270	10	18	-0.9700	1.9963	61.6	61.6	62.0	66.3	66.3	66.3
271	10	19	-1.0111	2.0676	61.6	61.6	62.0	66.1	66.1	66.1
272	10	20	-1.0523	2.1389	61.7	61.6	62.1	65.8	65.8	65.8
273	10	21	-1.0934	2.2101	61.6	61.6	62.0	65.5	65.5	65.5
274	10	22	-1.1346	2.2814	61.5	61.6	61.9	65.3	65.3	65.3
275	10	23	-1.1757	2.3527	61.5	61.5	61.8	65.0	65.0	65.0

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*	*No Project (DNL)*	*A2 Special Use Area Procedures (DNL)*	*A3 Wide Bodies (DNL)*
276	10	24	-1.2169	2.4239	61.4	61.4	61.7	64.8	64.8	64.8
277	10	25	-1.2580	2.4952	61.3	61.3	61.7	64.6	64.6	64.6
278	10	26	-1.2992	2.5665	61.2	61.2	61.6	64.2	64.2	64.2
279	10	27	-1.3403	2.6378	61.1	61.1	61.5	63.8	63.8	63.8
280	10	28	-1.3815	2.7090	61.0	61.0	61.4	63.4	63.4	63.4
281	11	1	-0.1992	0.8258	67.7	68.3	67.7	69.7	69.7	69.7
282	11	2	-0.2403	0.8971	66.2	68.0	66.4	69.8	69.8	69.8
283	11	3	-0.2815	0.9683	63.9	67.2	64.3	69.9	69.9	69.9
284	11	4	-0.3226	1.0396	61.3	65.5	62.1	69.9	69.9	69.9
285	11	5	-0.3638	1.1109	59.2	63.1	60.0	69.9	69.9	69.9
286	11	6	-0.4049	1.1822	57.7	60.7	58.4	69.9	69.9	69.9
287	11	7	-0.4461	1.2534	57.3	59.0	57.8	69.7	69.7	69.7
288	11	8	-0.4872	1.3247	57.3	57.9	57.6	69.1	69.1	69.1
289	11	9	-0.5284	1.3960	57.2	57.5	57.5	68.4	68.4	68.4
290	11	10	-0.5695	1.4673	57.2	57.3	57.5	67.9	67.9	67.9
291	11	11	-0.6107	1.5385	57.2	57.3	57.5	67.4	67.4	67.4
292	11	12	-0.6518	1.6098	57.4	57.4	57.7	67.0	67.0	67.0
293	11	13	-0.6930	1.6811	57.5	57.5	57.8	66.6	66.6	66.6
294	11	14	-0.7341	1.7524	57.6	57.6	57.9	66.2	66.2	66.2
295	11	15	-0.7753	1.8236	57.7	57.8	58.0	65.8	65.8	65.8
296	11	16	-0.8164	1.8949	57.8	57.9	58.2	65.5	65.5	65.5
297	11	17	-0.8576	1.9662	58.0	58.0	58.3	65.2	65.2	65.2
298	11	18	-0.8987	2.0375	58.1	58.1	58.4	64.9	64.9	64.9
299	11	19	-0.9399	2.1087	58.2	58.2	58.5	64.6	64.6	64.6
300	11	20	-0.9810	2.1800	58.3	58.3	58.6	64.4	64.4	64.4
301	11	21	-1.0222	2.2513	58.4	58.4	58.7	64.2	64.2	64.2
302	11	22	-1.0633	2.3225	58.5	58.5	58.8	64.0	64.0	64.0
303	11	23	-1.1045	2.3938	58.5	58.5	58.8	63.8	63.8	63.8
304	11	24	-1.1456	2.4651	58.5	58.5	58.9	63.6	63.6	63.6
305	11	25	-1.1868	2.5364	58.6	58.6	58.9	63.4	63.4	63.4
306	11	26	-1.2279	2.6076	58.6	58.6	59.0	63.0	63.0	63.0
307	11	27	-1.2691	2.6789	58.7	58.7	59.0	62.7	62.7	62.7
308	11	28	-1.3102	2.7502	58.7	58.7	59.0	62.4	62.4	62.4
309	12	1	-0.1279	0.8669	64.3	64.6	64.3	66.8	66.8	66.8
310	12	2	-0.1690	0.9382	63.4	64.4	63.4	67.0	67.0	67.0
311	12	3	-0.2102	1.0095	62.0	63.8	62.2	67.2	67.2	67.2
312	12	4	-0.2513	1.0808	60.2	62.8	60.6	67.6	67.5	67.5
313	12	5	-0.2925	1.1520	58.7	61.3	59.1	67.8	67.8	67.8
314	12	6	-0.3336	1.2233	57.4	59.6	57.7	68.0	68.0	68.0
315	12	7	-0.3748	1.2946	56.4	58.3	56.7	68.1	68.1	68.1
316	12	8	-0.4159	1.3659	55.9	57.3	56.2	67.8	67.8	67.8
317	12	9	-0.4571	1.4371	55.5	56.3	55.7	67.0	67.0	67.0
318	12	10	-0.4982	1.5084	55.1	55.6	55.3	66.3	66.3	66.3
319	12	11	-0.5394	1.5797	55.0	55.3	55.2	65.8	65.8	65.8
320	12	12	-0.5805	1.6510	55.0	55.2	55.2	65.2	65.2	65.2
321	12	13	-0.6217	1.7222	55.1	55.2	55.2	64.8	64.8	64.8
322	12	14	-0.6628	1.7935	55.1	55.2	55.3	64.4	64.4	64.4
323	12	15	-0.7040	1.8648	55.2	55.2	55.4	64.1	64.1	64.1
324	12	16	-0.7451	1.9361	55.3	55.3	55.4	63.8	63.8	63.8
325	12	17	-0.7863	2.0073	55.3	55.4	55.5	63.6	63.6	63.6
326	12	18	-0.8274	2.0786	55.4	55.4	55.6	63.3	63.3	63.3
327	12	19	-0.8686	2.1499	55.5	55.5	55.7	63.1	63.1	63.1
328	12	20	-0.9097	2.2212	55.6	55.6	55.8	62.9	62.9	62.9
329	12	21	-0.9509	2.2924	55.7	55.7	55.9	62.7	62.7	62.7
330	12	22	-0.9920	2.3637	55.7	55.7	56.0	62.5	62.5	62.5

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (DNL)	South Flow A2 Special Use Area Procedures (DNL)	South Flow A3 Wide Bodies (DNL)	North Flow Conditions (2018) No Project (DNL)	North Flow A2 Special Use Area Procedures (DNL)	North Flow A3 Wide Bodies (DNL)
331	12	23	-1.0332	2.4350	55.8	55.8	56.1	62.4	62.4	62.4
332	12	24	-1.0743	2.5062	55.9	55.9	56.1	62.2	62.2	62.2
333	12	25	-1.1155	2.5775	56.0	56.0	56.2	62.0	62.0	62.0
334	12	26	-1.1566	2.6488	56.1	56.1	56.3	61.8	61.8	61.8
335	12	27	-1.1978	2.7201	56.1	56.1	56.4	61.5	61.5	61.5
336	12	28	-1.2389	2.7913	56.2	56.2	56.5	61.2	61.2	61.2
337	13	1	-0.0566	0.9081	61.8	61.9	61.8	64.4	64.4	64.4
338	13	2	-0.0978	0.9794	61.2	61.8	61.2	64.7	64.7	64.7
339	13	3	-0.1389	1.0506	60.4	61.4	60.4	65.0	65.0	65.0
340	13	4	-0.1801	1.1219	59.3	60.7	59.4	65.5	65.5	65.5
341	13	5	-0.2212	1.1932	58.2	59.7	58.3	66.0	66.0	66.0
342	13	6	-0.2624	1.2645	57.1	58.7	57.2	66.4	66.4	66.4
343	13	7	-0.3035	1.3357	56.2	57.7	56.3	66.6	66.6	66.6
344	13	8	-0.3447	1.4070	55.6	56.8	55.7	66.5	66.5	66.5
345	13	9	-0.3858	1.4783	55.1	56.1	55.2	65.7	65.7	65.7
346	13	10	-0.4270	1.5496	54.5	55.3	54.6	64.9	64.9	64.9
347	13	11	-0.4681	1.6208	54.1	54.7	54.2	64.2	64.2	64.2
348	13	12	-0.5093	1.6921	54.0	54.3	54.0	63.6	63.6	63.6
349	13	13	-0.5504	1.7634	53.9	54.1	53.9	63.1	63.1	63.1
350	13	14	-0.5916	1.8347	53.9	54.0	53.9	62.7	62.7	62.7
351	13	15	-0.6327	1.9059	53.8	53.9	53.9	62.5	62.5	62.5
352	13	16	-0.6739	1.9772	53.8	53.9	53.9	62.2	62.2	62.2
353	13	17	-0.7150	2.0485	53.9	53.9	53.9	62.0	62.0	62.0
354	13	18	-0.7562	2.1198	53.9	53.9	53.9	61.8	61.8	61.8
355	13	19	-0.7973	2.1910	53.9	53.9	54.0	61.6	61.6	61.6
356	13	20	-0.8385	2.2623	53.9	54.0	54.0	61.4	61.4	61.4
357	13	21	-0.8796	2.3336	54.0	54.0	54.1	61.3	61.3	61.3
358	13	22	-0.9208	2.4048	54.0	54.0	54.1	61.1	61.1	61.1
359	13	23	-0.9619	2.4761	54.0	54.1	54.2	61.0	61.0	61.0
360	13	24	-1.0031	2.5474	54.1	54.1	54.2	60.9	60.9	60.9
361	13	25	-1.0442	2.6187	54.1	54.1	54.3	60.7	60.7	60.7
362	13	26	-1.0854	2.6899	54.2	54.2	54.3	60.5	60.5	60.5
363	13	27	-1.1265	2.7612	54.2	54.2	54.4	60.2	60.2	60.2
364	13	28	-1.1677	2.8325	54.3	54.3	54.4	60.0	60.0	60.0
365	14	1	0.0147	0.9492	60.1	60.1	60.0	62.4	62.4	62.4
366	14	2	-0.0265	1.0205	59.7	60.0	59.6	62.8	62.8	62.8
367	14	3	-0.0676	1.0918	59.1	59.7	59.1	63.2	63.2	63.2
368	14	4	-0.1088	1.1631	58.4	59.2	58.4	63.8	63.8	63.8
369	14	5	-0.1499	1.2343	57.5	58.6	57.6	64.4	64.4	64.4
370	14	6	-0.1911	1.3056	56.7	57.8	56.7	64.8	64.8	64.8
371	14	7	-0.2322	1.3769	55.9	57.0	55.9	65.2	65.2	65.2
372	14	8	-0.2734	1.4482	55.4	56.3	55.4	65.2	65.2	65.2
373	14	9	-0.3145	1.5194	55.0	55.8	55.0	64.5	64.5	64.5
374	14	10	-0.3557	1.5907	54.4	55.1	54.4	63.5	63.5	63.5
375	14	11	-0.3968	1.6620	53.9	54.5	53.9	62.7	62.7	62.7
376	14	12	-0.4380	1.7333	53.6	54.1	53.5	62.0	62.0	62.0
377	14	13	-0.4791	1.8045	53.4	53.7	53.4	61.5	61.5	61.5
378	14	14	-0.5203	1.8758	53.3	53.5	53.2	61.1	61.1	61.1
379	14	15	-0.5614	1.9471	53.2	53.4	53.2	60.8	60.8	60.8
380	14	16	-0.6026	2.0184	53.2	53.3	53.1	60.6	60.6	60.6
381	14	17	-0.6437	2.0896	53.1	53.2	53.1	60.4	60.4	60.4
382	14	18	-0.6849	2.1609	53.1	53.2	53.1	60.3	60.3	60.3
383	14	19	-0.7260	2.2322	53.1	53.2	53.1	60.1	60.1	60.1
384	14	20	-0.7672	2.3035	53.1	53.1	53.1	60.0	60.0	60.0
385	14	21	-0.8083	2.3747	53.1	53.1	53.1	59.9	59.9	59.9

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (DNL)	South Flow A2 Special Use Area Procedures (DNL)	South Flow A3 Wide Bodies (DNL)	North Flow Conditions (2018) No Project (DNL)	North Flow A2 Special Use Area Procedures (DNL)	North Flow A3 Wide Bodies (DNL)
386	14	22	-0.8495	2.4460	53.1	53.1	53.1	59.8	59.7	59.7
387	14	23	-0.8906	2.5173	53.1	53.1	53.1	59.6	59.6	59.6
388	14	24	-0.9318	2.5885	53.1	53.1	53.1	59.5	59.5	59.5
389	14	25	-0.9729	2.6598	53.1	53.1	53.1	59.4	59.4	59.4
390	14	26	-1.0141	2.7311	53.1	53.1	53.2	59.2	59.2	59.2
391	14	27	-1.0552	2.8024	53.1	53.1	53.2	59.0	59.0	59.0
392	14	28	-1.0964	2.8736	53.1	53.1	53.2	58.8	58.8	58.8
393	15	1	0.0859	0.9904	58.7	58.7	58.7	60.9	60.9	60.9
394	15	2	0.0448	1.0617	58.4	58.7	58.4	61.3	61.3	61.3
395	15	3	0.0036	1.1329	58.0	58.5	58.0	61.8	61.8	61.8
396	15	4	-0.0375	1.2042	57.5	58.1	57.5	62.4	62.4	62.4
397	15	5	-0.0787	1.2755	56.8	57.6	56.9	63.0	63.0	63.0
398	15	6	-0.1198	1.3468	56.2	57.0	56.2	63.5	63.5	63.5
399	15	7	-0.1610	1.4180	55.6	56.4	55.6	63.9	63.9	63.9
400	15	8	-0.2021	1.4893	55.1	55.9	55.2	64.0	64.0	64.0
401	15	9	-0.2433	1.5606	54.8	55.5	54.9	63.3	63.3	63.3
402	15	10	-0.2844	1.6319	54.3	54.9	54.3	62.3	62.3	62.3
403	15	11	-0.3256	1.7031	53.8	54.3	53.8	61.3	61.3	61.3
404	15	12	-0.3667	1.7744	53.5	53.9	53.5	60.6	60.6	60.6
405	15	13	-0.4079	1.8457	53.3	53.6	53.3	59.9	59.9	59.9
406	15	14	-0.4490	1.9170	53.1	53.4	53.1	59.5	59.5	59.5
407	15	15	-0.4902	1.9882	53.0	53.2	53.0	59.2	59.2	59.2
408	15	16	-0.5313	2.0595	52.9	53.1	52.9	59.0	59.0	59.0
409	15	17	-0.5725	2.1308	52.9	53.0	52.8	58.9	58.9	58.9
410	15	18	-0.6136	2.2021	52.8	52.9	52.8	58.7	58.7	58.7
411	15	19	-0.6548	2.2733	52.8	52.8	52.7	58.6	58.6	58.6
412	15	20	-0.6959	2.3446	52.7	52.8	52.7	58.5	58.5	58.5
413	15	21	-0.7371	2.4159	52.7	52.7	52.7	58.4	58.4	58.4
414	15	22	-0.7782	2.4871	52.7	52.7	52.7	58.3	58.3	58.3
415	15	23	-0.8194	2.5584	52.6	52.7	52.6	58.2	58.2	58.2
416	15	24	-0.8605	2.6297	52.6	52.6	52.6	58.2	58.1	58.1
417	15	25	-0.9017	2.7010	52.6	52.6	52.6	58.1	58.1	58.1
418	15	26	-0.9428	2.7722	52.6	52.6	52.6	57.9	57.9	57.9
419	15	27	-0.9840	2.8435	52.6	52.6	52.6	57.7	57.7	57.7
420	15	28	-1.0251	2.9148	52.6	52.6	52.6	57.6	57.6	57.6
421	16	1	0.1572	1.0315	57.7	57.7	57.7	59.8	59.8	59.8
422	16	2	0.1161	1.1028	57.5	57.7	57.5	60.2	60.2	60.2
423	16	3	0.0749	1.1741	57.1	57.5	57.2	60.8	60.8	60.8
424	16	4	0.0338	1.2454	56.7	57.2	56.7	61.4	61.4	61.4
425	16	5	-0.0074	1.3166	56.2	56.8	56.3	61.9	61.9	61.9
426	16	6	-0.0485	1.3879	55.8	56.3	55.8	62.4	62.4	62.4
427	16	7	-0.0897	1.4592	55.3	55.9	55.4	62.8	62.8	62.8
428	16	8	-0.1308	1.5305	55.0	55.6	55.1	62.9	62.9	62.9
429	16	9	-0.1720	1.6017	54.7	55.2	54.8	62.3	62.3	62.3
430	16	10	-0.2131	1.6730	54.2	54.7	54.3	61.2	61.2	61.2
431	16	11	-0.2543	1.7443	53.8	54.2	53.9	60.2	60.2	60.2
432	16	12	-0.2954	1.8156	53.6	53.9	53.6	59.4	59.4	59.4
433	16	13	-0.3366	1.8868	53.3	53.6	53.3	58.6	58.6	58.6
434	16	14	-0.3777	1.9581	53.2	53.4	53.2	58.1	58.1	58.1
435	16	15	-0.4189	2.0294	53.0	53.2	53.0	57.8	57.8	57.8
436	16	16	-0.4600	2.1007	52.9	53.1	52.9	57.6	57.5	57.5
437	16	17	-0.5012	2.1719	52.8	52.9	52.8	57.4	57.4	57.4
438	16	18	-0.5423	2.2432	52.8	52.8	52.7	57.3	57.3	57.3
439	16	19	-0.5835	2.3145	52.7	52.8	52.7	57.1	57.1	57.1
440	16	20	-0.6246	2.3858	52.6	52.7	52.6	57.0	57.0	57.0

Table C-14
King County International Airport EA
DNL Grid Point Analysis (250 ft Detail)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (DNL)	South Flow Conditions (2018) A2 Special Use Area Procedures (DNL)	South Flow Conditions (2018) A3 Wide Bodies (DNL)	North Flow Conditions (2018) No Project (DNL)	North Flow Conditions (2018) A2 Special Use Area Procedures (DNL)	North Flow Conditions (2018) A3 Wide Bodies (DNL)
441	16	21	-0.6658	2.4570	52.6	52.6	52.6	57.0	57.0	57.0
442	16	22	-0.7069	2.5283	52.5	52.6	52.5	56.9	56.9	56.9
443	16	23	-0.7481	2.5996	52.5	52.5	52.5	56.8	56.8	56.8
444	16	24	-0.7892	2.6708	52.5	52.5	52.5	56.8	56.8	56.8
445	16	25	-0.8304	2.7421	52.4	52.4	52.4	56.7	56.7	56.7
446	16	26	-0.8715	2.8134	52.4	52.4	52.4	56.6	56.6	56.6
447	16	27	-0.9127	2.8847	52.3	52.4	52.4	56.4	56.4	56.4
448	16	28	-0.9538	2.9559	52.3	52.3	52.3	56.3	56.3	56.3
SP	1	1	-0.5832	0.7732	66.6	78.1	69.8	74.6	74.6	74.6

Prepared December 31, 2003

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
			X	Y	No Project	A2 Special Use Area Procedures	A3 Wide Bodies	No Project	A2 Special Use Area Procedures	A3 Wide Bodies
Site	I	J	(nm)	(nm)	(TA-85)	(TA-85)	(TA-85)	(TA-85)	(TA-85)	(TA-85)
1	1	1	-0.9119	0.4143	0.0	0.0	0.0	0.0	0.0	0.0
2	1	2	-0.9530	0.4856	0.0	0.0	0.0	0.0	0.0	0.0
3	1	3	-0.9942	0.5568	0.0	0.0	0.0	0.0	0.0	0.0
4	1	4	-1.0353	0.6281	0.0	0.0	0.0	0.0	0.0	0.0
5	1	5	-1.0765	0.6994	0.0	0.0	0.0	0.0	0.0	0.0
6	1	6	-1.1176	0.7707	0.0	0.0	0.0	0.1	0.1	0.1
7	1	7	-1.1588	0.8419	0.0	0.0	0.0	0.1	0.1	0.1
8	1	8	-1.1999	0.9132	0.0	0.0	0.0	0.1	0.1	0.1
9	1	9	-1.2411	0.9845	0.0	0.0	0.0	0.1	0.1	0.1
10	1	10	-1.2822	1.0558	0.0	0.0	0.0	0.1	0.1	0.1
11	1	11	-1.3234	1.1270	0.0	0.0	0.0	0.1	0.1	0.1
12	1	12	-1.3645	1.1983	0.0	0.0	0.0	0.1	0.1	0.1
13	1	13	-1.4057	1.2696	0.0	0.0	0.0	0.1	0.1	0.1
14	1	14	-1.4468	1.3409	0.0	0.0	0.0	0.1	0.1	0.1
15	1	15	-1.4880	1.4121	0.0	0.0	0.0	0.1	0.1	0.1
16	1	16	-1.5291	1.4834	0.0	0.0	0.0	0.1	0.1	0.1
17	1	17	-1.5703	1.5547	0.0	0.0	0.0	0.1	0.1	0.1
18	1	18	-1.6114	1.6260	0.0	0.0	0.0	0.1	0.1	0.1
19	1	19	-1.6526	1.6972	0.0	0.0	0.0	0.1	0.1	0.1
20	1	20	-1.6937	1.7685	0.0	0.0	0.0	0.1	0.1	0.1
21	1	21	-1.7349	1.8398	0.0	0.0	0.0	0.1	0.1	0.1
22	1	22	-1.7760	1.9111	0.0	0.0	0.0	0.1	0.1	0.1
23	1	23	-1.8172	1.9823	0.0	0.0	0.0	0.1	0.1	0.1
24	1	24	-1.8583	2.0536	0.0	0.0	0.0	0.1	0.1	0.1
25	1	25	-1.8995	2.1249	0.0	0.0	0.0	0.1	0.1	0.1
26	1	26	-1.9406	2.1961	0.0	0.0	0.0	0.1	0.1	0.1
27	1	27	-1.9818	2.2674	0.0	0.0	0.0	0.1	0.1	0.1
28	1	28	-2.0229	2.3387	0.0	0.0	0.0	0.1	0.1	0.1
29	2	1	-0.8406	0.4554	0.0	0.0	0.0	0.1	0.1	0.1
30	2	2	-0.8818	0.5267	0.0	0.0	0.0	0.1	0.1	0.1
31	2	3	-0.9229	0.5980	0.0	0.0	0.0	0.1	0.1	0.1
32	2	4	-0.9641	0.6693	0.0	0.0	0.0	0.2	0.2	0.2
33	2	5	-1.0052	0.7405	0.0	0.0	0.0	0.2	0.2	0.2
34	2	6	-1.0464	0.8118	0.0	0.0	0.0	0.2	0.2	0.2
35	2	7	-1.0875	0.8831	0.0	0.0	0.0	0.2	0.2	0.2
36	2	8	-1.1287	0.9544	0.0	0.0	0.0	0.2	0.2	0.2
37	2	9	-1.1698	1.0256	0.0	0.0	0.0	0.2	0.2	0.2
38	2	10	-1.2110	1.0969	0.0	0.0	0.0	0.2	0.2	0.2
39	2	11	-1.2521	1.1682	0.0	0.0	0.0	0.2	0.2	0.2
40	2	12	-1.2933	1.2395	0.0	0.0	0.0	0.2	0.2	0.2
41	2	13	-1.3344	1.3107	0.0	0.0	0.0	0.2	0.2	0.2
42	2	14	-1.3756	1.3820	0.0	0.0	0.0	0.2	0.2	0.2
43	2	15	-1.4167	1.4533	0.0	0.0	0.0	0.2	0.2	0.2
44	2	16	-1.4579	1.5246	0.0	0.0	0.0	0.2	0.2	0.2
45	2	17	-1.4990	1.5958	0.0	0.0	0.0	0.2	0.2	0.2
46	2	18	-1.5402	1.6671	0.0	0.0	0.0	0.2	0.2	0.2
47	2	19	-1.5813	1.7384	0.0	0.0	0.0	0.2	0.2	0.2
48	2	20	-1.6225	1.8097	0.0	0.0	0.0	0.2	0.2	0.2
49	2	21	-1.6636	1.8809	0.0	0.0	0.0	0.2	0.2	0.2
50	2	22	-1.7048	1.9522	0.0	0.0	0.0	0.2	0.2	0.2
51	2	23	-1.7459	2.0235	0.0	0.0	0.0	0.2	0.2	0.2
52	2	24	-1.7871	2.0947	0.0	0.0	0.0	0.2	0.2	0.2
53	2	25	-1.8282	2.1660	0.0	0.0	0.0	0.2	0.2	0.2
54	2	26	-1.8694	2.2373	0.0	0.0	0.0	0.2	0.2	0.2
55	2	27	-1.9105	2.3086	0.0	0.0	0.0	0.2	0.2	0.2

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-85)	South Flow A2 Special Use Area Procedures (TA-85)	South Flow A3 Wide Bodies (TA-85)	North Flow Conditions (2018) No Project (TA-85)	North Flow A2 Special Use Area Procedures (TA-85)	North Flow A3 Wide Bodies (TA-85)
56	2	28	-1.9517	2.3798	0.0	0.0	0.0	0.1	0.1	0.1
57	3	1	-0.7694	0.4966	4.0	4.0	4.0	4.3	4.3	4.3
58	3	2	-0.8105	0.5679	2.0	2.0	2.0	2.3	2.3	2.3
59	3	3	-0.8517	0.6391	0.0	0.0	0.0	0.4	0.4	0.4
60	3	4	-0.8928	0.7104	0.0	0.0	0.0	0.4	0.4	0.4
61	3	5	-0.9340	0.7817	0.0	0.0	0.0	0.4	0.4	0.4
62	3	6	-0.9751	0.8530	0.0	0.0	0.0	0.5	0.5	0.5
63	3	7	-1.0163	0.9242	0.0	0.0	0.0	0.5	0.5	0.5
64	3	8	-1.0574	0.9955	0.0	0.0	0.0	0.5	0.5	0.5
65	3	9	-1.0986	1.0668	0.0	0.0	0.0	0.5	0.5	0.5
66	3	10	-1.1397	1.1381	0.0	0.0	0.0	0.5	0.5	0.5
67	3	11	-1.1809	1.2093	0.0	0.0	0.0	0.5	0.5	0.5
68	3	12	-1.2220	1.2806	0.0	0.0	0.0	0.5	0.5	0.5
69	3	13	-1.2632	1.3519	0.0	0.0	0.0	0.5	0.5	0.5
70	3	14	-1.3043	1.4232	0.0	0.0	0.0	0.5	0.5	0.5
71	3	15	-1.3455	1.4944	0.0	0.0	0.0	0.5	0.5	0.5
72	3	16	-1.3866	1.5657	0.0	0.0	0.0	0.4	0.4	0.4
73	3	17	-1.4278	1.6370	0.0	0.0	0.0	0.4	0.4	0.4
74	3	18	-1.4689	1.7083	0.0	0.0	0.0	0.4	0.4	0.4
75	3	19	-1.5101	1.7795	0.0	0.0	0.0	0.4	0.4	0.4
76	3	20	-1.5512	1.8508	0.0	0.0	0.0	0.4	0.4	0.4
77	3	21	-1.5924	1.9221	0.0	0.0	0.0	0.4	0.4	0.4
78	3	22	-1.6335	1.9934	0.0	0.0	0.0	0.4	0.4	0.4
79	3	23	-1.6747	2.0646	0.0	0.0	0.0	0.4	0.4	0.4
80	3	24	-1.7158	2.1359	0.0	0.0	0.0	0.3	0.3	0.3
81	3	25	-1.7570	2.2072	0.0	0.0	0.0	0.3	0.3	0.3
82	3	26	-1.7981	2.2784	0.0	0.0	0.0	0.3	0.3	0.3
83	3	27	-1.8393	2.3497	0.0	0.0	0.0	0.3	0.3	0.3
84	3	28	-1.8804	2.4210	0.0	0.0	0.0	0.2	0.2	0.2
85	4	1	-0.6981	0.5377	12.0	12.0	12.0	12.7	12.7	12.7
86	4	2	-0.7392	0.6090	10.0	10.0	10.0	10.7	10.7	10.7
87	4	3	-0.7804	0.6803	4.0	4.0	4.0	4.8	4.8	4.8
88	4	4	-0.8215	0.7516	0.0	0.0	0.0	0.8	0.8	0.8
89	4	5	-0.8627	0.8228	0.0	0.0	0.0	0.9	0.9	0.9
90	4	6	-0.9038	0.8941	0.0	0.0	0.0	0.9	0.9	0.9
91	4	7	-0.9450	0.9654	0.0	0.0	0.0	0.9	0.9	0.9
92	4	8	-0.9861	1.0367	0.0	0.0	0.0	0.9	0.9	0.9
93	4	9	-1.0273	1.1079	0.0	0.0	0.0	0.9	0.9	0.9
94	4	10	-1.0684	1.1792	0.0	0.0	0.0	0.9	0.9	0.9
95	4	11	-1.1096	1.2505	0.0	0.0	0.0	0.8	0.8	0.8
96	4	12	-1.1507	1.3218	0.0	0.0	0.0	0.8	0.8	0.8
97	4	13	-1.1919	1.3930	0.0	0.0	0.0	0.8	0.8	0.8
98	4	14	-1.2330	1.4643	0.0	0.0	0.0	0.8	0.8	0.8
99	4	15	-1.2742	1.5356	0.0	0.0	0.0	0.8	0.8	0.8
100	4	16	-1.3153	1.6069	0.0	0.0	0.0	0.7	0.7	0.7
101	4	17	-1.3565	1.6781	0.0	0.0	0.0	0.7	0.7	0.7
102	4	18	-1.3976	1.7494	0.0	0.0	0.0	0.6	0.6	0.6
103	4	19	-1.4388	1.8207	0.0	0.0	0.0	0.6	0.6	0.6
104	4	20	-1.4799	1.8920	0.0	0.0	0.0	0.6	0.6	0.6
105	4	21	-1.5211	1.9632	0.0	0.0	0.0	0.6	0.6	0.6
106	4	22	-1.5622	2.0345	0.0	0.0	0.0	0.6	0.6	0.6
107	4	23	-1.6034	2.1058	0.0	0.0	0.0	0.5	0.5	0.5
108	4	24	-1.6445	2.1770	0.0	0.0	0.0	0.5	0.5	0.5
109	4	25	-1.6857	2.2483	0.0	0.0	0.0	0.5	0.5	0.5
110	4	26	-1.7268	2.3196	0.0	0.0	0.0	0.4	0.5	0.5

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-85)	South Flow A2 Special Use Area Procedures (TA-85)	South Flow A3 Wide Bodies (TA-85)	North Flow Conditions (2018) No Project (TA-85)	North Flow A2 Special Use Area Procedures (TA-85)	North Flow A3 Wide Bodies (TA-85)
111	4	27	-1.7680	2.3909	0.0	0.0	0.0	0.4	0.4	0.4
112	4	28	-1.8091	2.4621	0.0	0.0	0.0	0.4	0.4	0.4
113	5	1	-0.6268	0.5789	20.8	21.2	20.8	21.3	21.4	21.4
114	5	2	-0.6680	0.6502	18.3	19.1	18.5	19.4	19.4	19.4
115	5	3	-0.7091	0.7214	6.0	6.7	6.2	7.4	7.4	7.4
116	5	4	-0.7503	0.7927	2.0	2.2	2.0	3.4	3.4	3.4
117	5	5	-0.7914	0.8640	0.0	0.0	0.0	1.4	1.4	1.4
118	5	6	-0.8326	0.9353	0.0	0.0	0.0	1.4	1.4	1.4
119	5	7	-0.8737	1.0065	0.0	0.0	0.0	1.4	1.4	1.4
120	5	8	-0.9149	1.0778	0.0	0.0	0.0	1.4	1.4	1.4
121	5	9	-0.9560	1.1491	0.0	0.0	0.0	1.3	1.3	1.3
122	5	10	-0.9972	1.2204	0.0	0.0	0.0	1.3	1.3	1.3
123	5	11	-1.0383	1.2916	0.0	0.0	0.0	1.2	1.2	1.2
124	5	12	-1.0795	1.3629	0.0	0.0	0.0	1.2	1.2	1.2
125	5	13	-1.1206	1.4342	0.0	0.0	0.0	1.1	1.1	1.1
126	5	14	-1.1618	1.5055	0.0	0.0	0.0	1.1	1.1	1.1
127	5	15	-1.2029	1.5767	0.0	0.0	0.0	1.0	1.0	1.0
128	5	16	-1.2441	1.6480	0.0	0.0	0.0	1.0	1.0	1.0
129	5	17	-1.2852	1.7193	0.0	0.0	0.0	0.9	0.9	0.9
130	5	18	-1.3264	1.7906	0.0	0.0	0.0	0.9	0.9	0.9
131	5	19	-1.3675	1.8618	0.0	0.0	0.0	0.8	0.8	0.8
132	5	20	-1.4087	1.9331	0.0	0.0	0.0	0.8	0.8	0.8
133	5	21	-1.4498	2.0044	0.0	0.0	0.0	0.8	0.8	0.8
134	5	22	-1.4910	2.0757	0.0	0.0	0.0	0.7	0.7	0.7
135	5	23	-1.5321	2.1469	0.0	0.0	0.0	0.7	0.7	0.7
136	5	24	-1.5733	2.2182	0.0	0.0	0.0	0.7	0.7	0.7
137	5	25	-1.6144	2.2895	0.0	0.0	0.0	0.7	0.7	0.7
138	5	26	-1.6556	2.3607	0.0	0.0	0.0	0.6	0.6	0.6
139	5	27	-1.6967	2.4320	0.0	0.0	0.0	0.5	0.5	0.5
140	5	28	-1.7379	2.5033	0.0	0.0	0.0	0.5	0.5	0.5
141	6	1	-0.5555	0.6200	29.1	31.3	29.3	27.0	27.0	27.0
142	6	2	-0.5967	0.6913	21.7	26.1	21.9	22.7	22.7	22.7
143	6	3	-0.6378	0.7626	6.2	9.1	6.8	8.4	8.4	8.4
144	6	4	-0.6790	0.8339	0.0	1.3	0.4	2.1	2.1	2.1
145	6	5	-0.7201	0.9051	0.0	0.1	0.0	2.0	2.0	2.0
146	6	6	-0.7613	0.9764	0.0	0.0	0.0	2.0	2.0	2.0
147	6	7	-0.8024	1.0477	0.0	0.0	0.0	1.9	1.9	1.9
148	6	8	-0.8436	1.1190	0.0	0.0	0.0	1.9	1.9	1.9
149	6	9	-0.8847	1.1902	0.0	0.0	0.0	1.8	1.8	1.8
150	6	10	-0.9259	1.2615	0.0	0.0	0.0	1.6	1.6	1.6
151	6	11	-0.9670	1.3328	0.0	0.0	0.0	1.5	1.5	1.5
152	6	12	-1.0082	1.4041	0.0	0.0	0.0	1.4	1.4	1.4
153	6	13	-1.0493	1.4753	0.0	0.0	0.0	1.4	1.4	1.4
154	6	14	-1.0905	1.5466	0.0	0.0	0.0	1.3	1.3	1.3
155	6	15	-1.1316	1.6179	0.0	0.0	0.0	1.3	1.3	1.3
156	6	16	-1.1728	1.6892	0.0	0.0	0.0	1.2	1.2	1.2
157	6	17	-1.2139	1.7604	0.0	0.0	0.0	1.1	1.1	1.1
158	6	18	-1.2551	1.8317	0.0	0.0	0.0	1.0	1.0	1.0
159	6	19	-1.2962	1.9030	0.0	0.0	0.0	1.0	1.0	1.0
160	6	20	-1.3374	1.9743	0.0	0.0	0.0	0.9	0.9	0.9
161	6	21	-1.3785	2.0455	0.0	0.0	0.0	0.9	0.9	0.9
162	6	22	-1.4197	2.1168	0.0	0.0	0.0	0.9	0.9	0.9
163	6	23	-1.4608	2.1881	0.0	0.0	0.0	0.8	0.8	0.8
164	6	24	-1.5020	2.2593	0.0	0.0	0.0	0.8	0.8	0.8
165	6	25	-1.5431	2.3306	0.0	0.0	0.0	0.8	0.8	0.8

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-85)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	South Flow Conditions (2018) A3 Wide Bodies (TA-85)	North Flow Conditions (2018) No Project (TA-85)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	North Flow Conditions (2018) A3 Wide Bodies (TA-85)
166	6	26	-1.5843	2.4019	0.0	0.0	0.0	0.7	0.7	0.7
167	6	27	-1.6254	2.4732	0.0	0.0	0.0	0.6	0.6	0.6
168	6	28	-1.6666	2.5444	0.0	0.0	0.0	0.6	0.6	0.6
169	7	1	-0.4843	0.6612	43.2	72.9	43.7	25.0	25.0	25.0
170	7	2	-0.5254	0.7325	13.7	51.6	14.6	16.0	16.0	16.0
171	7	3	-0.5666	0.8037	6.8	21.0	7.7	9.4	9.4	9.4
172	7	4	-0.6077	0.8750	0.7	1.1	1.0	2.8	2.8	2.8
173	7	5	-0.6489	0.9463	0.8	0.8	1.0	2.5	2.5	2.5
174	7	6	-0.6900	1.0176	0.8	0.8	1.0	2.4	2.4	2.4
175	7	7	-0.7312	1.0888	0.8	0.8	1.0	2.3	2.3	2.3
176	7	8	-0.7723	1.1601	0.7	0.7	0.9	2.2	2.2	2.2
177	7	9	-0.8135	1.2314	0.7	0.7	0.9	2.1	2.1	2.1
178	7	10	-0.8546	1.3027	0.7	0.7	0.8	1.9	1.9	1.9
179	7	11	-0.8958	1.3739	0.6	0.6	0.8	1.7	1.7	1.7
180	7	12	-0.9369	1.4452	0.6	0.6	0.7	1.6	1.6	1.6
181	7	13	-0.9781	1.5165	0.5	0.5	0.7	1.5	1.5	1.5
182	7	14	-1.0192	1.5878	0.5	0.5	0.6	1.5	1.5	1.5
183	7	15	-1.0604	1.6590	0.4	0.4	0.5	1.4	1.4	1.4
184	7	16	-1.1015	1.7303	0.3	0.3	0.3	1.3	1.3	1.3
185	7	17	-1.1427	1.8016	0.2	0.2	0.2	1.2	1.2	1.2
186	7	18	-1.1838	1.8729	0.2	0.2	0.2	1.1	1.1	1.1
187	7	19	-1.2250	1.9441	0.2	0.2	0.2	1.0	1.0	1.0
188	7	20	-1.2661	2.0154	0.2	0.2	0.2	1.0	1.0	1.0
189	7	21	-1.3073	2.0867	0.1	0.1	0.2	0.9	0.9	0.9
190	7	22	-1.3484	2.1580	0.1	0.1	0.2	0.9	0.9	0.9
191	7	23	-1.3896	2.2292	0.1	0.1	0.2	0.9	0.9	0.9
192	7	24	-1.4307	2.3005	0.1	0.1	0.1	0.8	0.8	0.8
193	7	25	-1.4719	2.3718	0.1	0.1	0.1	0.8	0.8	0.8
194	7	26	-1.5130	2.4430	0.1	0.1	0.1	0.7	0.7	0.7
195	7	27	-1.5542	2.5143	0.1	0.1	0.1	0.7	0.7	0.7
196	7	28	-1.5953	2.5856	0.1	0.1	0.1	0.6	0.6	0.6
197	8	1	-0.4130	0.7023	15.3	80.2	18.0	15.1	15.1	15.1
198	8	2	-0.4541	0.7736	10.6	57.5	13.3	9.5	9.5	9.5
199	8	3	-0.4953	0.8449	6.2	6.8	8.1	4.0	4.0	4.0
200	8	4	-0.5364	0.9162	5.2	5.4	6.9	3.0	3.0	3.0
201	8	5	-0.5776	0.9874	4.5	4.5	5.9	2.7	2.7	2.7
202	8	6	-0.6187	1.0587	4.1	4.1	5.4	2.5	2.5	2.5
203	8	7	-0.6599	1.1300	3.5	3.6	4.6	2.4	2.4	2.4
204	8	8	-0.7010	1.2013	2.9	2.9	3.7	2.3	2.3	2.3
205	8	9	-0.7422	1.2725	2.7	2.7	3.5	2.1	2.1	2.1
206	8	10	-0.7833	1.3438	2.4	2.4	3.2	1.9	1.9	1.9
207	8	11	-0.8245	1.4151	2.1	2.1	2.7	1.7	1.7	1.7
208	8	12	-0.8656	1.4864	1.6	1.6	2.1	1.6	1.6	1.6
209	8	13	-0.9068	1.5576	1.1	1.1	1.4	1.5	1.5	1.5
210	8	14	-0.9479	1.6289	1.0	1.0	1.3	1.4	1.4	1.4
211	8	15	-0.9891	1.7002	1.0	1.0	1.3	1.4	1.4	1.4
212	8	16	-1.0302	1.7715	0.9	0.9	1.2	1.3	1.3	1.3
213	8	17	-1.0714	1.8427	0.9	0.9	1.1	1.2	1.2	1.2
214	8	18	-1.1125	1.9140	0.8	0.8	1.0	1.1	1.1	1.1
215	8	19	-1.1537	1.9853	0.7	0.7	0.9	1.0	1.0	1.0
216	8	20	-1.1948	2.0566	0.7	0.7	0.8	1.0	1.0	1.0
217	8	21	-1.2360	2.1278	0.6	0.6	0.7	0.9	0.9	0.9
218	8	22	-1.2771	2.1991	0.5	0.5	0.7	0.9	0.9	0.9
219	8	23	-1.3183	2.2704	0.4	0.4	0.5	0.8	0.8	0.8
220	8	24	-1.3594	2.3416	0.2	0.2	0.3	0.8	0.8	0.8

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			**North Flow Conditions (2018)**		
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-85)*	*A2 Special Use Area Procedures (TA-85)*	*A3 Wide Bodies (TA-85)*	*No Project (TA-85)*	*A2 Special Use Area Procedures (TA-85)*	*A3 Wide Bodies (TA-85)*
221	8	25	-1.4006	2.4129	0.2	0.2	0.2	0.8	0.8	0.8
222	8	26	-1.4417	2.4842	0.2	0.2	0.2	0.7	0.7	0.7
223	8	27	-1.4829	2.5555	0.2	0.2	0.2	0.6	0.6	0.6
224	8	28	-1.5240	2.6267	0.1	0.1	0.2	0.6	0.6	0.6
225	9	1	-0.3417	0.7435	20.0	41.5	20.6	8.0	8.0	8.0
226	9	2	-0.3829	0.8148	2.3	30.2	3.2	5.2	5.2	5.2
227	9	3	-0.4240	0.8860	1.0	14.3	2.1	4.2	4.2	4.2
228	9	4	-0.4652	0.9573	0.9	1.5	1.4	3.3	3.3	3.3
229	9	5	-0.5063	1.0286	0.9	1.0	1.2	2.3	2.3	2.3
230	9	6	-0.5475	1.0999	0.9	0.9	1.1	2.2	2.2	2.2
231	9	7	-0.5886	1.1711	0.8	0.8	1.0	2.1	2.1	2.1
232	9	8	-0.6298	1.2424	0.7	0.7	0.9	2.0	2.0	2.0
233	9	9	-0.6709	1.3137	0.4	0.4	0.5	1.9	1.9	1.9
234	9	10	-0.7121	1.3850	0.4	0.4	0.5	1.7	1.7	1.7
235	9	11	-0.7532	1.4562	0.3	0.3	0.4	1.5	1.5	1.5
236	9	12	-0.7944	1.5275	0.3	0.3	0.3	1.4	1.4	1.4
237	9	13	-0.8355	1.5988	0.2	0.2	0.3	1.3	1.3	1.3
238	9	14	-0.8767	1.6701	0.2	0.2	0.2	1.3	1.3	1.3
239	9	15	-0.9178	1.7413	0.2	0.2	0.2	1.2	1.2	1.2
240	9	16	-0.9590	1.8126	0.2	0.2	0.2	1.1	1.1	1.1
241	9	17	-1.0001	1.8839	0.2	0.2	0.2	1.0	1.0	1.0
242	9	18	-1.0413	1.9552	0.1	0.1	0.2	1.0	1.0	1.0
243	9	19	-1.0824	2.0264	0.1	0.1	0.2	0.9	0.9	0.9
244	9	20	-1.1236	2.0977	0.1	0.1	0.2	0.9	0.9	0.9
245	9	21	-1.1647	2.1690	0.1	0.1	0.2	0.8	0.8	0.8
246	9	22	-1.2059	2.2403	0.1	0.1	0.1	0.8	0.8	0.8
247	9	23	-1.2470	2.3115	0.1	0.1	0.1	0.7	0.7	0.7
248	9	24	-1.2882	2.3828	0.1	0.1	0.1	0.7	0.7	0.7
249	9	25	-1.3293	2.4541	0.1	0.1	0.1	0.6	0.6	0.6
250	9	26	-1.3705	2.5253	0.1	0.1	0.1	0.6	0.6	0.6
251	9	27	-1.4116	2.5966	0.1	0.1	0.1	0.5	0.5	0.5
252	9	28	-1.4528	2.6679	0.1	0.1	0.1	0.5	0.5	0.5
253	10	1	-0.2704	0.7846	2.7	4.3	2.9	2.5	2.5	2.5
254	10	2	-0.3116	0.8559	1.5	4.4	1.6	2.2	2.2	2.2
255	10	3	-0.3527	0.9272	0.2	2.3	0.7	2.0	2.0	2.0
256	10	4	-0.3939	0.9985	0.0	1.1	0.3	1.8	1.8	1.8
257	10	5	-0.4350	1.0697	0.0	0.1	0.0	1.7	1.7	1.7
258	10	6	-0.4762	1.1410	0.0	0.0	0.0	1.7	1.6	1.6
259	10	7	-0.5173	1.2123	0.0	0.0	0.0	1.6	1.6	1.6
260	10	8	-0.5585	1.2836	0.0	0.0	0.0	1.5	1.5	1.5
261	10	9	-0.5996	1.3548	0.0	0.0	0.0	1.4	1.4	1.4
262	10	10	-0.6408	1.4261	0.0	0.0	0.0	1.3	1.3	1.3
263	10	11	-0.6819	1.4974	0.0	0.0	0.0	1.2	1.2	1.2
264	10	12	-0.7231	1.5687	0.0	0.0	0.0	1.2	1.2	1.2
265	10	13	-0.7642	1.6399	0.0	0.0	0.0	1.1	1.1	1.1
266	10	14	-0.8054	1.7112	0.0	0.0	0.0	1.0	1.0	1.0
267	10	15	-0.8465	1.7825	0.0	0.0	0.0	1.0	1.0	1.0
268	10	16	-0.8877	1.8538	0.0	0.0	0.0	0.9	0.9	0.9
269	10	17	-0.9288	1.9250	0.0	0.0	0.0	0.8	0.8	0.8
270	10	18	-0.9700	1.9963	0.0	0.0	0.0	0.8	0.8	0.8
271	10	19	-1.0111	2.0676	0.0	0.0	0.0	0.7	0.7	0.7
272	10	20	-1.0523	2.1389	0.0	0.0	0.0	0.7	0.7	0.7
273	10	21	-1.0934	2.2101	0.0	0.0	0.0	0.6	0.6	0.6
274	10	22	-1.1346	2.2814	0.0	0.0	0.0	0.6	0.6	0.6
275	10	23	-1.1757	2.3527	0.0	0.0	0.0	0.6	0.6	0.6

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
						A2 Special Use	*A3*		*A2 Special Use*	*A3*
			X	Y	*No Project*	*Area Procedures*	*Wide Bodies*	*No Project*	*Area Procedures*	*Wide Bodies*
Site	**I**	**J**	**(nm)**	**(nm)**	*(TA-85)*	*(TA-85)*	*(TA-85)*	*(TA-85)*	*(TA-85)*	*(TA-85)*
276	10	24	-1.2169	2.4239	0.0	0.0	0.0	0.5	0.5	0.5
277	10	25	-1.2580	2.4952	0.0	0.0	0.0	0.5	0.5	0.5
278	10	26	-1.2992	2.5665	0.0	0.0	0.0	0.5	0.5	0.5
279	10	27	-1.3403	2.6378	0.0	0.0	0.0	0.4	0.4	0.4
280	10	28	-1.3815	2.7090	0.0	0.0	0.0	0.4	0.4	0.4
281	11	1	-0.1992	0.8258	0.5	0.7	0.6	1.1	1.1	1.1
282	11	2	-0.2403	0.8971	0.2	0.7	0.4	1.1	1.1	1.1
283	11	3	-0.2815	0.9683	0.0	0.5	0.2	1.1	1.1	1.1
284	11	4	-0.3226	1.0396	0.0	0.1	0.0	1.1	1.1	1.1
285	11	5	-0.3638	1.1109	0.0	0.0	0.0	1.1	1.1	1.1
286	11	6	-0.4049	1.1822	0.0	0.0	0.0	1.1	1.1	1.1
287	11	7	-0.4461	1.2534	0.0	0.0	0.0	1.0	1.0	1.0
288	11	8	-0.4872	1.3247	0.0	0.0	0.0	1.0	1.0	1.0
289	11	9	-0.5284	1.3960	0.0	0.0	0.0	1.0	1.0	1.0
290	11	10	-0.5695	1.4673	0.0	0.0	0.0	0.9	0.9	0.9
291	11	11	-0.6107	1.5385	0.0	0.0	0.0	0.9	0.9	0.9
292	11	12	-0.6518	1.6098	0.0	0.0	0.0	0.8	0.8	0.8
293	11	13	-0.6930	1.6811	0.0	0.0	0.0	0.8	0.8	0.8
294	11	14	-0.7341	1.7524	0.0	0.0	0.0	0.7	0.7	0.7
295	11	15	-0.7753	1.8236	0.0	0.0	0.0	0.7	0.7	0.7
296	11	16	-0.8164	1.8949	0.0	0.0	0.0	0.6	0.6	0.6
297	11	17	-0.8576	1.9662	0.0	0.0	0.0	0.6	0.6	0.6
298	11	18	-0.8987	2.0375	0.0	0.0	0.0	0.5	0.5	0.5
299	11	19	-0.9399	2.1087	0.0	0.0	0.0	0.5	0.5	0.5
300	11	20	-0.9810	2.1800	0.0	0.0	0.0	0.5	0.5	0.5
301	11	21	-1.0222	2.2513	0.0	0.0	0.0	0.4	0.4	0.4
302	11	22	-1.0633	2.3225	0.0	0.0	0.0	0.4	0.4	0.4
303	11	23	-1.1045	2.3938	0.0	0.0	0.0	0.4	0.4	0.4
304	11	24	-1.1456	2.4651	0.0	0.0	0.0	0.4	0.4	0.4
305	11	25	-1.1868	2.5364	0.0	0.0	0.0	0.4	0.4	0.4
306	11	26	-1.2279	2.6076	0.0	0.0	0.0	0.3	0.3	0.3
307	11	27	-1.2691	2.6789	0.0	0.0	0.0	0.3	0.3	0.3
308	11	28	-1.3102	2.7502	0.0	0.0	0.0	0.2	0.2	0.2
309	12	1	-0.1279	0.8669	0.0	0.0	0.0	0.5	0.5	0.5
310	12	2	-0.1690	0.9382	0.0	0.0	0.0	0.6	0.6	0.6
311	12	3	-0.2102	1.0095	0.0	0.0	0.0	0.6	0.6	0.6
312	12	4	-0.2513	1.0808	0.0	0.0	0.0	0.6	0.6	0.6
313	12	5	-0.2925	1.1520	0.0	0.0	0.0	0.6	0.6	0.6
314	12	6	-0.3336	1.2233	0.0	0.0	0.0	0.6	0.6	0.6
315	12	7	-0.3748	1.2946	0.0	0.0	0.0	0.6	0.6	0.6
316	12	8	-0.4159	1.3659	0.0	0.0	0.0	0.6	0.6	0.6
317	12	9	-0.4571	1.4371	0.0	0.0	0.0	0.6	0.6	0.6
318	12	10	-0.4982	1.5084	0.0	0.0	0.0	0.5	0.5	0.5
319	12	11	-0.5394	1.5797	0.0	0.0	0.0	0.5	0.5	0.5
320	12	12	-0.5805	1.6510	0.0	0.0	0.0	0.5	0.5	0.5
321	12	13	-0.6217	1.7222	0.0	0.0	0.0	0.5	0.5	0.5
322	12	14	-0.6628	1.7935	0.0	0.0	0.0	0.4	0.4	0.4
323	12	15	-0.7040	1.8648	0.0	0.0	0.0	0.4	0.4	0.4
324	12	16	-0.7451	1.9361	0.0	0.0	0.0	0.4	0.4	0.4
325	12	17	-0.7863	2.0073	0.0	0.0	0.0	0.4	0.4	0.4
326	12	18	-0.8274	2.0786	0.0	0.0	0.0	0.3	0.3	0.3
327	12	19	-0.8686	2.1499	0.0	0.0	0.0	0.3	0.3	0.3
328	12	20	-0.9097	2.2212	0.0	0.0	0.0	0.3	0.3	0.3
329	12	21	-0.9509	2.2924	0.0	0.0	0.0	0.3	0.3	0.3
330	12	22	-0.9920	2.3637	0.0	0.0	0.0	0.3	0.3	0.3

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
						A2 Special Use	*A3*		*A2 Special Use*	*A3*
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-85)*	*Area Procedures (TA-85)*	*Wide Bodies (TA-85)*	*No Project (TA-85)*	*Area Procedures (TA-85)*	*Wide Bodies (TA-85)*
331	12	23	-1.0332	2.4350	0.0	0.0	0.0	0.2	0.2	0.2
332	12	24	-1.0743	2.5062	0.0	0.0	0.0	0.2	0.2	0.2
333	12	25	-1.1155	2.5775	0.0	0.0	0.0	0.2	0.2	0.2
334	12	26	-1.1566	2.6488	0.0	0.0	0.0	0.2	0.2	0.2
335	12	27	-1.1978	2.7201	0.0	0.0	0.0	0.1	0.1	0.1
336	12	28	-1.2389	2.7913	0.0	0.0	0.0	0.1	0.1	0.1
337	13	1	-0.0566	0.9081	0.0	0.0	0.0	0.2	0.2	0.2
338	13	2	-0.0978	0.9794	0.0	0.0	0.0	0.2	0.2	0.2
339	13	3	-0.1389	1.0506	0.0	0.0	0.0	0.3	0.3	0.3
340	13	4	-0.1801	1.1219	0.0	0.0	0.0	0.3	0.3	0.3
341	13	5	-0.2212	1.1932	0.0	0.0	0.0	0.3	0.3	0.3
342	13	6	-0.2624	1.2645	0.0	0.0	0.0	0.3	0.3	0.3
343	13	7	-0.3035	1.3357	0.0	0.0	0.0	0.3	0.3	0.3
344	13	8	-0.3447	1.4070	0.0	0.0	0.0	0.3	0.3	0.3
345	13	9	-0.3858	1.4783	0.0	0.0	0.0	0.3	0.3	0.3
346	13	10	-0.4270	1.5496	0.0	0.0	0.0	0.2	0.2	0.2
347	13	11	-0.4681	1.6208	0.0	0.0	0.0	0.2	0.2	0.2
348	13	12	-0.5093	1.6921	0.0	0.0	0.0	0.2	0.2	0.2
349	13	13	-0.5504	1.7634	0.0	0.0	0.0	0.2	0.2	0.2
350	13	14	-0.5916	1.8347	0.0	0.0	0.0	0.2	0.2	0.2
351	13	15	-0.6327	1.9059	0.0	0.0	0.0	0.2	0.2	0.2
352	13	16	-0.6739	1.9772	0.0	0.0	0.0	0.2	0.2	0.2
353	13	17	-0.7150	2.0485	0.0	0.0	0.0	0.2	0.2	0.2
354	13	18	-0.7562	2.1198	0.0	0.0	0.0	0.1	0.1	0.1
355	13	19	-0.7973	2.1910	0.0	0.0	0.0	0.1	0.1	0.1
356	13	20	-0.8385	2.2623	0.0	0.0	0.0	0.1	0.1	0.1
357	13	21	-0.8796	2.3336	0.0	0.0	0.0	0.1	0.1	0.1
358	13	22	-0.9208	2.4048	0.0	0.0	0.0	0.1	0.1	0.1
359	13	23	-0.9619	2.4761	0.0	0.0	0.0	0.1	0.1	0.1
360	13	24	-1.0031	2.5474	0.0	0.0	0.0	0.1	0.1	0.1
361	13	25	-1.0442	2.6187	0.0	0.0	0.0	0.1	0.1	0.1
362	13	26	-1.0854	2.6899	0.0	0.0	0.0	0.1	0.1	0.1
363	13	27	-1.1265	2.7612	0.0	0.0	0.0	0.1	0.1	0.1
364	13	28	-1.1677	2.8325	0.0	0.0	0.0	0.0	0.0	0.0
365	14	1	0.0147	0.9492	0.0	0.0	0.0	0.1	0.1	0.1
366	14	2	-0.0265	1.0205	0.0	0.0	0.0	0.1	0.1	0.1
367	14	3	-0.0676	1.0918	0.0	0.0	0.0	0.1	0.1	0.1
368	14	4	-0.1088	1.1631	0.0	0.0	0.0	0.1	0.1	0.1
369	14	5	-0.1499	1.2343	0.0	0.0	0.0	0.1	0.1	0.1
370	14	6	-0.1911	1.3056	0.0	0.0	0.0	0.1	0.1	0.1
371	14	7	-0.2322	1.3769	0.0	0.0	0.0	0.1	0.1	0.1
372	14	8	-0.2734	1.4482	0.0	0.0	0.0	0.1	0.1	0.1
373	14	9	-0.3145	1.5194	0.0	0.0	0.0	0.1	0.1	0.1
374	14	10	-0.3557	1.5907	0.0	0.0	0.0	0.1	0.1	0.1
375	14	11	-0.3968	1.6620	0.0	0.0	0.0	0.1	0.1	0.1
376	14	12	-0.4380	1.7333	0.0	0.0	0.0	0.1	0.1	0.1
377	14	13	-0.4791	1.8045	0.0	0.0	0.0	0.1	0.1	0.1
378	14	14	-0.5203	1.8758	0.0	0.0	0.0	0.1	0.1	0.1
379	14	15	-0.5614	1.9471	0.0	0.0	0.0	0.1	0.1	0.1
380	14	16	-0.6026	2.0184	0.0	0.0	0.0	0.0	0.0	0.0
381	14	17	-0.6437	2.0896	0.0	0.0	0.0	0.0	0.0	0.0
382	14	18	-0.6849	2.1609	0.0	0.0	0.0	0.0	0.0	0.0
383	14	19	-0.7260	2.2322	0.0	0.0	0.0	0.0	0.0	0.0
384	14	20	-0.7672	2.3035	0.0	0.0	0.0	0.0	0.0	0.0
385	14	21	-0.8083	2.3747	0.0	0.0	0.0	0.0	0.0	0.0

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-85)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	South Flow Conditions (2018) A3 Wide Bodies (TA-85)	North Flow Conditions (2018) No Project (TA-85)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	North Flow Conditions (2018) A3 Wide Bodies (TA-85)
386	14	22	-0.8495	2.4460	0.0	0.0	0.0	0.0	0.0	0.0
387	14	23	-0.8906	2.5173	0.0	0.0	0.0	0.0	0.0	0.0
388	14	24	-0.9318	2.5885	0.0	0.0	0.0	0.0	0.0	0.0
389	14	25	-0.9729	2.6598	0.0	0.0	0.0	0.0	0.0	0.0
390	14	26	-1.0141	2.7311	0.0	0.0	0.0	0.0	0.0	0.0
391	14	27	-1.0552	2.8024	0.0	0.0	0.0	0.0	0.0	0.0
392	14	28	-1.0964	2.8736	0.0	0.0	0.0	0.0	0.0	0.0
393	15	1	0.0859	0.9904	0.0	0.0	0.0	0.0	0.0	0.0
394	15	2	0.0448	1.0617	0.0	0.0	0.0	0.0	0.0	0.0
395	15	3	0.0036	1.1329	0.0	0.0	0.0	0.0	0.0	0.0
396	15	4	-0.0375	1.2042	0.0	0.0	0.0	0.0	0.0	0.0
397	15	5	-0.0787	1.2755	0.0	0.0	0.0	0.0	0.0	0.0
398	15	6	-0.1198	1.3468	0.0	0.0	0.0	0.0	0.0	0.0
399	15	7	-0.1610	1.4180	0.0	0.0	0.0	0.0	0.0	0.0
400	15	8	-0.2021	1.4893	0.0	0.0	0.0	0.0	0.0	0.0
401	15	9	-0.2433	1.5606	0.0	0.0	0.0	0.0	0.0	0.0
402	15	10	-0.2844	1.6319	0.0	0.0	0.0	0.0	0.0	0.0
403	15	11	-0.3256	1.7031	0.0	0.0	0.0	0.0	0.0	0.0
404	15	12	-0.3667	1.7744	0.0	0.0	0.0	0.0	0.0	0.0
405	15	13	-0.4079	1.8457	0.0	0.0	0.0	0.0	0.0	0.0
406	15	14	-0.4490	1.9170	0.0	0.0	0.0	0.0	0.0	0.0
407	15	15	-0.4902	1.9882	0.0	0.0	0.0	0.0	0.0	0.0
408	15	16	-0.5313	2.0595	0.0	0.0	0.0	0.0	0.0	0.0
409	15	17	-0.5725	2.1308	0.0	0.0	0.0	0.0	0.0	0.0
410	15	18	-0.6136	2.2021	0.0	0.0	0.0	0.0	0.0	0.0
411	15	19	-0.6548	2.2733	0.0	0.0	0.0	0.0	0.0	0.0
412	15	20	-0.6959	2.3446	0.0	0.0	0.0	0.0	0.0	0.0
413	15	21	-0.7371	2.4159	0.0	0.0	0.0	0.0	0.0	0.0
414	15	22	-0.7782	2.4871	0.0	0.0	0.0	0.0	0.0	0.0
415	15	23	-0.8194	2.5584	0.0	0.0	0.0	0.0	0.0	0.0
416	15	24	-0.8605	2.6297	0.0	0.0	0.0	0.0	0.0	0.0
417	15	25	-0.9017	2.7010	0.0	0.0	0.0	0.0	0.0	0.0
418	15	26	-0.9428	2.7722	0.0	0.0	0.0	0.0	0.0	0.0
419	15	27	-0.9840	2.8435	0.0	0.0	0.0	0.0	0.0	0.0
420	15	28	-1.0251	2.9148	0.0	0.0	0.0	0.0	0.0	0.0
421	16	1	0.1572	1.0315	0.0	0.0	0.0	0.0	0.0	0.0
422	16	2	0.1161	1.1028	0.0	0.0	0.0	0.0	0.0	0.0
423	16	3	0.0749	1.1741	0.0	0.0	0.0	0.0	0.0	0.0
424	16	4	0.0338	1.2454	0.0	0.0	0.0	0.0	0.0	0.0
425	16	5	-0.0074	1.3166	0.0	0.0	0.0	0.0	0.0	0.0
426	16	6	-0.0485	1.3879	0.0	0.0	0.0	0.0	0.0	0.0
427	16	7	-0.0897	1.4592	0.0	0.0	0.0	0.0	0.0	0.0
428	16	8	-0.1308	1.5305	0.0	0.0	0.0	0.0	0.0	0.0
429	16	9	-0.1720	1.6017	0.0	0.0	0.0	0.0	0.0	0.0
430	16	10	-0.2131	1.6730	0.0	0.0	0.0	0.0	0.0	0.0
431	16	11	-0.2543	1.7443	0.0	0.0	0.0	0.0	0.0	0.0
432	16	12	-0.2954	1.8156	0.0	0.0	0.0	0.0	0.0	0.0
433	16	13	-0.3366	1.8868	0.0	0.0	0.0	0.0	0.0	0.0
434	16	14	-0.3777	1.9581	0.0	0.0	0.0	0.0	0.0	0.0
435	16	15	-0.4189	2.0294	0.0	0.0	0.0	0.0	0.0	0.0
436	16	16	-0.4600	2.1007	0.0	0.0	0.0	0.0	0.0	0.0
437	16	17	-0.5012	2.1719	0.0	0.0	0.0	0.0	0.0	0.0
438	16	18	-0.5423	2.2432	0.0	0.0	0.0	0.0	0.0	0.0
439	16	19	-0.5835	2.3145	0.0	0.0	0.0	0.0	0.0	0.0
440	16	20	-0.6246	2.3858	0.0	0.0	0.0	0.0	0.0	0.0

Table C-15
King County International Airport EA
Time Above 85 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-85)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	South Flow Conditions (2018) A3 Wide Bodies (TA-85)	North Flow Conditions (2018) No Project (TA-85)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-85)	North Flow Conditions (2018) A3 Wide Bodies (TA-85)
441	16	21	-0.6658	2.4570	0.0	0.0	0.0	0.0	0.0	0.0
442	16	22	-0.7069	2.5283	0.0	0.0	0.0	0.0	0.0	0.0
443	16	23	-0.7481	2.5996	0.0	0.0	0.0	0.0	0.0	0.0
444	16	24	-0.7892	2.6708	0.0	0.0	0.0	0.0	0.0	0.0
445	16	25	-0.8304	2.7421	0.0	0.0	0.0	0.0	0.0	0.0
446	16	26	-0.8715	2.8134	0.0	0.0	0.0	0.0	0.0	0.0
447	16	27	-0.9127	2.8847	0.0	0.0	0.0	0.0	0.0	0.0
448	16	28	-0.9538	2.9559	0.0	0.0	0.0	0.0	0.0	0.0
SP	1	1	-0.5832	0.7732	6.3	20.3	7.2	9.2	9.2	9.2

Prepared December 31, 2003

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-75)	South Flow A2 Special Use Area Procedures (TA-75)	South Flow A3 Wide Bodies (TA-75)	North Flow Conditions (2018) No Project (TA-75)	North Flow A2 Special Use Area Procedures (TA-75)	North Flow A3 Wide Bodies (TA-75)
1	1	1	-0.9119	0.4143	4.0	4.0	4.0	5.1	5.1	5.1
2	1	2	-0.9530	0.4856	4.0	4.0	4.0	5.2	5.2	5.2
3	1	3	-0.9942	0.5568	4.0	4.0	4.0	5.3	5.3	5.3
4	1	4	-1.0353	0.6281	2.0	2.0	2.0	3.5	3.5	3.5
5	1	5	-1.0765	0.6994	0.0	0.0	0.0	1.6	1.6	1.6
6	1	6	-1.1176	0.7707	0.0	0.0	0.0	1.7	1.7	1.7
7	1	7	-1.1588	0.8419	0.0	0.0	0.0	1.7	1.7	1.7
8	1	8	-1.1999	0.9132	0.0	0.0	0.0	1.8	1.8	1.8
9	1	9	-1.2411	0.9845	0.0	0.0	0.0	1.9	1.9	1.9
10	1	10	-1.2822	1.0558	0.0	0.0	0.0	1.9	1.9	1.9
11	1	11	-1.3234	1.1270	0.0	0.0	0.0	1.9	1.9	1.9
12	1	12	-1.3645	1.1983	0.0	0.0	0.0	1.9	1.9	1.9
13	1	13	-1.4057	1.2696	0.0	0.0	0.0	1.9	1.9	1.9
14	1	14	-1.4468	1.3409	0.0	0.0	0.0	1.9	1.9	1.9
15	1	15	-1.4880	1.4121	0.0	0.0	0.0	1.9	1.9	1.9
16	1	16	-1.5291	1.4834	0.0	0.0	0.0	1.8	1.8	1.8
17	1	17	-1.5703	1.5547	0.0	0.0	0.0	1.8	1.8	1.8
18	1	18	-1.6114	1.6260	0.0	0.0	0.0	1.8	1.8	1.8
19	1	19	-1.6526	1.6972	0.0	0.0	0.0	1.8	1.8	1.8
20	1	20	-1.6937	1.7685	0.0	0.0	0.0	1.8	1.8	1.8
21	1	21	-1.7349	1.8398	0.0	0.0	0.0	1.8	1.8	1.8
22	1	22	-1.7760	1.9111	0.0	0.0	0.0	1.8	1.8	1.8
23	1	23	-1.8172	1.9823	0.0	0.0	0.0	1.8	1.8	1.8
24	1	24	-1.8583	2.0536	0.0	0.0	0.0	1.8	1.8	1.8
25	1	25	-1.8995	2.1249	0.0	0.0	0.0	1.7	1.7	1.7
26	1	26	-1.9406	2.1961	0.0	0.0	0.0	1.7	1.7	1.7
27	1	27	-1.9818	2.2674	0.0	0.0	0.0	1.6	1.6	1.6
28	1	28	-2.0229	2.3387	0.0	0.0	0.0	1.6	1.6	1.6
29	2	1	-0.8406	0.4554	8.6	8.7	8.6	9.8	9.8	9.8
30	2	2	-0.8818	0.5267	8.4	8.7	8.5	10.1	10.1	10.1
31	2	3	-0.9229	0.5980	4.2	4.6	4.3	6.5	6.5	6.5
32	2	4	-0.9641	0.6693	4.0	4.4	4.2	6.7	6.7	6.7
33	2	5	-1.0052	0.7405	2.0	2.0	2.0	4.8	4.8	4.8
34	2	6	-1.0464	0.8118	0.0	0.0	0.0	2.8	2.8	2.8
35	2	7	-1.0875	0.8831	0.0	0.0	0.0	2.9	2.9	2.9
36	2	8	-1.1287	0.9544	0.0	0.0	0.0	2.9	2.9	2.9
37	2	9	-1.1698	1.0256	0.0	0.0	0.0	2.9	2.9	2.9
38	2	10	-1.2110	1.0969	0.0	0.0	0.0	3.0	3.0	3.0
39	2	11	-1.2521	1.1682	0.0	0.0	0.0	3.0	3.0	3.0
40	2	12	-1.2933	1.2395	0.0	0.0	0.0	2.9	2.9	2.9
41	2	13	-1.3344	1.3107	0.0	0.0	0.0	2.7	2.7	2.7
42	2	14	-1.3756	1.3820	0.0	0.0	0.0	2.6	2.6	2.6
43	2	15	-1.4167	1.4533	0.0	0.0	0.0	2.6	2.6	2.6
44	2	16	-1.4579	1.5246	0.0	0.0	0.0	2.5	2.5	2.5
45	2	17	-1.4990	1.5958	0.0	0.0	0.0	2.5	2.5	2.5
46	2	18	-1.5402	1.6671	0.0	0.0	0.0	2.5	2.5	2.5
47	2	19	-1.5813	1.7384	0.0	0.0	0.0	2.5	2.5	2.5
48	2	20	-1.6225	1.8097	0.0	0.0	0.0	2.4	2.4	2.4
49	2	21	-1.6636	1.8809	0.0	0.0	0.0	2.4	2.4	2.4
50	2	22	-1.7048	1.9522	0.0	0.0	0.0	2.4	2.4	2.4
51	2	23	-1.7459	2.0235	0.0	0.0	0.0	2.4	2.4	2.4
52	2	24	-1.7871	2.0947	0.0	0.0	0.0	2.3	2.3	2.3
53	2	25	-1.8282	2.1660	0.0	0.0	0.0	2.3	2.3	2.3
54	2	26	-1.8694	2.2373	0.0	0.0	0.0	2.2	2.2	2.2
55	2	27	-1.9105	2.3086	0.0	0.0	0.0	2.1	2.1	2.1

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	No Project (TA-75)	A2 Special Use Area Procedures (TA-75)	A3 Wide Bodies (TA-75)	No Project (TA-75)	A2 Special Use Area Procedures (TA-75)	A3 Wide Bodies (TA-75)
56	2	28	-1.9517	2.3798	0.0	0.0	0.0	2.0	2.0	2.0
57	3	1	-0.7694	0.4966	20.0	20.3	20.0	22.1	22.1	22.1
58	3	2	-0.8105	0.5679	17.6	18.1	17.8	20.5	20.5	20.5
59	3	3	-0.8517	0.6391	12.9	14.0	13.1	16.8	16.8	16.8
60	3	4	-0.8928	0.7104	6.5	7.6	6.7	11.1	11.1	11.1
61	3	5	-0.9340	0.7817	4.0	4.8	4.3	9.2	9.2	9.2
62	3	6	-0.9751	0.8530	2.0	2.4	2.2	7.2	7.2	7.2
63	3	7	-1.0163	0.9242	0.0	0.0	0.0	5.1	5.1	5.1
64	3	8	-1.0574	0.9955	0.0	0.0	0.0	5.0	5.0	5.0
65	3	9	-1.0986	1.0668	0.0	0.0	0.0	5.0	5.0	5.0
66	3	10	-1.1397	1.1381	0.0	0.0	0.0	4.9	4.9	4.9
67	3	11	-1.1809	1.2093	0.0	0.0	0.0	4.9	4.9	4.9
68	3	12	-1.2220	1.2806	0.0	0.0	0.0	4.8	4.8	4.8
69	3	13	-1.2632	1.3519	0.0	0.0	0.0	4.4	4.4	4.4
70	3	14	-1.3043	1.4232	0.0	0.0	0.0	4.1	4.1	4.1
71	3	15	-1.3455	1.4944	0.0	0.0	0.0	3.8	3.8	3.8
72	3	16	-1.3866	1.5657	0.0	0.0	0.0	3.6	3.7	3.7
73	3	17	-1.4278	1.6370	0.0	0.0	0.0	3.5	3.5	3.5
74	3	18	-1.4689	1.7083	0.0	0.0	0.0	3.4	3.4	3.4
75	3	19	-1.5101	1.7795	0.0	0.0	0.0	3.3	3.3	3.3
76	3	20	-1.5512	1.8508	0.0	0.0	0.0	3.3	3.3	3.3
77	3	21	-1.5924	1.9221	0.0	0.0	0.0	3.2	3.2	3.2
78	3	22	-1.6335	1.9934	0.0	0.0	0.0	3.1	3.1	3.1
79	3	23	-1.6747	2.0646	0.0	0.0	0.0	3.0	3.0	3.0
80	3	24	-1.7158	2.1359	0.0	0.0	0.0	3.0	3.0	3.0
81	3	25	-1.7570	2.2072	0.0	0.0	0.0	2.9	2.9	2.9
82	3	26	-1.7981	2.2784	0.0	0.0	0.0	2.8	2.8	2.8
83	3	27	-1.8393	2.3497	0.0	0.0	0.0	2.6	2.6	2.6
84	3	28	-1.8804	2.4210	0.0	0.0	0.0	2.5	2.5	2.5
85	4	1	-0.6981	0.5377	26.2	26.7	26.3	30.8	30.8	30.8
86	4	2	-0.7392	0.6090	25.2	26.5	25.3	31.3	31.3	31.3
87	4	3	-0.7804	0.6803	20.4	22.0	20.7	27.6	27.6	27.6
88	4	4	-0.8215	0.7516	11.2	13.1	11.6	19.7	19.7	19.7
89	4	5	-0.8627	0.8228	4.4	6.2	4.8	13.7	13.7	13.7
90	4	6	-0.9038	0.8941	4.0	4.8	4.3	13.4	13.5	13.5
91	4	7	-0.9450	0.9654	0.0	0.3	0.1	9.0	9.0	9.0
92	4	8	-0.9861	1.0367	0.0	0.0	0.0	8.7	8.7	8.7
93	4	9	-1.0273	1.1079	0.0	0.0	0.0	8.5	8.5	8.5
94	4	10	-1.0684	1.1792	0.0	0.0	0.0	8.2	8.2	8.2
95	4	11	-1.1096	1.2505	0.0	0.0	0.0	7.8	7.9	7.9
96	4	12	-1.1507	1.3218	0.0	0.0	0.0	7.6	7.6	7.6
97	4	13	-1.1919	1.3930	0.0	0.0	0.0	7.0	7.0	7.0
98	4	14	-1.2330	1.4643	0.0	0.0	0.0	6.3	6.3	6.3
99	4	15	-1.2742	1.5356	0.0	0.0	0.0	5.7	5.7	5.7
100	4	16	-1.3153	1.6069	0.0	0.0	0.0	5.4	5.4	5.4
101	4	17	-1.3565	1.6781	0.0	0.0	0.0	5.1	5.1	5.1
102	4	18	-1.3976	1.7494	0.0	0.0	0.0	4.7	4.8	4.8
103	4	19	-1.4388	1.8207	0.0	0.0	0.0	4.5	4.5	4.5
104	4	20	-1.4799	1.8920	0.0	0.0	0.0	4.2	4.2	4.2
105	4	21	-1.5211	1.9632	0.0	0.0	0.1	4.1	4.1	4.1
106	4	22	-1.5622	2.0345	0.1	0.1	0.1	3.9	3.9	3.9
107	4	23	-1.6034	2.1058	0.1	0.1	0.1	3.8	3.8	3.8
108	4	24	-1.6445	2.1770	0.1	0.1	0.1	3.7	3.7	3.7
109	4	25	-1.6857	2.2483	0.1	0.1	0.1	3.6	3.6	3.6
110	4	26	-1.7268	2.3196	0.1	0.1	0.1	3.4	3.4	3.4

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (TA-75)*	*A2 Special Use Area Procedures (TA-75)*	*A3 Wide Bodies (TA-75)*	*No Project (TA-75)*	*A2 Special Use Area Procedures (TA-75)*	*A3 Wide Bodies (TA-75)*
111	4	27	-1.7680	2.3909	0.1	0.1	0.1	3.2	3.2	3.2
112	4	28	-1.8091	2.4621	0.1	0.1	0.1	3.0	3.0	3.0
113	5	1	-0.6268	0.5789	38.9	41.2	39.1	40.3	40.3	40.3
114	5	2	-0.6680	0.6502	33.4	40.4	33.6	39.8	39.8	39.8
115	5	3	-0.7091	0.7214	25.8	35.8	26.3	37.6	37.6	37.6
116	5	4	-0.7503	0.7927	17.9	24.1	18.6	31.4	31.4	31.4
117	5	5	-0.7914	0.8640	6.6	9.3	7.1	21.1	21.1	21.1
118	5	6	-0.8326	0.9353	4.1	5.7	4.6	18.4	18.4	18.4
119	5	7	-0.8737	1.0065	0.1	0.5	0.3	13.8	13.8	13.8
120	5	8	-0.9149	1.0778	0.1	0.1	0.1	13.0	13.0	13.0
121	5	9	-0.9560	1.1491	0.1	0.1	0.1	12.5	12.5	12.5
122	5	10	-0.9972	1.2204	0.1	0.1	0.1	11.9	11.9	11.9
123	5	11	-1.0383	1.2916	0.1	0.1	0.2	11.3	11.3	11.3
124	5	12	-1.0795	1.3629	0.2	0.2	0.2	10.7	10.7	10.7
125	5	13	-1.1206	1.4342	0.2	0.2	0.2	9.9	9.9	9.9
126	5	14	-1.1618	1.5055	0.2	0.2	0.2	8.9	8.9	8.9
127	5	15	-1.2029	1.5767	0.2	0.2	0.3	8.0	8.0	8.0
128	5	16	-1.2441	1.6480	0.2	0.2	0.3	7.3	7.3	7.3
129	5	17	-1.2852	1.7193	0.2	0.2	0.3	6.9	6.9	6.9
130	5	18	-1.3264	1.7906	0.2	0.2	0.3	6.2	6.2	6.2
131	5	19	-1.3675	1.8618	0.2	0.2	0.3	5.8	5.8	5.8
132	5	20	-1.4087	1.9331	0.2	0.2	0.3	5.3	5.3	5.3
133	5	21	-1.4498	2.0044	0.2	0.2	0.3	5.0	5.0	5.0
134	5	22	-1.4910	2.0757	0.2	0.2	0.3	4.7	4.7	4.7
135	5	23	-1.5321	2.1469	0.3	0.3	0.3	4.5	4.5	4.5
136	5	24	-1.5733	2.2182	0.3	0.3	0.3	4.4	4.4	4.4
137	5	25	-1.6144	2.2895	0.3	0.3	0.3	4.3	4.3	4.3
138	5	26	-1.6556	2.3607	0.3	0.3	0.3	4.1	4.1	4.1
139	5	27	-1.6967	2.4320	0.3	0.3	0.3	3.8	3.8	3.8
140	5	28	-1.7379	2.5033	0.3	0.3	0.3	3.5	3.5	3.5
141	6	1	-0.5555	0.6200	72.7	88.8	73.2	49.8	49.8	49.8
142	6	2	-0.5967	0.6913	45.7	84.7	46.4	48.9	48.9	48.9
143	6	3	-0.6378	0.7626	31.4	67.7	32.6	47.1	47.1	47.1
144	6	4	-0.6790	0.8339	15.7	30.6	16.9	35.9	35.9	35.9
145	6	5	-0.7201	0.9051	7.4	11.8	8.3	26.5	26.5	26.5
146	6	6	-0.7613	0.9764	5.4	5.8	5.8	23.5	23.5	23.5
147	6	7	-0.8024	1.0477	1.4	1.5	1.8	18.5	18.5	18.5
148	6	8	-0.8436	1.1190	1.5	1.5	1.9	17.3	17.3	17.3
149	6	9	-0.8847	1.1902	1.5	1.5	1.9	16.4	16.4	16.4
150	6	10	-0.9259	1.2615	1.6	1.6	2.0	15.7	15.7	15.7
151	6	11	-0.9670	1.3328	1.6	1.6	2.0	14.6	14.6	14.6
152	6	12	-1.0082	1.4041	1.6	1.6	2.0	13.7	13.7	13.7
153	6	13	-1.0493	1.4753	1.6	1.6	2.1	12.7	12.7	12.7
154	6	14	-1.0905	1.5466	1.7	1.7	2.1	11.5	11.5	11.5
155	6	15	-1.1316	1.6179	1.7	1.7	2.1	10.4	10.5	10.5
156	6	16	-1.1728	1.6892	1.7	1.7	2.1	9.3	9.3	9.3
157	6	17	-1.2139	1.7604	1.9	1.9	2.4	8.6	8.6	8.6
158	6	18	-1.2551	1.8317	2.3	2.3	3.0	7.5	7.5	7.5
159	6	19	-1.2962	1.9030	2.5	2.6	3.3	6.8	6.8	6.8
160	6	20	-1.3374	1.9743	2.1	2.1	2.7	6.2	6.2	6.2
161	6	21	-1.3785	2.0455	1.7	1.7	2.1	5.7	5.7	5.7
162	6	22	-1.4197	2.1168	1.6	1.6	2.1	5.3	5.3	5.3
163	6	23	-1.4608	2.1881	1.6	1.6	2.1	5.1	5.1	5.1
164	6	24	-1.5020	2.2593	1.5	1.5	1.9	5.0	5.0	5.0
165	6	25	-1.5431	2.3306	1.5	1.5	1.9	4.8	4.8	4.8

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
						A2 Special Use	*A3*		*A2 Special Use*	*A3*
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*
166	6	26	-1.5843	2.4019	1.5	1.5	1.9	4.6	4.6	4.6
167	6	27	-1.6254	2.4732	1.4	1.4	1.8	4.2	4.2	4.2
168	6	28	-1.6666	2.5444	1.4	1.4	1.8	3.8	3.8	3.8
169	7	1	-0.4843	0.6612	112.6	174.8	115.9	75.0	75.0	75.0
170	7	2	-0.5254	0.7325	41.1	152.0	45.2	70.7	70.7	70.7
171	7	3	-0.5666	0.8037	34.4	95.5	38.9	66.3	66.3	66.3
172	7	4	-0.6077	0.8750	19.9	24.0	23.2	47.2	47.2	47.2
173	7	5	-0.6489	0.9463	16.2	16.7	19.4	37.9	37.9	37.9
174	7	6	-0.6900	1.0176	14.4	14.5	17.7	30.6	30.6	30.6
175	7	7	-0.7312	1.0888	10.5	10.6	13.8	23.9	23.9	23.9
176	7	8	-0.7723	1.1601	10.4	10.4	13.6	21.5	21.5	21.5
177	7	9	-0.8135	1.2314	10.2	10.2	13.4	19.7	19.7	19.7
178	7	10	-0.8546	1.3027	9.8	9.8	12.8	17.8	17.8	17.8
179	7	11	-0.8958	1.3739	9.6	9.6	12.6	16.7	16.7	16.7
180	7	12	-0.9369	1.4452	9.4	9.4	12.4	15.6	15.6	15.6
181	7	13	-0.9781	1.5165	9.2	9.2	12.1	14.7	14.7	14.7
182	7	14	-1.0192	1.5878	8.9	8.9	11.7	13.5	13.5	13.5
183	7	15	-1.0604	1.6590	8.4	8.4	10.9	12.1	12.2	12.2
184	7	16	-1.1015	1.7303	7.8	7.8	10.2	10.7	10.7	10.7
185	7	17	-1.1427	1.8016	7.5	7.5	9.8	9.6	9.6	9.6
186	7	18	-1.1838	1.8729	7.3	7.3	9.5	8.3	8.3	8.3
187	7	19	-1.2250	1.9441	7.1	7.1	9.3	7.3	7.3	7.3
188	7	20	-1.2661	2.0154	7.0	7.0	9.1	6.7	6.7	6.7
189	7	21	-1.3073	2.0867	6.8	6.8	8.9	6.0	6.0	6.0
190	7	22	-1.3484	2.1580	6.6	6.6	8.6	5.6	5.6	5.6
191	7	23	-1.3896	2.2292	6.4	6.4	8.3	5.3	5.3	5.3
192	7	24	-1.4307	2.3005	6.0	6.0	7.8	5.2	5.2	5.2
193	7	25	-1.4719	2.3718	5.7	5.7	7.4	5.0	5.0	5.0
194	7	26	-1.5130	2.4430	5.6	5.6	7.2	4.7	4.7	4.7
195	7	27	-1.5542	2.5143	5.4	5.4	7.0	4.3	4.3	4.3
196	7	28	-1.5953	2.5856	5.2	5.2	6.8	4.0	4.0	4.0
197	8	1	-0.4130	0.7023	45.7	164.5	53.7	84.6	84.6	84.6
198	8	2	-0.4541	0.7736	46.4	133.1	55.3	79.5	79.5	79.5
199	8	3	-0.4953	0.8449	40.2	42.2	48.3	66.9	66.9	66.9
200	8	4	-0.5364	0.9162	28.5	29.2	36.0	54.5	54.5	54.5
201	8	5	-0.5776	0.9874	28.3	28.6	35.8	48.6	48.6	48.6
202	8	6	-0.6187	1.0587	21.8	21.8	29.0	37.0	37.0	37.0
203	8	7	-0.6599	1.1300	20.7	20.7	27.6	30.3	30.3	30.3
204	8	8	-0.7010	1.2013	19.3	19.3	25.7	24.1	24.1	24.1
205	8	9	-0.7422	1.2725	19.0	19.0	25.3	21.1	21.1	21.1
206	8	10	-0.7833	1.3438	18.6	18.6	24.7	19.7	19.7	19.7
207	8	11	-0.8245	1.4151	17.9	17.9	23.8	17.8	17.8	17.8
208	8	12	-0.8656	1.4864	17.1	17.1	22.8	15.9	15.9	15.9
209	8	13	-0.9068	1.5576	16.0	16.0	21.2	14.6	14.6	14.6
210	8	14	-0.9479	1.6289	15.0	15.0	19.9	13.4	13.4	13.4
211	8	15	-0.9891	1.7002	13.3	13.3	17.5	12.0	12.0	12.0
212	8	16	-1.0302	1.7715	12.7	12.7	16.7	10.6	10.6	10.6
213	8	17	-1.0714	1.8427	12.0	12.0	15.8	9.6	9.6	9.6
214	8	18	-1.1125	1.9140	11.4	11.4	14.9	8.3	8.3	8.3
215	8	19	-1.1537	1.9853	10.7	10.7	14.1	7.2	7.2	7.2
216	8	20	-1.1948	2.0566	10.4	10.4	13.6	6.5	6.5	6.5
217	8	21	-1.2360	2.1278	10.0	10.1	13.2	5.8	5.8	5.8
218	8	22	-1.2771	2.1991	9.5	9.5	12.5	5.4	5.4	5.4
219	8	23	-1.3183	2.2704	8.9	8.9	11.6	5.2	5.2	5.2
220	8	24	-1.3594	2.3416	8.1	8.1	10.5	5.0	5.0	5.0

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
						A2 Special Use	*A3*		*A2 Special Use*	*A3*
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*
221	8	25	-1.4006	2.4129	7.7	7.7	10.1	4.8	4.8	4.8
222	8	26	-1.4417	2.4842	7.5	7.5	9.8	4.6	4.6	4.6
223	8	27	-1.4829	2.5555	7.4	7.4	9.6	4.2	4.2	4.2
224	8	28	-1.5240	2.6267	7.2	7.2	9.4	3.8	3.8	3.8
225	9	1	-0.3417	0.7435	107.6	153.1	112.5	75.4	75.4	75.4
226	9	2	-0.3829	0.8148	40.0	132.7	45.5	67.7	67.7	67.7
227	9	3	-0.4240	0.8860	21.3	84.9	27.5	60.5	60.5	60.5
228	9	4	-0.4652	0.9573	20.6	28.3	25.7	59.3	59.3	59.3
229	9	5	-0.5063	1.0286	18.7	19.3	23.5	51.2	51.2	51.2
230	9	6	-0.5475	1.0999	14.7	14.8	19.5	40.4	40.4	40.4
231	9	7	-0.5886	1.1711	14.5	14.5	19.2	34.9	34.9	34.9
232	9	8	-0.6298	1.2424	14.1	14.1	18.7	23.8	23.8	23.8
233	9	9	-0.6709	1.3137	13.5	13.5	17.8	20.5	20.5	20.5
234	9	10	-0.7121	1.3850	12.5	12.5	16.5	18.1	18.1	18.1
235	9	11	-0.7532	1.4562	11.2	11.2	14.8	16.2	16.2	16.2
236	9	12	-0.7944	1.5275	9.3	9.3	12.2	14.7	14.7	14.7
237	9	13	-0.8355	1.5988	9.1	9.1	11.9	13.0	13.0	13.0
238	9	14	-0.8767	1.6701	8.8	8.8	11.5	11.7	11.7	11.7
239	9	15	-0.9178	1.7413	8.4	8.4	11.1	10.4	10.4	10.4
240	9	16	-0.9590	1.8126	8.1	8.1	10.6	9.2	9.2	9.2
241	9	17	-1.0001	1.8839	7.9	7.9	10.3	8.4	8.4	8.4
242	9	18	-1.0413	1.9552	7.8	7.8	10.2	7.3	7.3	7.3
243	9	19	-1.0824	2.0264	7.7	7.7	10.0	6.4	6.4	6.4
244	9	20	-1.1236	2.0977	7.6	7.6	9.9	5.8	5.8	5.8
245	9	21	-1.1647	2.1690	7.5	7.5	9.8	5.2	5.2	5.2
246	9	22	-1.2059	2.2403	7.3	7.3	9.6	4.9	4.9	4.9
247	9	23	-1.2470	2.3115	7.2	7.2	9.4	4.7	4.7	4.7
248	9	24	-1.2882	2.3828	7.0	7.0	9.2	4.5	4.5	4.5
249	9	25	-1.3293	2.4541	6.8	6.8	8.9	4.3	4.3	4.3
250	9	26	-1.3705	2.5253	6.6	6.6	8.7	4.1	4.1	4.1
251	9	27	-1.4116	2.5966	6.4	6.4	8.4	3.8	3.8	3.8
252	9	28	-1.4528	2.6679	6.2	6.2	8.1	3.5	3.5	3.5
253	10	1	-0.2704	0.7846	48.6	62.5	49.2	54.0	54.0	54.0
254	10	2	-0.3116	0.8559	25.2	56.1	26.0	50.7	50.7	50.7
255	10	3	-0.3527	0.9272	13.6	42.6	14.9	50.0	50.0	50.0
256	10	4	-0.3939	0.9985	6.6	20.5	8.1	47.9	47.9	47.9
257	10	5	-0.4350	1.0697	2.1	5.7	3.3	42.1	42.1	42.1
258	10	6	-0.4762	1.1410	2.1	2.7	2.9	39.7	39.7	39.7
259	10	7	-0.5173	1.2123	2.2	2.4	2.9	34.1	34.1	34.1
260	10	8	-0.5585	1.2836	2.3	2.3	3.0	26.7	26.7	26.7
261	10	9	-0.5996	1.3548	2.4	2.4	3.1	17.6	17.6	17.6
262	10	10	-0.6408	1.4261	2.5	2.5	3.2	14.9	14.9	14.9
263	10	11	-0.6819	1.4974	2.5	2.5	3.3	12.1	12.1	12.1
264	10	12	-0.7231	1.5687	2.6	2.6	3.4	11.2	11.2	11.2
265	10	13	-0.7642	1.6399	2.6	2.6	3.4	10.3	10.3	10.3
266	10	14	-0.8054	1.7112	2.6	2.6	3.4	9.2	9.2	9.2
267	10	15	-0.8465	1.7825	2.7	2.7	3.5	8.0	8.0	8.0
268	10	16	-0.8877	1.8538	2.7	2.7	3.5	7.0	7.0	7.0
269	10	17	-0.9288	1.9250	2.7	2.7	3.5	6.5	6.5	6.5
270	10	18	-0.9700	1.9963	2.6	2.6	3.4	5.6	5.6	5.6
271	10	19	-1.0111	2.0676	2.6	2.6	3.4	5.1	5.1	5.1
272	10	20	-1.0523	2.1389	2.6	2.6	3.4	4.7	4.7	4.7
273	10	21	-1.0934	2.2101	2.6	2.6	3.4	4.4	4.4	4.4
274	10	22	-1.1346	2.2814	2.5	2.5	3.3	4.1	4.1	4.1
275	10	23	-1.1757	2.3527	2.5	2.5	3.2	4.0	4.0	4.0

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-75)	South Flow A2 Special Use Area Procedures (TA-75)	South Flow A3 Wide Bodies (TA-75)	North Flow Conditions (2018) No Project (TA-75)	North Flow A2 Special Use Area Procedures (TA-75)	North Flow A3 Wide Bodies (TA-75)
276	10	24	-1.2169	2.4239	2.3	2.3	3.0	3.8	3.8	3.8
277	10	25	-1.2580	2.4952	2.3	2.3	2.9	3.7	3.7	3.7
278	10	26	-1.2992	2.5665	2.2	2.2	2.8	3.5	3.5	3.5
279	10	27	-1.3403	2.6378	2.1	2.1	2.7	3.2	3.2	3.2
280	10	28	-1.3815	2.7090	2.0	2.0	2.5	3.0	3.0	3.0
281	11	1	-0.1992	0.8258	13.4	15.9	13.6	19.6	19.6	19.6
282	11	2	-0.2403	0.8971	9.7	15.7	9.8	20.0	20.0	20.0
283	11	3	-0.2815	0.9683	5.5	12.6	5.9	25.3	25.3	25.3
284	11	4	-0.3226	1.0396	1.9	5.9	2.5	27.4	27.4	27.4
285	11	5	-0.3638	1.1109	0.6	3.0	1.1	30.7	30.7	30.7
286	11	6	-0.4049	1.1822	0.1	1.6	0.5	31.3	31.2	31.2
287	11	7	-0.4461	1.2534	0.1	0.5	0.3	28.9	28.9	28.9
288	11	8	-0.4872	1.3247	0.1	0.1	0.1	24.3	24.3	24.3
289	11	9	-0.5284	1.3960	0.1	0.1	0.1	17.2	17.2	17.2
290	11	10	-0.5695	1.4673	0.1	0.1	0.1	10.5	10.5	10.5
291	11	11	-0.6107	1.5385	0.1	0.1	0.1	8.4	8.4	8.4
292	11	12	-0.6518	1.6098	0.1	0.1	0.1	7.8	7.8	7.8
293	11	13	-0.6930	1.6811	0.1	0.1	0.1	7.0	7.0	7.0
294	11	14	-0.7341	1.7524	0.1	0.1	0.1	6.1	6.0	6.0
295	11	15	-0.7753	1.8236	0.1	0.1	0.2	5.1	5.1	5.1
296	11	16	-0.8164	1.8949	0.1	0.1	0.2	4.7	4.7	4.7
297	11	17	-0.8576	1.9662	0.2	0.1	0.2	4.4	4.4	4.4
298	11	18	-0.8987	2.0375	0.2	0.2	0.2	4.1	4.1	4.1
299	11	19	-0.9399	2.1087	0.2	0.2	0.2	3.8	3.8	3.8
300	11	20	-0.9810	2.1800	0.2	0.2	0.2	3.7	3.7	3.7
301	11	21	-1.0222	2.2513	0.2	0.2	0.3	3.5	3.5	3.5
302	11	22	-1.0633	2.3225	0.2	0.2	0.3	3.3	3.3	3.3
303	11	23	-1.1045	2.3938	0.2	0.2	0.3	3.2	3.2	3.2
304	11	24	-1.1456	2.4651	0.2	0.2	0.3	3.1	3.1	3.1
305	11	25	-1.1868	2.5364	0.2	0.2	0.3	3.0	3.0	3.0
306	11	26	-1.2279	2.6076	0.2	0.2	0.3	2.8	2.8	2.8
307	11	27	-1.2691	2.6789	0.2	0.2	0.3	2.6	2.6	2.6
308	11	28	-1.3102	2.7502	0.2	0.2	0.3	2.5	2.5	2.5
309	12	1	-0.1279	0.8669	3.7	4.1	3.7	7.4	7.4	7.4
310	12	2	-0.1690	0.9382	3.0	4.1	3.0	7.7	7.6	7.6
311	12	3	-0.2102	1.0095	2.3	3.5	2.4	8.2	8.2	8.2
312	12	4	-0.2513	1.0808	1.0	2.9	1.2	9.6	9.6	9.6
313	12	5	-0.2925	1.1520	0.4	2.1	0.7	14.3	14.3	14.3
314	12	6	-0.3336	1.2233	0.1	0.8	0.3	22.0	22.0	22.0
315	12	7	-0.3748	1.2946	0.1	0.3	0.1	24.1	24.1	24.1
316	12	8	-0.4159	1.3659	0.1	0.1	0.0	21.8	21.8	21.8
317	12	9	-0.4571	1.4371	0.1	0.1	0.0	15.8	15.8	15.8
318	12	10	-0.4982	1.5084	0.1	0.1	0.0	7.3	7.3	7.3
319	12	11	-0.5394	1.5797	0.1	0.1	0.0	5.2	5.2	5.2
320	12	12	-0.5805	1.6510	0.1	0.1	0.0	4.9	4.8	4.8
321	12	13	-0.6217	1.7222	0.1	0.1	0.0	4.4	4.4	4.4
322	12	14	-0.6628	1.7935	0.1	0.1	0.0	3.9	3.9	3.9
323	12	15	-0.7040	1.8648	0.0	0.0	0.0	3.5	3.5	3.5
324	12	16	-0.7451	1.9361	0.0	0.0	0.0	3.3	3.3	3.3
325	12	17	-0.7863	2.0073	0.0	0.0	0.0	3.1	3.1	3.1
326	12	18	-0.8274	2.0786	0.0	0.0	0.0	2.9	2.9	2.9
327	12	19	-0.8686	2.1499	0.0	0.0	0.0	2.8	2.8	2.8
328	12	20	-0.9097	2.2212	0.0	0.0	0.0	2.7	2.7	2.7
329	12	21	-0.9509	2.2924	0.0	0.0	0.0	2.6	2.6	2.6
330	12	22	-0.9920	2.3637	0.0	0.0	0.0	2.5	2.5	2.5

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-75)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-75)	South Flow Conditions (2018) A3 Wide Bodies (TA-75)	North Flow Conditions (2018) No Project (TA-75)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-75)	North Flow Conditions (2018) A3 Wide Bodies (TA-75)
331	12	23	-1.0332	2.4350	0.0	0.0	0.0	2.4	2.4	2.4
332	12	24	-1.0743	2.5062	0.0	0.0	0.1	2.4	2.4	2.4
333	12	25	-1.1155	2.5775	0.1	0.1	0.1	2.3	2.3	2.3
334	12	26	-1.1566	2.6488	0.1	0.1	0.1	2.1	2.1	2.1
335	12	27	-1.1978	2.7201	0.1	0.1	0.1	2.0	2.0	2.0
336	12	28	-1.2389	2.7913	0.1	0.1	0.1	1.9	1.9	1.9
337	13	1	-0.0566	0.9081	1.9	2.1	1.8	3.8	3.8	3.8
338	13	2	-0.0978	0.9794	1.5	2.0	1.5	4.0	4.0	4.0
339	13	3	-0.1389	1.0506	0.8	1.8	0.9	4.1	4.1	4.1
340	13	4	-0.1801	1.1219	0.5	1.4	0.6	4.2	4.2	4.2
341	13	5	-0.2212	1.1932	0.2	0.8	0.3	6.2	6.2	6.2
342	13	6	-0.2624	1.2645	0.1	0.3	0.1	7.4	7.4	7.4
343	13	7	-0.3035	1.3357	0.1	0.1	0.0	18.2	18.2	18.2
344	13	8	-0.3447	1.4070	0.1	0.1	0.0	17.9	17.9	17.9
345	13	9	-0.3858	1.4783	0.1	0.1	0.0	12.1	12.1	12.1
346	13	10	-0.4270	1.5496	0.1	0.1	0.0	5.6	5.6	5.6
347	13	11	-0.4681	1.6208	0.1	0.1	0.0	3.8	3.8	3.8
348	13	12	-0.5093	1.6921	0.1	0.1	0.0	3.2	3.2	3.2
349	13	13	-0.5504	1.7634	0.1	0.1	0.0	3.0	3.0	3.0
350	13	14	-0.5916	1.8347	0.1	0.1	0.0	2.8	2.8	2.8
351	13	15	-0.6327	1.9059	0.1	0.1	0.0	2.7	2.7	2.7
352	13	16	-0.6739	1.9772	0.1	0.1	0.0	2.6	2.6	2.6
353	13	17	-0.7150	2.0485	0.1	0.1	0.0	2.5	2.5	2.5
354	13	18	-0.7562	2.1198	0.1	0.1	0.0	2.4	2.4	2.4
355	13	19	-0.7973	2.1910	0.1	0.1	0.0	2.3	2.3	2.3
356	13	20	-0.8385	2.2623	0.1	0.1	0.0	2.2	2.2	2.2
357	13	21	-0.8796	2.3336	0.1	0.1	0.0	2.1	2.1	2.1
358	13	22	-0.9208	2.4048	0.0	0.0	0.0	2.0	2.0	2.0
359	13	23	-0.9619	2.4761	0.0	0.0	0.0	1.9	1.9	1.9
360	13	24	-1.0031	2.5474	0.0	0.0	0.0	1.8	1.8	1.8
361	13	25	-1.0442	2.6187	0.0	0.0	0.0	1.7	1.7	1.7
362	13	26	-1.0854	2.6899	0.0	0.0	0.0	1.6	1.6	1.6
363	13	27	-1.1265	2.7612	0.0	0.0	0.0	1.5	1.5	1.5
364	13	28	-1.1677	2.8325	0.0	0.0	0.0	1.5	1.5	1.5
365	14	1	0.0147	0.9492	0.6	0.6	0.4	1.9	1.9	1.9
366	14	2	-0.0265	1.0205	0.5	0.6	0.4	2.0	2.0	2.0
367	14	3	-0.0676	1.0918	0.2	0.5	0.2	2.1	2.1	2.1
368	14	4	-0.1088	1.1631	0.1	0.4	0.1	2.2	2.2	2.2
369	14	5	-0.1499	1.2343	0.1	0.2	0.0	2.8	2.8	2.8
370	14	6	-0.1911	1.3056	0.1	0.1	0.0	5.1	5.1	5.1
371	14	7	-0.2322	1.3769	0.1	0.1	0.0	9.5	9.5	9.5
372	14	8	-0.2734	1.4482	0.1	0.1	0.0	11.7	11.7	11.7
373	14	9	-0.3145	1.5194	0.1	0.1	0.0	9.0	9.0	9.0
374	14	10	-0.3557	1.5907	0.1	0.1	0.0	4.2	4.2	4.2
375	14	11	-0.3968	1.6620	0.1	0.1	0.0	2.9	2.9	2.9
376	14	12	-0.4380	1.7333	0.1	0.1	0.0	2.2	2.2	2.2
377	14	13	-0.4791	1.8045	0.1	0.1	0.0	2.2	2.2	2.2
378	14	14	-0.5203	1.8758	0.1	0.1	0.0	2.1	2.1	2.1
379	14	15	-0.5614	1.9471	0.1	0.1	0.0	2.0	2.0	2.0
380	14	16	-0.6026	2.0184	0.1	0.1	0.0	1.9	1.9	1.9
381	14	17	-0.6437	2.0896	0.1	0.1	0.0	1.9	1.9	1.9
382	14	18	-0.6849	2.1609	0.1	0.1	0.0	1.8	1.8	1.8
383	14	19	-0.7260	2.2322	0.1	0.1	0.0	1.7	1.7	1.7
384	14	20	-0.7672	2.3035	0.0	0.0	0.0	1.6	1.6	1.6
385	14	21	-0.8083	2.3747	0.0	0.0	0.0	1.5	1.5	1.5

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-75)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-75)	South Flow Conditions (2018) A3 Wide Bodies (TA-75)	North Flow Conditions (2018) No Project (TA-75)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-75)	North Flow Conditions (2018) A3 Wide Bodies (TA-75)
386	14	22	-0.8495	2.4460	0.0	0.0	0.0	1.4	1.4	1.4
387	14	23	-0.8906	2.5173	0.0	0.0	0.0	1.4	1.4	1.4
388	14	24	-0.9318	2.5885	0.0	0.0	0.0	1.3	1.3	1.3
389	14	25	-0.9729	2.6598	0.0	0.0	0.0	1.3	1.3	1.3
390	14	26	-1.0141	2.7311	0.0	0.0	0.0	1.2	1.2	1.2
391	14	27	-1.0552	2.8024	0.0	0.0	0.0	1.2	1.2	1.2
392	14	28	-1.0964	2.8736	0.0	0.0	0.0	1.1	1.1	1.1
393	15	1	0.0859	0.9904	0.1	0.1	0.0	1.2	1.2	1.2
394	15	2	0.0448	1.0617	0.1	0.1	0.0	1.2	1.2	1.2
395	15	3	0.0036	1.1329	0.1	0.1	0.0	1.3	1.3	1.3
396	15	4	-0.0375	1.2042	0.1	0.1	0.0	1.4	1.4	1.4
397	15	5	-0.0787	1.2755	0.1	0.1	0.0	1.4	1.4	1.4
398	15	6	-0.1198	1.3468	0.0	0.0	0.0	3.3	3.3	3.3
399	15	7	-0.1610	1.4180	0.0	0.0	0.0	4.3	4.3	4.3
400	15	8	-0.2021	1.4893	0.0	0.0	0.0	8.4	8.4	8.4
401	15	9	-0.2433	1.5606	0.0	0.0	0.0	6.3	6.3	6.3
402	15	10	-0.2844	1.6319	0.0	0.0	0.0	3.0	3.0	3.0
403	15	11	-0.3256	1.7031	0.0	0.0	0.0	2.1	2.1	2.1
404	15	12	-0.3667	1.7744	0.0	0.0	0.0	1.3	1.3	1.3
405	15	13	-0.4079	1.8457	0.0	0.0	0.0	1.3	1.3	1.3
406	15	14	-0.4490	1.9170	0.0	0.0	0.0	1.2	1.2	1.2
407	15	15	-0.4902	1.9882	0.0	0.0	0.0	1.2	1.2	1.2
408	15	16	-0.5313	2.0595	0.0	0.0	0.0	1.2	1.2	1.2
409	15	17	-0.5725	2.1308	0.0	0.0	0.0	1.1	1.1	1.1
410	15	18	-0.6136	2.2021	0.0	0.0	0.0	1.1	1.1	1.1
411	15	19	-0.6548	2.2733	0.0	0.0	0.0	1.1	1.1	1.1
412	15	20	-0.6959	2.3446	0.0	0.0	0.0	1.1	1.1	1.1
413	15	21	-0.7371	2.4159	0.0	0.0	0.0	1.0	1.0	1.0
414	15	22	-0.7782	2.4871	0.0	0.0	0.0	1.0	1.0	1.0
415	15	23	-0.8194	2.5584	0.0	0.0	0.0	1.0	1.0	1.0
416	15	24	-0.8605	2.6297	0.0	0.0	0.0	1.0	1.0	1.0
417	15	25	-0.9017	2.7010	0.0	0.0	0.0	0.9	0.9	0.9
418	15	26	-0.9428	2.7722	0.0	0.0	0.0	0.9	0.9	0.9
419	15	27	-0.9840	2.8435	0.0	0.0	0.0	0.8	0.8	0.8
420	15	28	-1.0251	2.9148	0.0	0.0	0.0	0.8	0.8	0.8
421	16	1	0.1572	1.0315	0.0	0.0	0.0	0.6	0.6	0.6
422	16	2	0.1161	1.1028	0.0	0.0	0.0	0.6	0.6	0.6
423	16	3	0.0749	1.1741	0.0	0.0	0.0	0.7	0.7	0.7
424	16	4	0.0338	1.2454	0.0	0.0	0.0	0.7	0.7	0.7
425	16	5	-0.0074	1.3166	0.0	0.0	0.0	0.8	0.8	0.8
426	16	6	-0.0485	1.3879	0.0	0.0	0.0	2.1	2.1	2.1
427	16	7	-0.0897	1.4592	0.0	0.0	0.0	3.4	3.4	3.4
428	16	8	-0.1308	1.5305	0.0	0.0	0.0	3.6	3.6	3.6
429	16	9	-0.1720	1.6017	0.0	0.0	0.0	3.1	3.1	3.1
430	16	10	-0.2131	1.6730	0.0	0.0	0.0	2.4	2.4	2.4
431	16	11	-0.2543	1.7443	0.0	0.0	0.0	0.9	0.9	0.9
432	16	12	-0.2954	1.8156	0.0	0.0	0.0	0.9	0.9	0.9
433	16	13	-0.3366	1.8868	0.0	0.0	0.0	0.9	0.9	0.9
434	16	14	-0.3777	1.9581	0.0	0.0	0.0	0.8	0.8	0.8
435	16	15	-0.4189	2.0294	0.0	0.0	0.0	0.8	0.8	0.8
436	16	16	-0.4600	2.1007	0.0	0.0	0.0	0.8	0.8	0.8
437	16	17	-0.5012	2.1719	0.0	0.0	0.0	0.8	0.8	0.8
438	16	18	-0.5423	2.2432	0.0	0.0	0.0	0.7	0.7	0.7
439	16	19	-0.5835	2.3145	0.0	0.0	0.0	0.7	0.7	0.7
440	16	20	-0.6246	2.3858	0.0	0.0	0.0	0.7	0.7	0.7

Table C-16
King County International Airport EA
Time Above 75 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
						A2 Special Use	*A3*		*A2 Special Use*	*A3*
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*	*No Project (TA-75)*	*Area Procedures (TA-75)*	*Wide Bodies (TA-75)*
441	16	21	-0.6658	2.4570	0.0	0.0	0.0	0.7	0.7	0.7
442	16	22	-0.7069	2.5283	0.0	0.0	0.0	0.7	0.7	0.7
443	16	23	-0.7481	2.5996	0.0	0.0	0.0	0.7	0.7	0.7
444	16	24	-0.7892	2.6708	0.0	0.0	0.0	0.7	0.7	0.7
445	16	25	-0.8304	2.7421	0.0	0.0	0.0	0.6	0.6	0.6
446	16	26	-0.8715	2.8134	0.0	0.0	0.0	0.6	0.6	0.6
447	16	27	-0.9127	2.8847	0.0	0.0	0.0	0.6	0.6	0.6
448	16	28	-0.9538	2.9559	0.0	0.0	0.0	0.5	0.5	0.5
SP	1	1	-0.5832	0.7732	32.0	106.2	35.1	60.9	60.9	60.9

Prepared December 31, 2003

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*
1	1	1	-0.9119	0.4143	29.9	29.7	29.9	41.9	41.9	41.9
2	1	2	-0.9530	0.4856	29.4	30.2	29.4	43.5	43.5	43.5
3	1	3	-0.9942	0.5568	26.5	27.7	26.6	42.7	42.7	42.7
4	1	4	-1.0353	0.6281	21.6	23.2	21.8	40.1	40.1	40.1
5	1	5	-1.0765	0.6994	16.6	18.3	16.9	37.0	37.0	37.0
6	1	6	-1.1176	0.7707	9.5	11.3	9.8	31.7	31.7	31.7
7	1	7	-1.1588	0.8419	8.7	10.4	9.0	32.0	32.0	32.0
8	1	8	-1.1999	0.9132	8.0	9.3	8.3	32.1	32.1	32.1
9	1	9	-1.2411	0.9845	7.4	8.5	7.7	32.1	32.1	32.1
10	1	10	-1.2822	1.0558	6.8	7.9	7.1	31.6	31.6	31.6
11	1	11	-1.3234	1.1270	4.4	5.3	4.6	29.3	29.3	29.3
12	1	12	-1.3645	1.1983	0.2	0.6	0.4	24.9	24.9	24.9
13	1	13	-1.4057	1.2696	0.1	0.3	0.3	24.3	24.3	24.3
14	1	14	-1.4468	1.3409	0.0	0.1	0.1	23.6	23.6	23.6
15	1	15	-1.4880	1.4121	0.0	0.1	0.0	23.1	23.1	23.1
16	1	16	-1.5291	1.4834	0.0	0.1	0.1	22.7	22.7	22.7
17	1	17	-1.5703	1.5547	0.1	0.1	0.1	22.1	22.1	22.1
18	1	18	-1.6114	1.6260	0.1	0.1	0.1	21.3	21.3	21.3
19	1	19	-1.6526	1.6972	0.1	0.1	0.1	20.5	20.5	20.5
20	1	20	-1.6937	1.7685	0.1	0.1	0.1	19.8	19.8	19.8
21	1	21	-1.7349	1.8398	0.1	0.1	0.1	19.4	19.4	19.4
22	1	22	-1.7760	1.9111	0.1	0.1	0.1	19.0	19.0	19.0
23	1	23	-1.8172	1.9823	0.1	0.1	0.1	18.8	18.8	18.8
24	1	24	-1.8583	2.0536	0.1	0.1	0.1	18.5	18.5	18.5
25	1	25	-1.8995	2.1249	0.1	0.1	0.2	18.1	18.1	18.1
26	1	26	-1.9406	2.1961	0.1	0.1	0.2	17.5	17.6	17.6
27	1	27	-1.9818	2.2674	0.1	0.1	0.2	16.8	16.8	16.8
28	1	28	-2.0229	2.3387	0.1	0.1	0.2	16.0	16.0	16.0
29	2	1	-0.8406	0.4554	37.9	37.2	37.8	57.2	57.2	57.2
30	2	2	-0.8818	0.5267	36.2	38.7	36.3	58.8	58.8	58.8
31	2	3	-0.9229	0.5980	31.1	35.1	31.3	57.8	57.8	57.8
32	2	4	-0.9641	0.6693	29.5	33.8	29.7	58.3	58.3	58.3
33	2	5	-1.0052	0.7405	21.8	24.8	22.1	53.0	53.0	53.0
34	2	6	-1.0464	0.8118	16.5	19.1	16.9	49.6	49.6	49.6
35	2	7	-1.0875	0.8831	9.2	11.6	9.6	43.9	43.9	43.9
36	2	8	-1.1287	0.9544	8.3	10.3	8.7	44.0	44.0	44.0
37	2	9	-1.1698	1.0256	7.7	9.1	8.1	43.6	43.6	43.6
38	2	10	-1.2110	1.0969	7.1	8.2	7.4	42.8	42.8	42.8
39	2	11	-1.2521	1.1682	4.5	5.6	4.7	40.0	40.0	40.0
40	2	12	-1.2933	1.2395	2.3	3.0	2.5	37.3	37.3	37.3
41	2	13	-1.3344	1.3107	0.2	0.4	0.4	34.4	34.5	34.5
42	2	14	-1.3756	1.3820	0.2	0.3	0.3	33.9	33.9	33.9
43	2	15	-1.4167	1.4533	0.2	0.2	0.2	33.3	33.3	33.3
44	2	16	-1.4579	1.5246	0.2	0.2	0.2	32.6	32.6	32.6
45	2	17	-1.4990	1.5958	0.2	0.2	0.2	31.8	31.8	31.8
46	2	18	-1.5402	1.6671	0.2	0.2	0.2	30.4	30.4	30.4
47	2	19	-1.5813	1.7384	0.2	0.2	0.2	28.9	28.9	28.9
48	2	20	-1.6225	1.8097	0.2	0.2	0.2	27.8	27.8	27.8
49	2	21	-1.6636	1.8809	0.2	0.2	0.2	27.1	27.1	27.1
50	2	22	-1.7048	1.9522	0.2	0.2	0.2	26.4	26.4	26.4
51	2	23	-1.7459	2.0235	0.2	0.2	0.2	25.9	25.9	25.9
52	2	24	-1.7871	2.0947	0.2	0.2	0.2	25.3	25.3	25.3
53	2	25	-1.8282	2.1660	0.2	0.2	0.3	24.6	24.6	24.6
54	2	26	-1.8694	2.2373	0.3	0.3	0.3	23.7	23.7	23.7
55	2	27	-1.9105	2.3086	0.3	0.3	0.4	22.6	22.6	22.6

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-65)	South Flow A2 Special Use Area Procedures (TA-65)	South Flow A3 Wide Bodies (TA-65)	North Flow Conditions (2018) No Project (TA-65)	North Flow A2 Special Use Area Procedures (TA-65)	North Flow A3 Wide Bodies (TA-65)
56	2	28	-1.9517	2.3798	0.3	0.3	0.4	21.8	21.8	21.8
57	3	1	-0.7694	0.4966	55.6	57.4	55.6	75.8	75.8	75.8
58	3	2	-0.8105	0.5679	48.5	58.1	48.7	76.2	76.2	76.2
59	3	3	-0.8517	0.6391	40.7	54.0	41.0	76.5	76.5	76.5
60	3	4	-0.8928	0.7104	36.0	46.9	36.5	76.0	76.0	76.0
61	3	5	-0.9340	0.7817	29.3	37.6	29.9	73.7	73.7	73.7
62	3	6	-0.9751	0.8530	21.1	26.9	21.7	67.2	67.2	67.2
63	3	7	-1.0163	0.9242	11.7	14.7	12.2	59.5	59.5	59.5
64	3	8	-1.0574	0.9955	8.5	10.9	9.0	57.7	57.7	57.7
65	3	9	-1.0986	1.0668	7.6	9.5	8.1	57.1	57.1	57.1
66	3	10	-1.1397	1.1381	7.1	8.4	7.5	56.0	56.0	56.0
67	3	11	-1.1809	1.2093	6.8	7.6	7.1	54.7	54.7	54.7
68	3	12	-1.2220	1.2806	2.6	3.1	2.8	49.2	49.3	49.3
69	3	13	-1.2632	1.3519	0.5	0.8	0.7	46.0	46.0	46.0
70	3	14	-1.3043	1.4232	0.5	0.6	0.7	44.9	44.9	44.9
71	3	15	-1.3455	1.4944	0.5	0.6	0.7	43.9	43.9	43.9
72	3	16	-1.3866	1.5657	0.6	0.6	0.7	42.8	42.8	42.8
73	3	17	-1.4278	1.6370	0.6	0.6	0.7	41.6	41.6	41.6
74	3	18	-1.4689	1.7083	0.6	0.6	0.8	39.8	39.9	39.9
75	3	19	-1.5101	1.7795	0.7	0.7	0.8	37.8	37.8	37.8
76	3	20	-1.5512	1.8508	0.7	0.7	0.8	36.4	36.4	36.4
77	3	21	-1.5924	1.9221	0.7	0.7	0.9	35.4	35.4	35.4
78	3	22	-1.6335	1.9934	0.7	0.7	0.9	34.5	34.5	34.5
79	3	23	-1.6747	2.0646	0.7	0.7	0.9	33.5	33.6	33.6
80	3	24	-1.7158	2.1359	0.8	0.8	1.0	32.7	32.7	32.7
81	3	25	-1.7570	2.2072	0.8	0.8	1.0	31.6	31.6	31.6
82	3	26	-1.7981	2.2784	0.8	0.8	1.0	30.3	30.3	30.3
83	3	27	-1.8393	2.3497	0.9	0.9	1.1	29.0	29.0	29.0
84	3	28	-1.8804	2.4210	0.9	0.9	1.2	28.0	28.0	28.0
85	4	1	-0.6981	0.5377	87.8	93.1	88.0	100.1	100.1	100.1
86	4	2	-0.7392	0.6090	76.5	91.9	76.8	99.9	99.9	99.9
87	4	3	-0.7804	0.6803	57.5	85.6	58.1	98.3	98.3	98.3
88	4	4	-0.8215	0.7516	41.6	73.1	42.5	97.7	97.7	97.7
89	4	5	-0.8627	0.8228	32.3	52.2	33.4	94.0	94.1	94.1
90	4	6	-0.9038	0.8941	25.7	35.6	26.6	91.1	91.1	91.1
91	4	7	-0.9450	0.9654	15.7	21.2	16.5	82.0	82.1	82.1
92	4	8	-0.9861	1.0367	8.6	11.5	9.3	74.0	74.0	74.0
93	4	9	-1.0273	1.1079	8.2	9.7	8.8	72.6	72.6	72.6
94	4	10	-1.0684	1.1792	8.1	8.8	8.6	70.5	70.5	70.5
95	4	11	-1.1096	1.2505	8.1	8.5	8.6	67.7	67.7	67.7
96	4	12	-1.1507	1.3218	6.0	6.4	6.6	63.3	63.4	63.4
97	4	13	-1.1919	1.3930	2.1	2.3	2.7	57.2	57.2	57.2
98	4	14	-1.2330	1.4643	2.1	2.2	2.8	55.1	55.1	55.1
99	4	15	-1.2742	1.5356	2.2	2.3	2.8	53.5	53.5	53.5
100	4	16	-1.3153	1.6069	3.1	3.1	4.0	52.0	52.0	52.0
101	4	17	-1.3565	1.6781	3.8	3.8	5.0	50.5	50.5	50.5
102	4	18	-1.3976	1.7494	4.4	4.4	5.7	49.4	49.4	49.4
103	4	19	-1.4388	1.8207	4.8	4.8	6.2	47.1	47.2	47.2
104	4	20	-1.4799	1.8920	5.2	5.2	6.8	45.2	45.2	45.2
105	4	21	-1.5211	1.9632	5.6	5.6	7.2	43.6	43.6	43.6
106	4	22	-1.5622	2.0345	5.9	5.9	7.6	42.2	42.3	42.3
107	4	23	-1.6034	2.1058	6.1	6.1	8.0	40.9	40.9	40.9
108	4	24	-1.6445	2.1770	6.4	6.4	8.3	39.6	39.6	39.6
109	4	25	-1.6857	2.2483	6.5	6.5	8.5	38.3	38.3	38.3
110	4	26	-1.7268	2.3196	6.8	6.8	8.9	37.0	37.1	37.1

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-65)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-65)	South Flow Conditions (2018) A3 Wide Bodies (TA-65)	North Flow Conditions (2018) No Project (TA-65)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-65)	North Flow Conditions (2018) A3 Wide Bodies (TA-65)
111	4	27	-1.7680	2.3909	7.1	7.1	9.2	35.5	35.6	35.6
112	4	28	-1.8091	2.4621	7.3	7.3	9.5	34.5	34.5	34.5
113	5	1	-0.6268	0.5789	141.4	153.5	142.7	140.2	140.2	140.2
114	5	2	-0.6680	0.6502	114.2	146.4	116.0	138.5	138.5	138.5
115	5	3	-0.7091	0.7214	82.3	133.5	84.8	134.6	134.6	134.6
116	5	4	-0.7503	0.7927	53.6	108.4	56.7	130.9	130.9	130.9
117	5	5	-0.7914	0.8640	39.4	76.4	42.6	125.3	125.3	125.3
118	5	6	-0.8326	0.9353	31.9	49.0	35.1	118.9	118.9	118.9
119	5	7	-0.8737	1.0065	23.3	28.5	26.2	106.2	106.2	106.2
120	5	8	-0.9149	1.0778	15.4	16.6	18.1	89.8	89.9	89.9
121	5	9	-0.9560	1.1491	15.9	16.6	18.8	86.9	87.0	87.0
122	5	10	-0.9972	1.2204	16.4	16.8	19.4	83.4	83.5	83.5
123	5	11	-1.0383	1.2916	16.7	17.0	19.9	80.5	80.5	80.5
124	5	12	-1.0795	1.3629	15.0	15.2	18.3	75.5	75.5	75.5
125	5	13	-1.1206	1.4342	11.3	11.5	14.7	68.4	68.4	68.4
126	5	14	-1.1618	1.5055	11.6	11.7	15.2	66.2	66.2	66.2
127	5	15	-1.2029	1.5767	11.9	12.0	15.6	64.1	64.1	64.1
128	5	16	-1.2441	1.6480	12.2	12.2	15.9	61.8	61.8	61.8
129	5	17	-1.2852	1.7193	12.5	12.5	16.3	59.7	59.7	59.7
130	5	18	-1.3264	1.7906	12.8	12.8	16.7	57.5	57.5	57.5
131	5	19	-1.3675	1.8618	13.1	13.1	17.2	55.7	55.7	55.7
132	5	20	-1.4087	1.9331	13.4	13.4	17.6	54.1	54.2	54.2
133	5	21	-1.4498	2.0044	13.7	13.7	17.9	52.7	52.7	52.7
134	5	22	-1.4910	2.0757	13.9	13.9	18.2	51.3	51.3	51.3
135	5	23	-1.5321	2.1469	14.2	14.2	18.5	49.4	49.5	49.5
136	5	24	-1.5733	2.2182	14.4	14.4	18.9	47.6	47.6	47.6
137	5	25	-1.6144	2.2895	14.7	14.7	19.2	46.1	46.1	46.1
138	5	26	-1.6556	2.3607	14.8	14.8	19.3	44.6	44.6	44.6
139	5	27	-1.6967	2.4320	15.0	15.0	19.6	42.9	42.9	42.9
140	5	28	-1.7379	2.5033	15.2	15.2	19.9	41.6	41.6	41.6
141	6	1	-0.5555	0.6200	220.6	245.3	225.7	169.0	169.0	169.0
142	6	2	-0.5967	0.6913	149.3	230.0	155.3	165.7	165.7	165.7
143	6	3	-0.6378	0.7626	87.3	199.2	94.5	160.1	160.1	160.1
144	6	4	-0.6790	0.8339	51.5	132.9	59.2	156.2	156.3	156.3
145	6	5	-0.7201	0.9051	46.0	80.6	53.4	151.6	151.6	151.6
146	6	6	-0.7613	0.9764	43.7	48.8	50.4	140.8	140.8	140.8
147	6	7	-0.8024	1.0477	36.0	37.2	42.8	126.1	126.1	126.1
148	6	8	-0.8436	1.1190	30.1	30.6	37.6	110.9	110.9	110.9
149	6	9	-0.8847	1.1902	31.1	31.4	39.1	98.2	98.2	98.2
150	6	10	-0.9259	1.2615	32.0	32.2	40.3	93.5	93.5	93.5
151	6	11	-0.9670	1.3328	32.7	32.9	41.3	89.0	89.0	89.0
152	6	12	-1.0082	1.4041	31.4	31.6	40.3	83.8	83.8	83.8
153	6	13	-1.0493	1.4753	28.0	28.1	37.1	76.0	76.0	76.0
154	6	14	-1.0905	1.5466	28.5	28.6	37.9	73.1	73.1	73.1
155	6	15	-1.1316	1.6179	29.1	29.1	38.6	70.3	70.3	70.3
156	6	16	-1.1728	1.6892	29.6	29.6	39.3	67.7	67.7	67.7
157	6	17	-1.2139	1.7604	30.1	30.1	40.0	65.4	65.4	65.4
158	6	18	-1.2551	1.8317	30.7	30.7	40.7	62.9	62.9	62.9
159	6	19	-1.2962	1.9030	31.2	31.2	41.4	61.1	61.1	61.1
160	6	20	-1.3374	1.9743	31.0	31.0	41.1	59.5	59.5	59.5
161	6	21	-1.3785	2.0455	30.6	30.6	40.6	57.9	57.9	57.9
162	6	22	-1.4197	2.1168	30.3	30.3	40.2	56.3	56.3	56.3
163	6	23	-1.4608	2.1881	30.2	30.2	40.1	54.2	54.2	54.2
164	6	24	-1.5020	2.2593	30.1	30.1	39.9	52.3	52.3	52.3
165	6	25	-1.5431	2.3306	29.8	29.8	39.5	50.6	50.6	50.6

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-65)	South Flow A2 Special Use Area Procedures (TA-65)	South Flow A3 Wide Bodies (TA-65)	North Flow Conditions (2018) No Project (TA-65)	North Flow A2 Special Use Area Procedures (TA-65)	North Flow A3 Wide Bodies (TA-65)
166	6	26	-1.5843	2.4019	29.4	29.4	38.9	49.2	49.2	49.2
167	6	27	-1.6254	2.4732	28.6	28.6	37.9	47.6	47.6	47.6
168	6	28	-1.6666	2.5444	27.8	27.8	36.8	46.4	46.4	46.4
169	7	1	-0.4843	0.6612	251.0	367.5	266.6	197.1	197.1	197.1
170	7	2	-0.5254	0.7325	94.4	325.4	112.0	191.4	191.4	191.4
171	7	3	-0.5666	0.8037	76.3	212.8	95.0	185.0	185.0	185.0
172	7	4	-0.6077	0.8750	74.3	87.3	90.7	180.7	180.7	180.7
173	7	5	-0.6489	0.9463	73.6	76.6	90.1	174.0	174.0	174.0
174	7	6	-0.6900	1.0176	72.4	73.3	89.1	160.5	160.5	160.5
175	7	7	-0.7312	1.0888	63.3	63.6	80.4	140.6	140.6	140.6
176	7	8	-0.7723	1.1601	58.0	58.2	75.4	128.0	128.0	128.0
177	7	9	-0.8135	1.2314	58.4	58.5	76.0	119.2	119.2	119.2
178	7	10	-0.8546	1.3027	58.8	58.9	76.5	105.1	105.2	105.2
179	7	11	-0.8958	1.3739	59.1	59.3	77.0	98.1	98.1	98.1
180	7	12	-0.9369	1.4452	57.4	57.6	75.4	89.7	89.7	89.7
181	7	13	-0.9781	1.5165	53.7	53.9	71.8	81.6	81.6	81.6
182	7	14	-1.0192	1.5878	54.0	54.1	72.3	78.3	78.3	78.3
183	7	15	-1.0604	1.6590	53.7	53.8	71.9	75.7	75.7	75.7
184	7	16	-1.1015	1.7303	53.4	53.5	71.4	72.9	72.9	72.9
185	7	17	-1.1427	1.8016	53.2	53.2	71.1	70.2	70.2	70.2
186	7	18	-1.1838	1.8729	52.9	52.9	70.7	67.5	67.5	67.5
187	7	19	-1.2250	1.9441	52.4	52.4	70.1	65.0	65.0	65.0
188	7	20	-1.2661	2.0154	52.1	52.1	69.6	62.6	62.7	62.7
189	7	21	-1.3073	2.0867	51.5	51.5	68.8	60.2	60.2	60.2
190	7	22	-1.3484	2.1580	50.8	50.8	67.9	58.0	58.0	58.0
191	7	23	-1.3896	2.2292	50.3	50.3	67.1	56.2	56.2	56.2
192	7	24	-1.4307	2.3005	49.7	49.7	66.4	54.1	54.1	54.1
193	7	25	-1.4719	2.3718	49.0	49.0	65.4	52.5	52.5	52.5
194	7	26	-1.5130	2.4430	48.2	48.2	64.3	51.0	51.0	51.0
195	7	27	-1.5542	2.5143	47.2	47.2	63.1	49.4	49.4	49.4
196	7	28	-1.5953	2.5856	46.3	46.3	61.8	48.0	48.0	48.0
197	8	1	-0.4130	0.7023	86.0	296.8	105.4	203.5	203.5	203.5
198	8	2	-0.4541	0.7736	85.6	240.3	106.6	198.3	198.3	198.3
199	8	3	-0.4953	0.8449	85.8	91.1	106.0	194.5	194.5	194.5
200	8	4	-0.5364	0.9162	84.8	88.0	105.0	192.4	192.4	192.4
201	8	5	-0.5776	0.9874	82.7	84.2	102.4	184.6	184.6	184.6
202	8	6	-0.6187	1.0587	77.0	77.6	96.9	166.1	166.1	166.1
203	8	7	-0.6599	1.1300	65.4	65.6	85.4	146.4	146.4	146.4
204	8	8	-0.7010	1.2013	65.8	66.0	86.0	140.3	140.3	140.3
205	8	9	-0.7422	1.2725	66.0	66.1	86.3	130.9	130.9	130.9
206	8	10	-0.7833	1.3438	66.0	66.1	86.4	119.3	119.3	119.3
207	8	11	-0.8245	1.4151	65.5	65.6	85.8	104.8	104.8	104.8
208	8	12	-0.8656	1.4864	63.7	63.9	84.1	92.7	92.7	92.7
209	8	13	-0.9068	1.5576	59.7	59.8	80.0	82.3	82.3	82.3
210	8	14	-0.9479	1.6289	59.4	59.6	79.7	79.1	79.1	79.1
211	8	15	-0.9891	1.7002	59.1	59.2	79.3	76.5	76.5	76.5
212	8	16	-1.0302	1.7715	58.7	58.8	78.7	73.7	73.7	73.7
213	8	17	-1.0714	1.8427	58.2	58.3	78.0	70.9	70.9	70.9
214	8	18	-1.1125	1.9140	57.5	57.5	77.0	68.0	68.0	68.0
215	8	19	-1.1537	1.9853	57.3	57.3	76.6	65.5	65.5	65.5
216	8	20	-1.1948	2.0566	57.2	57.2	76.5	63.0	63.0	63.0
217	8	21	-1.2360	2.1278	56.9	56.9	76.1	60.6	60.6	60.6
218	8	22	-1.2771	2.1991	56.4	56.4	75.5	58.7	58.7	58.7
219	8	23	-1.3183	2.2704	56.1	56.1	75.1	56.1	56.1	56.1
220	8	24	-1.3594	2.3416	55.8	55.8	74.6	53.1	53.1	53.1

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-65)	South Flow A2 Special Use Area Procedures (TA-65)	South Flow A3 Wide Bodies (TA-65)	North Flow Conditions (2018) No Project (TA-65)	North Flow A2 Special Use Area Procedures (TA-65)	North Flow A3 Wide Bodies (TA-65)
221	8	25	-1.4006	2.4129	55.4	55.4	74.0	51.5	51.5	51.5
222	8	26	-1.4417	2.4842	54.9	54.9	73.4	50.0	50.0	50.0
223	8	27	-1.4829	2.5555	54.3	54.3	72.5	48.2	48.2	48.2
224	8	28	-1.5240	2.6267	53.7	53.7	71.8	46.7	46.7	46.7
225	9	1	-0.3417	0.7435	268.5	354.8	287.7	201.6	201.6	201.6
226	9	2	-0.3829	0.8148	128.2	326.0	148.3	199.8	199.8	199.8
227	9	3	-0.4240	0.8860	87.1	238.0	108.9	198.8	198.8	198.8
228	9	4	-0.4652	0.9573	83.0	108.0	102.7	197.1	197.1	197.1
229	9	5	-0.5063	1.0286	80.4	84.6	99.8	186.5	186.5	186.5
230	9	6	-0.5475	1.0999	74.8	76.1	94.5	168.9	168.9	168.9
231	9	7	-0.5886	1.1711	64.0	64.4	83.3	155.2	155.2	155.2
232	9	8	-0.6298	1.2424	64.3	64.5	83.8	148.8	148.8	148.8
233	9	9	-0.6709	1.3137	65.1	65.2	84.9	136.8	136.8	136.8
234	9	10	-0.7121	1.3850	65.2	65.4	85.0	124.2	124.2	124.2
235	9	11	-0.7532	1.4562	64.9	65.1	84.7	111.4	111.4	111.4
236	9	12	-0.7944	1.5275	58.6	58.8	78.3	87.8	87.8	87.8
237	9	13	-0.8355	1.5988	58.2	58.4	77.7	81.0	81.0	81.0
238	9	14	-0.8767	1.6701	57.6	57.7	77.0	76.6	76.6	76.6
239	9	15	-0.9178	1.7413	56.8	56.9	75.9	74.0	74.0	74.0
240	9	16	-0.9590	1.8126	56.7	56.7	75.7	71.5	71.5	71.5
241	9	17	-1.0001	1.8839	56.6	56.6	75.6	68.8	68.8	68.8
242	9	18	-1.0413	1.9552	56.5	56.5	75.4	66.0	66.0	66.0
243	9	19	-1.0824	2.0264	56.3	56.3	75.1	63.1	63.1	63.1
244	9	20	-1.1236	2.0977	56.1	56.1	74.8	60.4	60.4	60.4
245	9	21	-1.1647	2.1690	55.7	55.7	74.3	58.1	58.1	58.1
246	9	22	-1.2059	2.2403	55.2	55.2	73.7	56.0	56.0	56.0
247	9	23	-1.2470	2.3115	54.9	54.9	73.2	53.5	53.5	53.5
248	9	24	-1.2882	2.3828	54.6	54.6	72.7	50.8	50.8	50.8
249	9	25	-1.3293	2.4541	54.1	54.1	72.1	48.7	48.7	48.7
250	9	26	-1.3705	2.5253	53.6	53.6	71.4	47.0	47.0	47.0
251	9	27	-1.4116	2.5966	52.9	52.9	70.5	45.4	45.4	45.4
252	9	28	-1.4528	2.6679	52.3	52.4	69.7	43.8	43.8	43.8
253	10	1	-0.2704	0.7846	207.1	227.3	215.2	196.9	196.9	196.9
254	10	2	-0.3116	0.8559	155.1	222.1	163.6	197.9	197.9	197.9
255	10	3	-0.3527	0.9272	100.0	199.5	110.1	199.6	199.6	199.6
256	10	4	-0.3939	0.9985	62.6	142.5	73.6	196.6	196.6	196.6
257	10	5	-0.4350	1.0697	50.0	88.0	61.3	184.9	184.9	184.9
258	10	6	-0.4762	1.1410	41.8	48.7	53.1	165.4	165.4	165.4
259	10	7	-0.5173	1.2123	42.8	44.3	54.4	158.4	158.4	158.4
260	10	8	-0.5585	1.2836	41.6	42.2	52.9	148.9	148.9	148.9
261	10	9	-0.5996	1.3548	42.6	42.9	54.2	135.7	135.7	135.7
262	10	10	-0.6408	1.4261	43.6	43.9	55.6	121.8	121.8	121.8
263	10	11	-0.6819	1.4974	43.9	44.1	56.1	110.0	110.0	110.0
264	10	12	-0.7231	1.5687	38.2	38.4	50.5	90.8	90.8	90.8
265	10	13	-0.7642	1.6399	38.4	38.6	50.8	76.3	76.3	76.3
266	10	14	-0.8054	1.7112	39.7	39.8	52.6	70.5	70.5	70.5
267	10	15	-0.8465	1.7825	40.7	40.8	54.0	67.8	67.8	67.8
268	10	16	-0.8877	1.8538	41.5	41.5	54.9	65.5	65.5	65.5
269	10	17	-0.9288	1.9250	42.1	42.1	55.7	63.0	63.0	63.0
270	10	18	-0.9700	1.9963	42.7	42.7	56.6	60.4	60.4	60.4
271	10	19	-1.0111	2.0676	43.2	43.2	57.2	57.6	57.6	57.6
272	10	20	-1.0523	2.1389	43.9	43.6	58.2	54.8	54.8	54.8
273	10	21	-1.0934	2.2101	43.3	43.3	57.4	52.6	52.6	52.6
274	10	22	-1.1346	2.2814	42.8	42.8	56.7	50.2	50.2	50.2
275	10	23	-1.1757	2.3527	42.2	42.2	55.9	47.3	47.3	47.3

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*
276	10	24	-1.2169	2.4239	41.6	41.6	55.1	45.5	45.5	45.5
277	10	25	-1.2580	2.4952	40.9	40.9	54.1	43.8	43.8	43.8
278	10	26	-1.2992	2.5665	40.0	40.0	52.9	42.1	42.1	42.1
279	10	27	-1.3403	2.6378	39.0	39.0	51.5	40.2	40.2	40.2
280	10	28	-1.3815	2.7090	37.8	37.8	50.0	38.8	38.8	38.8
281	11	1	-0.1992	0.8258	137.0	147.6	138.1	161.3	161.3	161.3
282	11	2	-0.2403	0.8971	108.2	135.4	109.4	167.4	167.4	167.4
283	11	3	-0.2815	0.9683	76.1	121.2	78.1	175.7	175.7	175.7
284	11	4	-0.3226	1.0396	42.3	91.7	45.1	176.6	176.6	176.6
285	11	5	-0.3638	1.1109	23.9	57.0	27.0	168.6	168.5	168.5
286	11	6	-0.4049	1.1822	17.9	34.3	21.0	161.1	161.1	161.1
287	11	7	-0.4461	1.2534	19.0	25.4	22.6	152.4	152.3	152.3
288	11	8	-0.4872	1.3247	19.4	20.8	22.9	140.3	140.3	140.3
289	11	9	-0.5284	1.3960	17.9	18.6	20.9	127.8	127.8	127.8
290	11	10	-0.5695	1.4673	18.4	18.9	21.7	114.9	114.9	114.9
291	11	11	-0.6107	1.5385	12.9	13.2	16.3	98.7	98.7	98.7
292	11	12	-0.6518	1.6098	13.3	13.6	16.9	85.2	85.2	85.2
293	11	13	-0.6930	1.6811	13.9	14.1	17.7	68.2	68.2	68.2
294	11	14	-0.7341	1.7524	14.3	14.4	18.4	62.1	62.1	62.1
295	11	15	-0.7753	1.8236	14.8	14.9	19.0	58.6	58.6	58.6
296	11	16	-0.8164	1.8949	15.3	15.3	19.6	56.1	56.1	56.1
297	11	17	-0.8576	1.9662	15.7	15.7	20.1	54.1	54.1	54.1
298	11	18	-0.8987	2.0375	16.1	16.1	20.7	51.5	51.5	51.5
299	11	19	-0.9399	2.1087	16.5	16.5	21.3	47.9	47.9	47.9
300	11	20	-0.9810	2.1800	16.9	16.9	21.8	45.7	45.7	45.7
301	11	21	-1.0222	2.2513	17.3	17.3	22.3	44.1	44.1	44.1
302	11	22	-1.0633	2.3225	17.4	17.4	22.5	42.5	42.5	42.5
303	11	23	-1.1045	2.3938	17.5	17.5	22.7	40.6	40.6	40.6
304	11	24	-1.1456	2.4651	17.7	17.7	22.9	38.9	38.9	38.9
305	11	25	-1.1868	2.5364	17.8	17.8	23.1	37.2	37.2	37.2
306	11	26	-1.2279	2.6076	17.8	17.8	23.1	35.6	35.6	35.6
307	11	27	-1.2691	2.6789	18.0	18.0	23.3	34.0	34.0	34.0
308	11	28	-1.3102	2.7502	18.0	18.0	23.4	32.5	32.5	32.5
309	12	1	-0.1279	0.8669	82.5	86.4	81.5	118.9	118.9	118.9
310	12	2	-0.1690	0.9382	63.9	77.4	63.0	128.9	128.9	128.9
311	12	3	-0.2102	1.0095	46.7	71.1	46.0	143.1	143.1	143.1
312	12	4	-0.2513	1.0808	28.2	55.9	28.0	149.5	149.5	149.5
313	12	5	-0.2925	1.1520	20.9	38.0	20.9	154.5	154.5	154.5
314	12	6	-0.3336	1.2233	15.9	25.1	15.9	151.2	151.2	151.2
315	12	7	-0.3748	1.2946	13.5	17.8	13.5	143.0	143.0	143.0
316	12	8	-0.4159	1.3659	12.8	15.6	13.5	131.4	131.4	131.4
317	12	9	-0.4571	1.4371	11.8	13.4	12.1	121.1	121.1	121.1
318	12	10	-0.4982	1.5084	10.4	11.1	10.2	109.4	109.4	109.4
319	12	11	-0.5394	1.5797	4.3	4.8	4.1	90.8	90.8	90.8
320	12	12	-0.5805	1.6510	4.3	4.7	4.3	76.6	76.6	76.6
321	12	13	-0.6217	1.7222	4.5	4.7	4.5	58.4	58.4	58.4
322	12	14	-0.6628	1.7935	4.7	4.8	4.8	53.3	53.3	53.3
323	12	15	-0.7040	1.8648	4.9	4.9	5.1	48.8	48.8	48.8
324	12	16	-0.7451	1.9361	5.0	5.0	5.3	46.8	46.8	46.8
325	12	17	-0.7863	2.0073	5.1	5.1	5.5	44.7	44.7	44.7
326	12	18	-0.8274	2.0786	5.3	5.3	5.7	42.5	42.5	42.5
327	12	19	-0.8686	2.1499	6.0	6.0	6.7	40.3	40.3	40.3
328	12	20	-0.9097	2.2212	7.0	6.9	8.1	38.0	38.0	38.0
329	12	21	-0.9509	2.2924	7.6	7.6	9.0	36.4	36.4	36.4
330	12	22	-0.9920	2.3637	8.1	8.1	9.7	35.0	35.0	35.0

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			North Flow Conditions (2018)		
Site	I	J	X (nm)	Y (nm)	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*
331	12	23	-1.0332	2.4350	8.5	8.5	10.3	33.4	33.4	33.4
332	12	24	-1.0743	2.5062	8.8	8.8	10.8	32.0	32.0	32.0
333	12	25	-1.1155	2.5775	9.0	9.0	11.2	30.4	30.4	30.4
334	12	26	-1.1566	2.6488	9.3	9.3	11.7	28.7	28.7	28.7
335	12	27	-1.1978	2.7201	9.7	9.7	12.2	27.1	27.1	27.1
336	12	28	-1.2389	2.7913	10.0	10.0	12.6	25.7	25.7	25.7
337	13	1	-0.0566	0.9081	41.2	43.6	39.9	70.4	70.4	70.4
338	13	2	-0.0978	0.9794	34.9	44.0	33.7	84.1	84.0	84.0
339	13	3	-0.1389	1.0506	28.9	39.1	27.9	107.5	107.5	107.5
340	13	4	-0.1801	1.1219	23.9	32.2	23.0	120.8	120.8	120.8
341	13	5	-0.2212	1.1932	18.5	25.9	17.7	131.5	131.5	131.5
342	13	6	-0.2624	1.2645	16.0	20.3	15.2	135.4	135.4	135.4
343	13	7	-0.3035	1.3357	14.0	16.9	13.3	129.6	129.6	129.6
344	13	8	-0.3447	1.4070	12.0	14.4	11.2	120.2	120.2	120.2
345	13	9	-0.3858	1.4783	11.4	13.2	11.1	108.9	108.9	108.9
346	13	10	-0.4270	1.5496	2.3	3.6	1.4	90.4	90.3	90.3
347	13	11	-0.4681	1.6208	2.0	2.8	1.0	76.2	76.2	76.2
348	13	12	-0.5093	1.6921	1.7	2.3	0.7	63.8	63.8	63.8
349	13	13	-0.5504	1.7634	1.6	1.9	0.6	48.3	48.3	48.3
350	13	14	-0.5916	1.8347	1.6	1.7	0.6	41.8	41.8	41.8
351	13	15	-0.6327	1.9059	1.6	1.6	0.5	37.8	37.8	37.8
352	13	16	-0.6739	1.9772	1.6	1.6	0.6	35.9	35.9	35.9
353	13	17	-0.7150	2.0485	1.6	1.6	0.6	34.5	34.5	34.5
354	13	18	-0.7562	2.1198	1.7	1.7	0.7	32.9	32.9	32.9
355	13	19	-0.7973	2.1910	1.7	1.7	0.7	31.0	31.0	31.0
356	13	20	-0.8385	2.2623	1.7	1.7	0.8	29.5	29.5	29.5
357	13	21	-0.8796	2.3336	1.7	1.7	0.8	28.2	28.2	28.2
358	13	22	-0.9208	2.4048	1.7	1.7	0.8	27.1	27.1	27.1
359	13	23	-0.9619	2.4761	2.0	2.0	1.3	26.0	26.0	26.0
360	13	24	-1.0031	2.5474	2.3	2.3	1.7	25.0	25.0	25.0
361	13	25	-1.0442	2.6187	2.4	2.4	2.0	23.9	23.9	23.9
362	13	26	-1.0854	2.6899	2.6	2.6	2.2	22.6	22.6	22.6
363	13	27	-1.1265	2.7612	2.7	2.7	2.4	21.0	21.0	21.0
364	13	28	-1.1677	2.8325	2.8	2.8	2.6	19.3	19.3	19.3
365	14	1	0.0147	0.9492	26.5	25.8	25.2	43.2	43.1	43.1
366	14	2	-0.0265	1.0205	24.9	27.0	23.7	51.7	51.7	51.7
367	14	3	-0.0676	1.0918	22.1	25.6	21.0	69.4	69.3	69.3
368	14	4	-0.1088	1.1631	19.7	23.2	18.6	92.9	92.9	92.9
369	14	5	-0.1499	1.2343	16.8	19.6	15.9	110.4	110.4	110.4
370	14	6	-0.1911	1.3056	14.7	17.0	13.8	114.4	114.4	114.4
371	14	7	-0.2322	1.3769	13.1	15.3	12.2	110.1	110.1	110.1
372	14	8	-0.2734	1.4482	11.3	13.2	10.4	101.5	101.5	101.5
373	14	9	-0.3145	1.5194	4.5	5.8	4.1	84.1	84.1	84.1
374	14	10	-0.3557	1.5907	2.3	3.4	1.4	72.3	72.3	72.3
375	14	11	-0.3968	1.6620	1.7	2.8	0.7	59.8	59.8	59.8
376	14	12	-0.4380	1.7333	1.5	2.2	0.5	49.7	49.7	49.7
377	14	13	-0.4791	1.8045	1.4	1.6	0.4	37.7	37.7	37.7
378	14	14	-0.5203	1.8758	1.3	1.4	0.3	30.3	30.3	30.3
379	14	15	-0.5614	1.9471	1.3	1.3	0.2	26.8	26.8	26.8
380	14	16	-0.6026	2.0184	1.3	1.3	0.2	25.2	25.2	25.2
381	14	17	-0.6437	2.0896	1.2	1.2	0.2	24.0	24.0	24.0
382	14	18	-0.6849	2.1609	1.2	1.2	0.2	22.7	22.7	22.7
383	14	19	-0.7260	2.2322	1.2	1.2	0.2	21.3	21.3	21.3
384	14	20	-0.7672	2.3035	1.2	1.2	0.2	20.0	20.0	20.0
385	14	21	-0.8083	2.3747	1.1	1.1	0.2	19.1	19.1	19.1

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

					South Flow Conditions (2018)			**North Flow Conditions (2018)**		
Site	**I**	**J**	**X (nm)**	**Y (nm)**	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*	*No Project (TA-65)*	*A2 Special Use Area Procedures (TA-65)*	*A3 Wide Bodies (TA-65)*
386	14	22	-0.8495	2.4460	1.1	1.1	0.2	18.6	18.6	18.6
387	14	23	-0.8906	2.5173	1.1	1.1	0.2	18.1	18.1	18.1
388	14	24	-0.9318	2.5885	1.0	1.0	0.2	17.5	17.5	17.5
389	14	25	-0.9729	2.6598	1.0	1.0	0.2	16.8	16.8	16.8
390	14	26	-1.0141	2.7311	0.9	0.9	0.2	16.1	16.1	16.1
391	14	27	-1.0552	2.8024	0.9	0.9	0.3	15.2	15.2	15.2
392	14	28	-1.0964	2.8736	0.9	0.9	0.3	14.3	14.3	14.3
393	15	1	0.0859	0.9904	19.5	19.4	18.4	30.2	30.2	30.2
394	15	2	0.0448	1.0617	18.9	19.7	17.9	36.4	36.4	36.4
395	15	3	0.0036	1.1329	17.7	18.9	16.8	44.0	44.0	44.0
396	15	4	-0.0375	1.2042	15.6	17.1	14.8	73.4	73.4	73.4
397	15	5	-0.0787	1.2755	13.4	15.0	12.6	89.6	89.6	89.6
398	15	6	-0.1198	1.3468	10.9	12.6	10.2	95.6	95.6	95.6
399	15	7	-0.1610	1.4180	7.5	9.1	6.9	91.4	91.4	91.4
400	15	8	-0.2021	1.4893	4.8	6.1	4.2	80.5	80.5	80.5
401	15	9	-0.2433	1.5606	3.5	4.6	3.4	67.3	67.3	67.3
402	15	10	-0.2844	1.6319	1.6	2.7	1.0	56.7	56.6	56.6
403	15	11	-0.3256	1.7031	1.2	2.0	0.5	46.2	46.2	46.2
404	15	12	-0.3667	1.7744	1.0	1.3	0.4	36.8	36.8	36.8
405	15	13	-0.4079	1.8457	0.9	1.1	0.2	27.4	27.4	27.4
406	15	14	-0.4490	1.9170	0.8	0.9	0.1	20.2	20.2	20.2
407	15	15	-0.4902	1.9882	0.8	0.8	0.0	17.4	17.4	17.4
408	15	16	-0.5313	2.0595	0.7	0.7	0.0	16.1	16.1	16.1
409	15	17	-0.5725	2.1308	0.6	0.7	0.0	15.1	15.1	15.1
410	15	18	-0.6136	2.2021	0.6	0.6	0.1	14.0	14.0	14.0
411	15	19	-0.6548	2.2733	0.5	0.5	0.1	13.1	13.1	13.1
412	15	20	-0.6959	2.3446	0.5	0.5	0.1	12.7	12.6	12.6
413	15	21	-0.7371	2.4159	0.5	0.5	0.1	12.3	12.3	12.3
414	15	22	-0.7782	2.4871	0.5	0.5	0.1	11.9	11.9	11.9
415	15	23	-0.8194	2.5584	0.5	0.5	0.1	11.6	11.6	11.6
416	15	24	-0.8605	2.6297	0.5	0.5	0.1	11.2	11.2	11.2
417	15	25	-0.9017	2.7010	0.5	0.5	0.1	10.9	10.9	10.9
418	15	26	-0.9428	2.7722	0.5	0.5	0.1	10.6	10.6	10.6
419	15	27	-0.9840	2.8435	0.4	0.4	0.2	10.0	10.0	10.0
420	15	28	-1.0251	2.9148	0.4	0.4	0.2	9.5	9.5	9.5
421	16	1	0.1572	1.0315	13.1	13.1	12.9	22.7	22.7	22.7
422	16	2	0.1161	1.1028	12.0	12.6	11.9	27.5	27.5	27.5
423	16	3	0.0749	1.1741	11.2	12.0	11.1	40.9	40.9	40.9
424	16	4	0.0338	1.2454	10.1	11.2	10.0	60.3	60.3	60.3
425	16	5	-0.0074	1.3166	7.5	8.6	7.5	71.8	71.8	71.8
426	16	6	-0.0485	1.3879	4.9	6.0	4.9	75.3	75.3	75.3
427	16	7	-0.0897	1.4592	2.3	3.4	2.2	72.5	72.5	72.5
428	16	8	-0.1308	1.5305	1.7	2.7	1.7	65.3	65.3	65.3
429	16	9	-0.1720	1.6017	2.2	3.2	2.6	56.5	56.5	56.5
430	16	10	-0.2131	1.6730	0.7	1.7	0.6	46.5	46.5	46.5
431	16	11	-0.2543	1.7443	0.6	1.1	0.4	35.1	35.1	35.1
432	16	12	-0.2954	1.8156	0.4	0.7	0.3	28.2	28.2	28.2
433	16	13	-0.3366	1.8868	0.3	0.5	0.1	17.4	17.4	17.4
434	16	14	-0.3777	1.9581	0.3	0.4	0.1	12.1	12.1	12.1
435	16	15	-0.4189	2.0294	0.3	0.3	0.0	9.6	9.6	9.6
436	16	16	-0.4600	2.1007	0.3	0.3	0.0	8.9	8.9	8.9
437	16	17	-0.5012	2.1719	0.3	0.3	0.0	8.8	8.8	8.8
438	16	18	-0.5423	2.2432	0.3	0.3	0.0	8.7	8.7	8.7
439	16	19	-0.5835	2.3145	0.3	0.3	0.0	8.6	8.6	8.6
440	16	20	-0.6246	2.3858	0.3	0.3	0.0	8.5	8.5	8.5

Table C-17
King County International Airport EA
Time Above 65 dBA Grid Point Analysis (250 ft Detail)
(Minutes per Day)

Site	I	J	X (nm)	Y (nm)	South Flow Conditions (2018) No Project (TA-65)	South Flow Conditions (2018) A2 Special Use Area Procedures (TA-65)	South Flow Conditions (2018) A3 Wide Bodies (TA-65)	North Flow Conditions (2018) No Project (TA-65)	North Flow Conditions (2018) A2 Special Use Area Procedures (TA-65)	North Flow Conditions (2018) A3 Wide Bodies (TA-65)
441	16	21	-0.6658	2.4570	0.3	0.3	0.0	8.3	8.3	8.3
442	16	22	-0.7069	2.5283	0.3	0.3	0.0	8.0	8.0	8.0
443	16	23	-0.7481	2.5996	0.3	0.3	0.0	7.8	7.8	7.8
444	16	24	-0.7892	2.6708	0.2	0.2	0.0	7.7	7.7	7.7
445	16	25	-0.8304	2.7421	0.2	0.2	0.0	7.7	7.7	7.7
446	16	26	-0.8715	2.8134	0.2	0.2	0.0	7.5	7.5	7.5
447	16	27	-0.9127	2.8847	0.2	0.2	0.0	7.3	7.3	7.3
448	16	28	-0.9538	2.9559	0.2	0.2	0.0	7.0	7.0	7.0
SP	1	1	-0.5832	0.7732	74.0	254.1	88.4	178.4	178.4	178.4

Prepared December 31, 2003

PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

GENERAL CONFORMITY WORKING PAPER

PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

CLEAN AIR ACT
GENERAL CONFORMITY WORKING PAPER

Because King County is seeking approval under the National Environmental Policy Act (NEPA) and Airport Layout Plan approval for the Master Plan recommendations, this Federal approval must be preceded by a Clean Air Act general conformity evaluation. To identify potential air emissions from the Master Plan recommendations, an emissions inventory was prepared and contrasted with the de-minimis levels for a maintenance area for Ozone precursor pollutants, Carbon Monoxide, and Particulate Matter. This analysis shows that the emissions from the Master Plan recommendations are below the Clean Air Act defined de-minimis thresholds, and thus indicate that a conformity determination is not required for this project.

Table D-1
Total Project Related Impacts

Year	CO	NOx	VOC	PM10
Year 2000 (construction – rwy shift)	11	17	2	20
Year 2010 (operation)	5	1	<1	<1
Year 2018 (operation)	5	1	<1	<1
De-minimis (maintenance area)	**100**	**100**	**100**	**100**

Source: Bridgenet Consulting Services, December 2003. Sources reflect direct and indirect emissions from on and off-airport sources.

Regulatory Framework

The Clean Air Act Amendments of 1990 require Federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP). The SIP is a plan that provides for implementation, maintenance, and enforcement of the Ambient Air Quality Standards (AAQS), and includes emission limitations and control measures to attain and maintain the AAQS. Conformity is defined as demonstrating that a project conforms to the SIP's purpose of eliminating or reducing the severity and number of violations of the ambient air quality standards and achieving expeditious attainment of such standards. The Puget Sound Air Quality Maintenance Area, including King County International Airport, was re-designated from non-attainment for Carbon Monoxide (CO) and Ozone (O3) in the fall of 1996 to maintenance; thus, the maintenance plan serves as an amendment to the State Implementation Plan. The Duwamish Valley was recently re-designated as maintenance from non-attainment for particulate matter of 10 microns or smaller.

The evaluation of conformity for actions or projects at KCIA is governed by the following maintenance area principle:

- That the project will not cause or contribute to any new violations of any of the ambient air quality standards (AAQS) in the project area or the metropolitan area.

Federally funded and approved actions or projects are subject to the "General Conformity" regulations (40 CFR Part 93, Subpart B). General Conformity applies to Federal actions occurring in non-attainment and maintenance areas for any of the criteria pollutants. In accordance with the Clean Air Act amendment requirements, this conformity analysis focuses on CO, the Ozone precursors (NOx-Nitrogen Oxides, and VOCs-Volatile Organic Compounds), and Particulate Matter (PM_{10}).

A conformity determination is required for a project proposed to be located in a maintenance area/non-attainment area if the project's total direct or indirect emissions would equal or exceed the annual *de-minimis* emissions levels in 40 CFR 93.153. Because the Puget Sound Region is a maintenance area for Ozone, Carbon Monoxide (CO) and PM_{10}, the applicable *de-minimis* emission levels are 100 tons per year each for pollutant. [40 CFR 93.153(b)(2)]

Analysis Years

Conformity requires consideration of the following (49 CFR 93.183):

(1) **The year mandated by the Clean Air Act amendments for attainment by the region or the farthest year for which emissions are projected in the maintenance plan** - The analysis years of the maintenance plan are 1996 through 2010. For particulate matter, the evaluation focused on the same years. Information prepared for the NEPA/SEPA document provide data through 2018 for information purposes only.

(2) **The year in which the total direct and indirect emissions from the project are greatest** - In general, in examining emissions from on-going operations, the period in which the activity levels are the greatest typically produce the greatest emissions. Relative to this evaluation, direct emissions are those associated with on-going operation of the facility as aircraft and point source emissions. Indirect emissions are construction related. No other direct or indirect emissions are expected from the project.

(3) **Any year for which the applicable SIP specifies an emissions budget** - The maintenance plan reflects two primary surface transportation actions: continuation of the existing vehicle inspection/maintenance program and VOC maximum achievable control technologies. These actions have been reflected in the emission rates used for this analysis.

The analysis in the following sections reflects the years required by the conformity regulation. As a result, years 2000 and 2010 are evaluated for purposes of conformity. Year 2018 is presented for information purposes only.

Emissions Inventory

As described in the preceding section, the Master Plan recommendations will likely affect aircraft taxi-related emissions, as well as generate emissions during the construction period.

Therefore, to quantify the emissions associated with the Runway Safety Area (primarily due to the Runway Shift), the emissions associated with aircraft operations were quantified with the existing facilities, and then upon completion of these projects. As was noted earlier, the growth in demand for facilities at the Airport is expected to occur regardless of the implementation of the Master Plan recommendations. As a result, the recommendations will not result in additional aircraft operations. Finally, the types of construction equipment that would be used during construction were identified, and emissions were estimated.

Aircraft Operations Emissions - Table D-2 lists the emissions associated with aircraft taxi distance changes due to the shift in the runway. To compute the emissions from aircraft requires knowledge concerning the number of aircraft operations, by aircraft type, performing in each of the four operating modes. Because the Master Plan recommendations will only affect aircraft operations during the taxi/idle/delay (TID) mode, emissions during the three other modes (takeoff, approach and landing) would be the same with and without the Master Plan. Default time in mode, as defined in AP-42 was used for the Without Master Plan condition. It is anticipated that the runway shift will increase taxi distances by 880 feet, translating to about 45 seconds more taxiing per aircraft (with the project, this additional taxiing would be limited to those aircraft which would have prior permission to use the special use area). **Table D-2** summarizes aircraft emissions.

Table D-2
Tons per Year of Aircraft and GSE Emissions

	CO	NOx	VOCs	PM10
Existing	2,210	167	132	1
Future				
Without Master Plan (RSA Alternative A-5)	2,538	205	183	3
With Runway Shift (RSA Alternative A-3)	2,543	205	184	3
With Other Master Plan Recommendations	2,543	205	184	3

Source: Bridgenet Consulting Services, December 2003.

As the table above shows, the slight change in taxi distance would result in five (5) additional tons of CO, and 1 additional ton of VOC, with no change in NOx emissions.

Emissions due to GSE/APU usage would not be affected by the proposed Master Plan improvements, but are reflected in the air quality analysis discussion presented in Chapter 4 of the SEPA EIS/NEPA EA.

Construction Emissions - Construction emissions were calculated using the EPA's "Non-road Engine and Vehicle Emission Study" and estimates of the equipment that would likely be used in building the Master Plan recommendations. The analysis of construction emissions reflects construction of the projects, transportation of construction-related materials, construction employee travel, site preparation (including apron paving), and general construction support activity. As is shown below, a worst-case estimate of construction emissions are expected, which would produce 11 tons of CO, about 17 tons of NOx, about 2 tons of VOCs and 20 tons of particulate matter. These emissions consist of the following elements:

Table D-3
Tons per year of Construction Emissions

Construction Activity	CO	NOx	VOCs	PM10
Runway Shift	11	17	2	20

Source: Synergy Consultants, July 1999

The majority of emissions associated with the project would occur during construction. Therefore, it should be noted that these emissions would cease upon completion of construction.

TOTAL PROJECT EMISSIONS

Table D-4 summarizes the emissions associated with the Preferred Alternative Master Plan recommendations for each of the analysis years, reflecting the total direct and indirect emissions. To identify the air pollution effect of the project, the emissions associated with the "Without Master Plan" are subtracted from the emissions associated with the "With Master Plan".

CONFORMITY CONCLUSION

As is shown, the Master Plan recommendations at KCIA have been demonstrated by this document to conform to the Washington State Implementation Plan (SIP). As the analysis reflected in **Table D-1** shows, the project will not result in emissions that would equal or exceed the applicable de-minimis threshold rates, nor will it be considered "regionally significant" with regard to air pollution emissions. EPA's rules and guidance are clear that where the net emissions increase resulting from the project do not exceed the applicable thresholds, there are no further obligations with regard to the conformity rules. Thus, the proposed airport improvements are consistent with the SIP.

APPENDIX E

PRIOR PERMISSION REQUESTED AND SPECIAL USE AREA DOCUMENTATION

PAGE INTENTIONALLY LEFT BLANK

King County International Airport
Prior Permission Required Pavement
Policy and Procedures

I. Introduction and Purpose

The Federal Aviation Administration (FAA) and King County International Airport (KCIA) have agreed to establish limited access provisions related to the use of pavement constructed north of the Runway 13R landing threshold hereinafter to be called Prior Permission Required Pavement (PPRP). This use agreement will be administered under the informal use program, described below.

This Runway Use Program has been developed under FAA Order 8400.9, *National Safety and Operational Criteria for Runway Use Programs*, which provides safety and operational criteria for runway use programs. Under this program, prior permission is required (PPR) from KCIA for an aircraft operator to use the Prior Permission Required Pavement.

The Prior Permission Required Pavement is approximately 880 feet in length located at the northern end of Runway 13R/31L. It will be used only for aircraft operations requiring an Accelerate-Stop Distance Available (ASDA) length exceeding 9,121 feet. Additionally, Taxiway Zulu ("Z") will provide access to the Prior Permission Required Pavement and is limited to such function. The additional 880 feet of pavement and Taxiway Z will be collectively referred to as Prior Permission Required Pavement.

II. Definitions

Airport Director: The Airport Director of KCIA or designated representative.

Air Traffic Control Tower (ATCT): The KCIA/Boeing Field (BFI) Air Traffic Control Tower operated by the FAA.

Prior Permission Required Pavement (PPRP): Approximately 880 feet of pavement located at the north end of the main runway (13R/31L) to be used by aircraft requiring an Accelerate Stop Distance Available (ASDA) exceeding 9,121 feet. Taxiway Zulu, which provides access to the additional 880 feet of pavement, will be included as part of the Prior Permission Required Pavement.

Taxiway Zulu: Provides access to the Prior Permission Required Pavement. For the purpose of this document, Taxiway Z is included as a part of the Prior Permission Required Pavement and requires prior permission for use.

Prior Permission Request (PPR): Aircraft operators must request permission to use the Prior Permission Required Pavement. This consists of the aircraft operator submitting an official KCIA Prior Permission Required Pavement Application to the Airport Director or designated representative documenting operational need of the Prior Permission Required Pavement. Upon approval or denial, the aircraft operator will be contacted by KCIA.

III. Prior Permission Required Pavement Criteria

Aircraft operators seeking use of the Prior Permission Required Pavement must meet the following criteria to obtain authorization from KCIA:

1. Be a party to a Memorandum of Agreement (MOA) with KCIA documenting need to use the Prior Permission Required Pavement; or,

2. Show an operational need and submit the KCIA Prior Permission Required Pavement Application for approval.

IV. Application and Approval Process

1. Aircraft operators requesting to use the Prior Permission Required Pavement must submit a completed KCIA Prior Permission Required Pavement Application to the Airport Director or designated representative for prior approval, 72 hours in advance of the proposed operation.

2. Upon receipt of a KCIA Prior Permission Required Pavement Application, it will be reviewed to verify the aircraft operation does meet the usage criteria for the Prior Permission Required Pavement. Criteria for usage is based upon the accelerated stop distance available (ASDA) of the aircraft.

3. If the application is not approved, KCIA shall provide rationale as to the denial. If approved, KCIA shall issue an authorization number to the application for internal tracking purposes. If the aircraft operator fails to receive from KCIA an approved or rejected application within 24 hours of the proposed operations, the aircraft operator should contact KCIA Airport Operations directly.

4. The KCIA Prior Permission Required Pavement Application can be distributed to requesting aircraft operators via fax, email, or postal mail. It can also be downloaded off the Internet from the KCIA website or picked up in person. The KCIA Prior Permission Required Pavement Application can be returned to KCIA for approval in any of the previously mentioned methods.

5. Applications will be approved or declined within 24 hours of receipt; however, it is required that the aircraft operator submit the completed application, at minimum, 72 hours in advance of the requested date and time of the operation.

6. If the KCIA Prior Permission Required Pavement Application is approved, the assigned authorization number applies only to the circumstances and date(s) described in the application. All other use of the Prior Permission Required Pavement will require an additional application.

7. If an application is approved, KCIA will forward the approved application to the ATCT after the aircraft operator has been notified of the approval.

8. KCIA will provide ATCT with a listing of personnel authorized to approve use of PPRP. Personnel list will be reviewed and updated as required.

V. Operational Procedures

1. The Prior Permission Required Pavement will be closed to all operations during normal operating periods. Normal aircraft operations will use Taxiway B1 for departures and arrivals.

2. When ATCT clears an aircraft to use the Prior Permission Required Pavement, ATCT shall in effect open Taxiway Z and Prior Permission Required Pavement by engaging an electrical switch. The switch will, in turn, "activate" the Prior Permission Required Pavement by turning on the appropriate lighting and signage.

3. ATCT has discretion to hold aircraft requesting to use the Prior Permission Required Pavement as need on Taxiway Bravo to avoid penetrating the ILS critical area during inclement weather.

4. Taxiway Z will have standard taxiway marking and lighting when activated.

5. The Prior Permission Required Pavement will have red runway lights when activated.

6. The "distance to go" signs for Runway 13R will apply only too normal aircraft operations on Runway 13R.

7. There will be one (1) informational sign installed at the entrance of Taxiway Z reading "Prior Permission Required for Use."

8. The Prior Permission Required Pavement will be marked with yellow chevrons depicting the pavement as unusable for landing, takeoff, and taxiing for normal aircraft operations.

9. After the aircraft has departed the runway, ATCT will in effect close Taxiway Zulu and Prior Permission Required Pavement by disengaging the electrical switch and returning all lighting to its normal operating configuration.

10. KCIA Airport Operations will maintain the Prior Permission Required Pavement authorization number log and monitor the usage of the pavement.

11. The Prior Permission Required Pavement will be included in the Part 139 daily self-inspection.

12. When the Prior Permission Required Pavement has been used, an additional runway inspection will be required.

13. The Prior Permission Required Pavement strength will not be included in Runway 13R/31L published strengths for single, dual and dual-tandem aircraft.

VI. 13R/31L Runway Length Dimensions for Normal Operations

Landing 13R	9,121 feet
Departing 13R	9,121 feet
Landing 31L	9,121 feet
Departing 31L	10,001 feet

VII. 13R/31L Runway Length Dimensions with the Prior Permission Required Pavement

Landing 13R	9,121 feet
Departing 13R	**10,001 feet**
Landing 31L	9,121 feet
Departing 31L	10,001 feet

VIII. Public Notice

Public notice and publication of the Prior Permission Required Pavement will be made via insertion in the FAA Airport/Facility Directory for the Northwest Region.
Aircraft operators may request the KCIA Prior Permission Required Pavement Application from:

King County International Airport
7277 Perimeter Road South
PO Box 80245
Seattle, Washington 98108-0245

Telephone: (206) 296-7380
Fax: (206) 296-0190
Email: PPRApplication@metrokc.gov
Website: www.metrokc.gov/airport

LETTER OF AGREEMENT

between
King County International Airport/Boeing Field
and
The Federal Aviation Administration Air Traffic Control Tower (BFI)

Subject: Prior Permission Required Pavement

Effective Date: TBD

---

1) **Purpose**

This Letter of Agreement (LOA) establishes responsibilities and procedures for using the Prior Permission Required Pavement (PPRP).

2) **Definitions**

Airport Director: The Airport Director of KCIA or designated representative.

Air Traffic Control Tower (ATCT): The KCIA/Boeing Field Air Traffic Control Tower operated by the FAA.

Prior Permission Required Pavement: Approximately 880 feet of pavement at the north end of the main runway (13R/31L) to be used by aircraft requiring an Accelerate Stop Distance Available (ASDA) greater than 9,121 feet. Taxiway Zulu, which provides access to the additional 880 feet of pavement, will be included as part of the PPRP definition.

Taxiway Zulu: Provides access to the PPRP. For the purpose of this LOA, Taxiway Zulu is included as a part of the PPRP and requires prior permission for use.

Prior Permission Required (PPR): Aircraft operators must request permission to use the PPRP. This consists of the aircraft operator submitting an official KCIA PPRP Application to the Airport Director or designated representative documenting operational need.

3) **Scope**

The responsibilities and procedures outlined herein are applicable only to the PPRP. The PPRP is 880 feet of additional pavement located at the north end of the main runway (13R/31L). It will only be used for aircraft operations requiring an Accelerate-Stop Distance Available (ASDA) length exceeding 9,121 feet. Additionally, Taxiway Zulu will provide access to the PPRP and is limited to such function. The additional 880 feet of pavement and Taxiway Zulu will be collectively referred to as the Prior Permission Required Pavement (PPRP).

4) **Distribution**

King County International Airport (KCIA)/Boeing Field Airport Director and Federal Aviation Administration (FAA) Air Traffic Control Tower (BFI).

5) Responsibilities

The Airport Director shall:

- Establish Prior Permission Required Pavement (PPRP) Policy and Procedures addressing the receipt, review and approval of the PPRP Application.
- Provide ATCT with a listing of personnel authorized to approve use of PPRP. Personnel list will be reviewed and updated as required.
- Maintain PPRP lighting and associated systems and controls consistent with its existing standards.

The KCIA/Boeing Field ATCT shall:

- Use Taxiway B-1 for departures and arrivals for normal aircraft operations.
- If an emergency situation occurs and prior permission is not possible, ATCT can use their discretion in using the PPRP. KCIA requests to be notified of such of an occurrence as soon as practical.
- Activate/deactivate PPRP as requested by the aircraft operator.
- Operate PPRP lighting in accordance with the Letter of Agreement with KCIA regarding airfield lighting dated 01/06/2004.

6) Attachments

- *KCIA Prior Permission Required Pavement Policy and Procedures*
- *KCIA Prior Permission Required Pavement Application*

The undersigned agree to hold this Letter of Agreement between King County International Airport/Boeing Field and the FAA Air Traffic Control Tower (BFI).

Ricard S. Wunn
Air Traffic Control Manager
FAA Air Traffic Control Tower (BFI)

Robert I. Burke, AAE
Airport Director
King County International Airport

King County International Airport
Prior Permission Required Pavement Application

Fax Completed Application to (206) 296-0190

Access to the Special Use Area is only allowed if the Airport Director or designated representative approves this request.

The additional 880 feet pavement to the north of the 13R landing threshold has been designated by the FAA and KCIA to be Prior Permission Required Pavement (PPRP); thus, requiring permission by KCIA to use this area. Access to the PPRP is granted on a case by case basis to aircraft operators demonstrating a need for an Accelerate-Stop Distance Available (ASDA) greater than 9,121 feet. The PPRP is marked with yellow chevrons indicating its restricted use and is not lighted as conventional runway or taxiway except when activated for use. Aircraft operators requesting the PPRP must submit this completed application to the Airport Director for prior approval. **Access to the Special Use Area is only allowed if the Airport Director or designated representative approves this request.** If application is approved by KCIA, upon initial call up to ATCT via ground frequency report intentions of use.

Contact Information					
Date of Application		**Date of Proposed Use**		**Time of Departure**	
Company Name					
Mailing Address					
Applicant Name		**Contact Number**			
Applicant Email		**Fax Number**			
Pilot Name		**Contact Number**			

Aircraft Information					
Aircraft Type		**Aircraft N-Number**			
Aircraft Empty Weight		**Aircraft Proposed Takeoff Weight**		A S D A	

Description of Operation

Applicant Certification:

The undersigned applicant request use of the Prior Permission Required Pavement (PPRP) based on the operational need stated above on this application. The applicant acknowledges it may use the PPRP only if the Airport Manager approves this request. The applicant further acknowledges this authorization applies only to the date described above and any other use of the PPRP requires an additional application. The applicant agrees to conduct all operations in strict compliance with the KCIA PPRP Policy and Procedures, FAA rules and regulations including instructions from KCIA Air Traffic Control Tower, and all other applicable laws and regulations. The applicant understands that the PPRP is marked and lighted unconventionally to designate its restricted use. The applicant agrees to defend, indemnify, and hold King County, its officer, agents and employees harmless from and against any and all damages, actions, costs, claims, and/or judgements arising out of or relating to the applicant's use of the PPRP. The applicant hereby acknowledges and agrees to these provisions and has caused this certification to be signed by its duly authorized officer or representative as of the date set forth below.

By: ______________________________ **For:** ______________________________

(Signature) (Printed Name) (Company) (Date)

(Airport Use Only)

Received Date:				**Review Date:**			
Approved		**Denied:**		**PPRP Authorization #**			
Approval Signature							
Sent to KCIA Operations (Date/Time)						**Verified Receipt**	
Sent Copy to Applicant (Date/Time)						**Verified Receipt**	

PAGE INTENTIONALLY LEFT BLANK

APPENDIX F

DRAFT BIOLOGICAL ASSESSMENT

PAGE INTENTIONALLY LEFT BLANK

Biological Assessment of
King County International Airport (Boeing Field)
Proposed Master Plan Improvements

Seattle, Washington

Prepared for:

King County
Federal Aviation Administraiton

Prepared by:

Anchor Environmental, L.L.C.
1411 Fourth Ave., Suite 1210
Seattle, Washington 98101

July 2001

Table of Contents

List of Tables

List of Figures

Summary

This biological assessment has been prepared for proposed Master Plan improvements at the King County International Airport (KCIA). The proposed Master Plan projects have been defined at a program level for all elements of the recommendations, except a shift in the runway, which would enable the airport to meet current FAA mandated runway safety area standards. The airport is located in the Duwamish River basin, within the City of Seattle, King County. The National Marine Fisheries Service has identified chinook salmon (*Oncorhynchus tshawytscha*), a threatened species, and coho salmon (*O. kisutch*), a candidate species, as potentially occurring in the project vicinity (NMFS 2000). The U.S. Fish and Wildlife Service (USFWS) has identified bald eagle (*Haliaeetus leucocephalus*), a threatened species, and bull trout (*Salvelinus confluentus*), a threatened species, as potentially occurring in the vicinity of the project area (Appendix B). No other threatened or endangered species of flora or fauna have been identified in the airport area.

In addition to providing the biological information necessary for evaluating the potential effects on chinook salmon, bull trout, and bald eagles for compliance with Section 7 of the Endangered Species Act, this biological assessment was prepared to provide a resource document for concurrent consultation with NMFS for compliance with the Magnuson-Stevens Fishery Conservation and Management Act (also known as the Magnuson-Stevens Act). The Magnuson-Stevens Act, as re-authorized in 1996, mandates that Federal agencies consult with the Secretary of Commerce on all activities or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). EFH is defined as *"those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."* In addition to species listed as threatened or endangered, EFH consultations are required for non-listed, federally managed fishery species, which include Puget Sound coho and pink salmon populations. Pink salmon historically used the Duwamish, but were extirpated by the 1930's (WDF 1975).

The listing of the lower Duwamish River as a "Superfund" site will also entail scrutiny of projects in the Duwamish basin. This biological assessment provides information that can be used in considering the proposed Master Plan improvements in relation to the Superfund response plans.

This biological assessment was conducted to determine whether the Puget Sound populations of bald eagles, chinook salmon, coho salmon, and bull trout would be affected by the proposed project. In addition, this assessment determines whether Essential Fish Habitat for

the fish species would be affected by the proposed project. The assessment is based on a literature review, review of project descriptions and drawings provided by King County (owner and operator of KCIA), and site visits. Given the present status of the Duwamish River and its watershed, the proposed shift of the runway may have an effect on chinook salmon and bull trout and their habitat, but it would not be likely to have an adverse effect. Impacts from the proposed work would be insignificant and would not have negative impacts on coho salmon should they be listed as threatened or endangered. The project would have no effect on bald eagles.

Impacts of the remaining elements of the proposed Master Plan have been considered in this biological assessment, and are treated in a programmatic fashion, as these projects have not yet been designed. However, because of the developed nature of the airport area, and specifically the airport property, it is anticipated that over time, small increments of additional impervious surface would be added by these tenant improvements. These additions may have an effect on the species considered, but they would not be likely to have an adverse effect.

Project Location

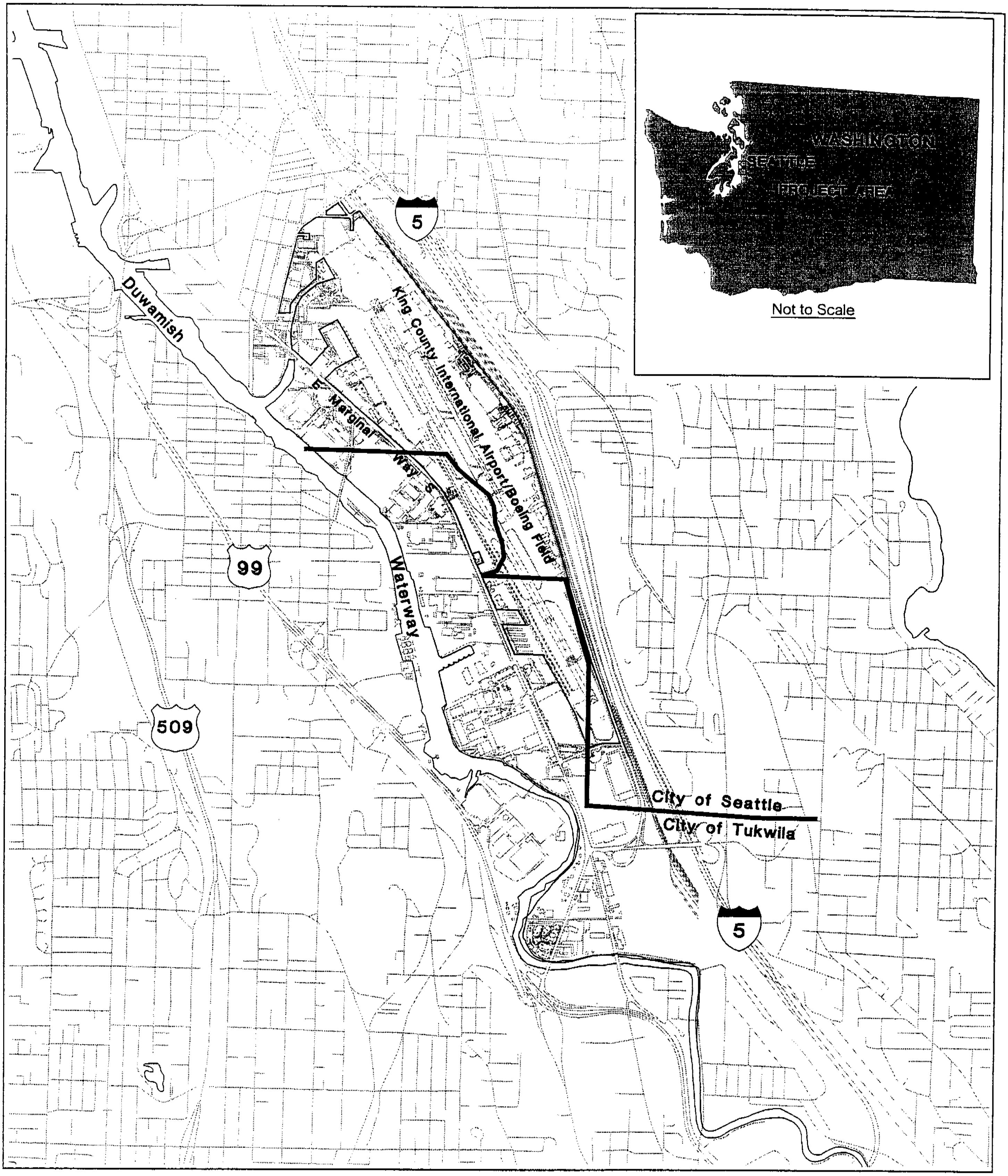
KCIA is located in the Cities of Seattle and Tukwila, King County, Washington (Figure 1), between the Duwamish River and Interstate Highway 5, about 5 miles south of downtown Seattle. The river is about ½ mile west of the airport. The Green River becomes the Duwamish River at river mile 10, and flows into Puget Sound on the southern end of Elliott Bay. The airport is in Township 23N, Range 4E, Sections 3 and 4, and Township 24N, Range 4E, Sections 28, 29, 33, and 34.

The **Project Area** is those parts of the Airport that will be altered by the proposed Master Plan improvements. The **Action Area** includes the project area as well as the area affected indirectly by the proposed improvements, here the lower Duwamish River.

Purpose and Need for the Project

In 1995, King County began a Master Plan study for KCIA for the purpose of examining existing facilities, predicting future growth in aviation activity, and identifying possible concepts for addressing this activity. The Study found two primary needs and solutions to addressing these needs:

- Existing runway did not meet current FAA runway safety area standards; and
- Existing facilities may not satisfy existing and future demand in a safe and efficient manner.



Sources:
City of Tukwila, *Comprensive Land Use Plan*
December 4, 1995

City of Seattle *Land Use Code*, Chapter 23.64

ANCHOR
ENVIRONMENTAL, L.L.C.

07/23/01 SYN002-03.DWG

0 3000
Scale in Feet

FIGURE 1
Vicinity Map

As a result, the Master Plan identified the need to maintain the existing runway length and to shift the runway about 880 feet to the north. This would enable both ends of the primary runway to meet the current runway safety area standards. In addition, several scenarios were considered to address facility (building and space) requirements to accommodate existing and future demand. The following briefly describes these needs:

(A) Achieve Runway Safety Area Requirement Compliance While Maintaining the Airport's Existing Operating Capability

A review of all airfield facilities was conducted for the purpose of ensuring that these facilities complied with all current FAA standards. At that time, King County found that the Runway Safety Area (RSA) for the south end of the Airport's primary runway (13R/31L) do not meet current dimension/use standards. A RSA is "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway".[1/]

The RSA dimension for Runway 13R/31L is defined as a rectangular area 250 feet wide on both sides of the centerline for the length of the runway and extends 1,000 feet beyond each runway end. In addition to the two-dimensional standards, FAA has longitudinal and transverse gradient standards for RSAs. The RSA should be cleared, drained and graded, and is usually turfed. Under dry conditions, this area should be capable of supporting occasional aircraft that could overrun the runway without causing structural damage, as well as fire fighting and snow removal equipment.

The current RSA for the south end of the runway (31L) meets the dimensional standards for only 120 feet beyond the threshold of the runway, in contrast to the required 1,000 feet. The current RSA for the north end of that runway (13R) meets the standard for 1,000 feet by 500 feet

In 1999, the FAA installed an Instrument Landing System (ILS) for landings from the south on Runway 31L. As a result of installing this ILS, King County was required to displace the landing threshold for aircraft landing on this end of the runway by 800 feet. Aircraft landing on this runway in a north flow now have 9,200 feet of landing length. The installation of the ILS did not affect the runway length available for departure, nor did it affect operations in a south flow.

[1/] FAA Advisory Circular 150/5300-13, Airport Design Chapter 3, Runway Design.

King County proposes to shift the runway threshold to the north, such that about 880 feet of pavement would be constructed. Aircraft departing to the north on Runway 31L would continue to use the existing departure point, but landings from the south would land 80 feet further down the runway than occurs today. Arrivals from the north on Runway 13R with the 880 ft shift would continue to land at the current landing threshold. Departures for most aircraft, which do not need 10,000 feet of takeoff length, would continue from their present locations. Only aircraft that have a demonstrated operating need would be provided permission from King County to depart from the new pavement.

Based on discussions with the tenants of the airport, including cargo operators and the Boeing Company, few aircraft operations require a departure runway length in excess of 9,200-ft. However, King County International Airport (KCIA) is located adjacent to the world headquarters of The Boeing Company.

The Boeing Company site at KCIA is involved in the following activities for the Boeing Commercial Aircraft and Military divisions:

- AWACs Installation and Electronics Test program;
- FAA certification tests and test flights of any new Boeing aircraft models; and
- Preparation for delivery of the B-737/B-757 aircraft line, which are assembled in Renton, Washington and flown to KCIA for delivery.

Because the Research and Development Flight Test and Delivery Center for the 737/757 are co-located, the company realizes efficiencies from the test pilot and ground support integration between programs. During certain testing and operating conditions, Boeing Company and its customers operations require 10,000 feet of departure length.

To minimize the effects of the shift on the airport environs, King County would utilize a prior permission required (PPR) process. Because of these procedures, the new pavement would carry a designation of "special use area – Runway 13R". The signators of the agreement would agree to use the additional pavement only when the operational performance and weather conditions require 10,000 feet of departure length in a south flow condition. All other times, the existing departure point would be used.

(B) Satisfy Existing and Future Aviation Demand in a Safe and Efficient Manner

Based on the existing facilities and aviation activity conducted at the Airport, a review of future facilities that would be required to accommodate the forecast demand were evaluated. These projects would include:

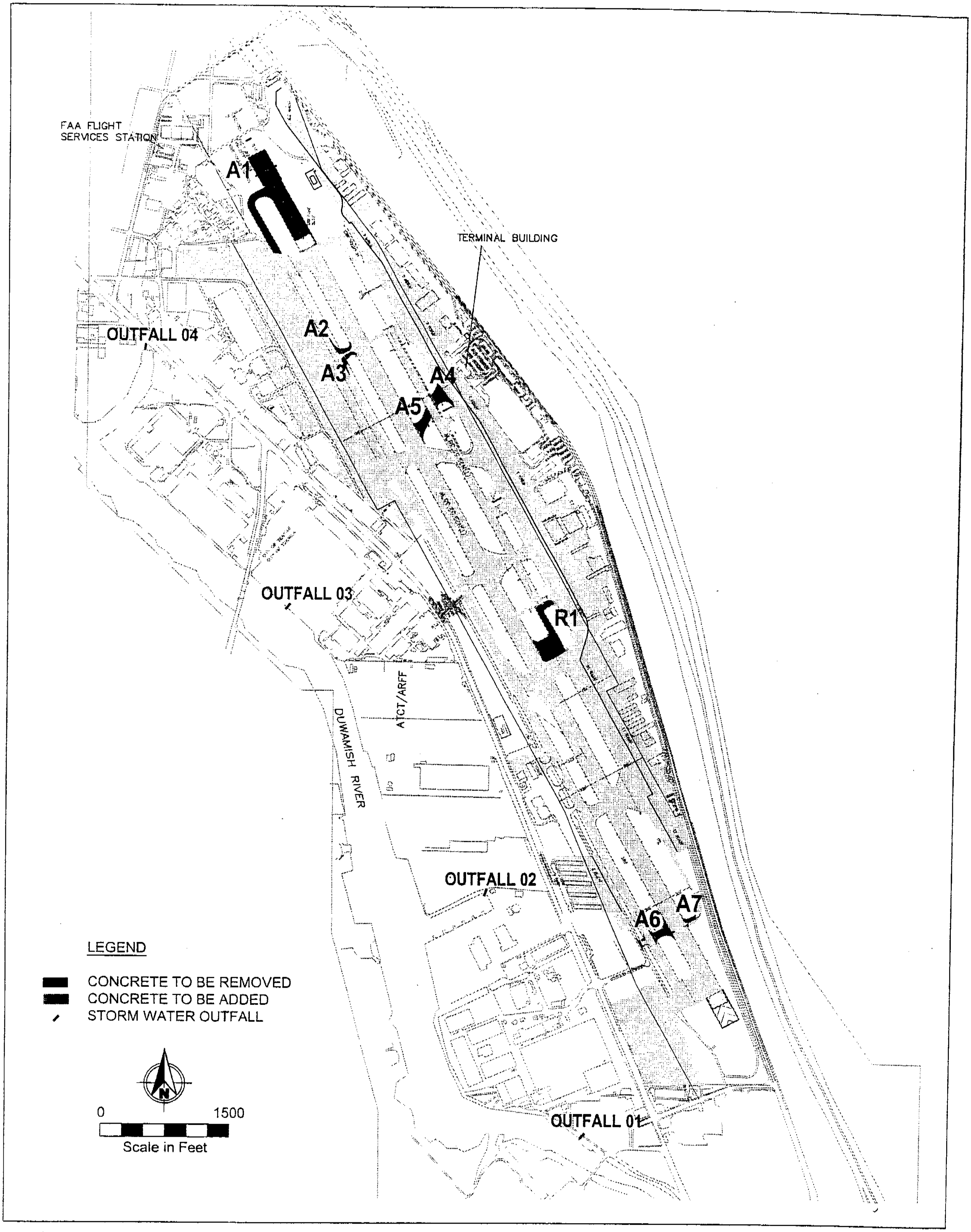
- Consolidate users in specific parts of the Airport, such as general aviation (GA) and cargo users;
- Relocate the fuel farm currently located at the airport's north end
- Construct an engine testing enclosure ("hush house");
- Relocation by about 100 feet a helicopter landing pad on the north east side of the airport;

Proposed Actions

As noted earlier, King County (the owner and operator of KCIA) has proposed a Master Plan for the airport that contains an immediate project and a program for addressing long-range needs at the airport. The County has voluntarily initiated an Environmental Impact Statement (EIS) under the Washington State Environmental Policy Act (SEPA) and an Environmental Assessment under the National Environmental Policy Act. In addition, this biological assessment has been prepared to analyze the consequences of recommendations of the proposed Master Plan on endangered and threatened species of flora and fauna. The environmental documents are being and have been prepared based on a project level information for the runway shift (as identified in the preceding section). Because the remaining long-range items aimed at addressing existing and future facility/tenant requirements have been defined at a programmatic level, the environmental documents have and are addressing these projects as interdependent and inter-related actions.

The runway shift project is being addressed at a project specific level at this time. The Master Plan projects would consist of the following construction activities (Figure 2):

- Extending the runway pavement by about 880 feet to the north. This pavement would be 200 feet wide;
- Extending the west parallel taxiway by about 880 feet to the north (to be referred to as taxiway X). The taxiway would be 75 feet wide and would be located 325 feet west of the shifted runway;
- Installation of associated taxiway and runway pavement markings and lighting, such as in-pavement approach lighting;
- Installation of a screening wall and plantings on the north end of the airport perimeter, which would require minor excavation for wall footings and plantings. Slight grading may be conducted to facilitate planting and landscaping;
- Construction of an additional paved crossover taxiway west of the terminal approximately 500 ft long by 100 ft wide; and



ANCHOR
ENVIRONMENTAL, L.L.C.

07/23/01 syn004-03 00-031-02

FIGURE 2
Concrete Additions and Deletions and
Stormwater Outfall Locations

Construction of an additional paved crossover taxiway near the south end of the runway roughly 100 ft wide by 200 ft long.

To complete the runway shift, an area of about 15 acres would initially be disturbed. This acreage would be comprised of 9.5 acres now covered with regularly mown grass that would be paved with concrete and 3 acres of pavement would be removed and replaced by regularly mown grass (see Figure 2). These actions will create a net increase of approximately 6.5 acres of impervious surface. The pavement to be added is anticipated to be about 24 inches thick, requiring the excavation of about 35,000 cubic yards of earth and existing blast pad. Materials excavated from the project would be transported off-site for disposal in approved/permitted receiving locations.

Other Master Plan projects consist primarily of tenant improvements that would be undertaken over time, as well as, airport support facility improvements. Actions that would likely occur could include:

- Consolidate cargo use on parcels immediately to the south of the Terminal and Arrivals Buildings (east side);
- Consolidate small GA use of the far ends of the east side, midfield on the west side, and adjacent to the Museum of Flight;
- Relocate the fuel farm currently located at the airport's north end - The airport's main fuel storage area is located at the north end of airport property. The facility is privately owned, but leases storage in the tanks to the fixed based operators located at KCIA. The facility consists of ten (10) 20,000-gallon underground fuel storage tanks. Because the fuel tanks are located in the runway protection zone (RPZ) for Runway 13R, King County would relocate this facility to another location on airport property. It is likely that during the removal of the tanks that contaminated soils would be identified. If such a condition arises, the County would comply with the Model Toxics Control Act (MTCA) and remediate the site in accordance with a Federal and State laws. Soils would be disposed of in accordance with these laws;
- Construct an engine testing enclosure ("hush house"). A site has not been identified for the enclosure, however, it is likely to be located on the west side of the airport, which is already heavily developed;
- Relocation of a 100 ft by 50 ft helicopter landing pad on the north east side of the airport, requiring excavation of between 100 and 200 cubic yards of material;
- On the eastside, use the area between the small GA and cargo for corporate GA.

Today, approximately 73 percent of the area within the airport fence line is developed or paved in support of airport and airport-related activities. The significant majority of airport property that is undeveloped/unpaved remains as such due to FAA airport design standards. As a result, while the recommendations of the proposed Master Plan are likely to lead to additional impervious surface and associated storm water runoff, no significant increases in impervious surface are anticipated.

Storm water runoff from the additional area of impervious surface from the shifted runway as well as other proposed Master Plan projects would be routed through the existing storm drain system to the Duwamish Waterway. Further discussion of storm water is in the Analysis of Effects section of this BA.

The proposed Airport Master Plan entails moving some existing activities within the airport boundaries. As a result, there would be minor changes in traffic circulation within the immediate area, but these changes would not affect traffic volume. The project does not include filling or any in-water work.

Construction would begin as soon as environmental review is complete, likely in 2001. Construction associated with the runway shift project is expected to last approximately six months. Work would occur during a five- or six-day week, with ten-hour days. Work associated with the tenant improvements and other elements of the proposed Master Plan would be expected over the next 10 to 15 years.

Methods and Materials

In order to determine whether bald eagles, bull trout, chinook salmon, or coho salmon would be adversely affected by the proposed actions at the KCIA, this biological assessment consists of the following tasks:

- Review proposed project permits, plans, drawings, and technical specifications of the elements and activities;
- Review existing information on animal use of the vicinity of the proposed project;
- Interview federal and state agency biologists regarding the occurrence of threatened and endangered species in the vicinity of the proposed project;
- Conduct site reconnaissance of the project site to determine its suitability for bald eagles, bull trout, chinook salmon, or coho salmon habitat, and connectivity to the Duwamish Waterway;

- Present results of the literature review, interviews, and site reconnaissance and provide an assessment of use of the proposed project area by threatened and endangered species;
- Describe short-term construction effects and long-term changes to habitat expected to result from the proposed action;
- Propose conservation measures, including best management practices (BMPs), and provide recommendations to avoid, minimize, rectify, or compensate for any effects associated with the proposed construction activities; and
- Make effect determinations for bald eagles, bull trout, chinook salmon, and coho salmon.

Description of Project Area

Existing Conditions: Environmental Baseline

Anchor Environmental made a site visit of the King County properties at KCIA on July 17, 2000. Photographs from this visit are in Appendix A. The KCIA is located in the Duwamish industrial area, between the Duwamish River and Interstate Highway 5. Airport property consists of about 594 acres of land and includes two parallel runways, a parallel taxiway system, aircraft parking aprons, a passenger terminal building, vehicle parking, and roadway system. The Boeing Company occupies about 20 percent of airport land (120 acres) under a long-term lease.

The airport is a flat, highly developed site, with approximately 73 percent covered by existing pavement and impervious surface. Groundwater is approximately eight feet below the surface. Vegetation around the runways consists mainly of mowed grass that is managed carefully to discourage wildlife use. The FAA issued an Advisory Circular in May 1997 stating that wildlife habitat and airports are incompatible land uses. The Washington State Department of Natural Resources has no records of rare plants or high quality ecosystems in the vicinity of KCIA (Appendix B).

The Duwamish River is heavily industrialized and its channel has been straightened and deepened. Bulkheads and rip-rap line both shorelines and the area provides poor habitat for anadromous salmonids and other aquatic species. The stretch of river closest to the project site (over 1,800 feet away) and where storm water outfalls for the airport drain is tidally influenced. The stretch comprises part of the estuarine transition zone between the freshwater river and the higher salinity environment of Elliott Bay. Almost all of the wetland and marsh areas along the margins of the river no longer exist, although several restoration projects have been undertaken in the Duwamish River to provide such habitats. Water quality and sediment quality in the river has also been impaired through inputs related to industrial activities and urban development of the surrounding area. A recent water quality assessment of the Duwamish River and Elliott Bay found *"minimal risks to aquatic life from chemicals in the water column, no risks to juvenile salmon from direct exposure to chemicals in the water, and no risks to salmon smolt from consuming amphipods in the Duwamish Estuary"* (Parametrix and King County DNR 1999). Despite the reduction in habitat and habitat quality, the Duwamish River remains an important migratory corridor for juvenile and adult salmonids. In addition, numerous other fish species utilize the river for feeding and resting (USACE et al. 1994).

Fish Use

The Duwamish River is used by migrating anadromous fish, both juveniles and adults. The National Marine Fisheries Service has identified chinook salmon (*Oncorhynchus tshawytscha*), a threatened species, as potentially occurring in the project vicinity (NMFS 2000). The National Marine Fisheries Service listed the Puget Sound chinook as a threatened species on March 24, 1999. The identified *evolutionarily significant unit* (ESU) includes all naturally spawned populations of chinook salmon from rivers and streams flowing into Puget Sound.

In addition, the agency published final rules for critical chinook habitat in February 2000, including all marine, estuarine, and river reaches accessible to chinook salmon in Puget Sound. Critical habitat for chinook salmon is defined to include areas "on which are found those physical or biological features 'essential to the conservation of the species' and which may require special management considerations or protection (Federal Register Volume 65, Number 32)." Essential habitat types for anadromous salmonids include the following: (1) juvenile rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions. The Duwamish River is important for all of these aspects.

The U.S. Fish and Wildlife Service (USFWS) has identified the coastal population of bull trout (*Salvelinus confluentus*), a threatened species, as potentially occurring in the vicinity of the project area. The Puget Sound/Coastal segment of bull trout was listed as threatened on October 28, 1999 (USFWS 1999a).

In September 1999, Puget Sound coho salmon were listed by NMFS as a candidate species for listing under the Endangered Species Act (ESA). Coho salmon, as a candidate species, are not

Table 1 – Checklist for Documenting Environmental Baseline and Effects of Proposed Action on Relevant Indicators

Pathways Indicators	Environmental Baseline			Effects of the Action		
	Properly Functioning[1]	At Risk[1]	Not Properly Functioning[1]	Restore[2]	Maintain[3]	Degrade[4]
Water Quality						
Temperature	X				X	
Sediment		X			X	
Chemical Contam./Nutrients			X		X	
Habitat Access						
Physical Barriers	X				X	
Habitat Elements						
Substrate			X		X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality			X		X	
Off-Channel Habitat			X		X	
Refugia			X		X	
Channel Condition & Dynamics						
Width/Depth Ratio			X		X	
Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Flow/Hydrology						
Peak/Base Flows			X		X	
Drainage Network (increase)	X				X	
Watershed Conditions						
Road Density & Location			X		X	
Disturbance History			X		X	
Riparian Reserves			X		X	
Watershed Name:	**Duwamish**		**Location: King County International Airport**			

Notes:

1. These three categories of function ("properly functioning", "at risk", and "not properly functioning" are defined for each indicator in the "Matrix of Pathways and Indicators" (NMFS, 1999)
2. For the purposes of this checklist, "restore" means to change the function of an "at risk" indicator to "properly functioning" or to change the function of a "not properly functioning" indicator to "at risk" or "properly functioning" (i.e., it does not apply to "properly functioning" indicators).
3. For the purposes of this checklist, "maintain" means that the function of an indicator does not change (i.e., it applies to all indicators regardless of functional level).
4. For the purposes of this checklist, "degrade" means to change the function of an indicator for the worse (i.e., it applies to all indicators regardless of functional level). In some cases, a "not properly functioning" indicator may be further worsened, and this should be noted.

currently afforded protection under the Endangered Species Act. However, coho are also addressed because they are covered by the Magnuson-Stevens Act.

Chinook Salmon

General Overview

Chinook salmon are generally differentiated into two behavioral forms, ocean-type and stream-type, based on their patterns of freshwater rearing and marine migrations. Ocean-type chinook salmon leave the river environment and enter the estuary and marine environment in their first year of life, typically within three to four months after emergence (Healey 1991). Ocean-type chinook salmon generally spend most of their marine migrations in coastal waters and return to their natal river in the fall, a few days or weeks before spawning. Alternatively, stream-type chinook salmon spend one or more years in freshwater before migrating to sea and undertake extensive offshore migrations. Stream-type chinook return to their natal river in the spring or summer, often several months prior to spawning.

The principal race of chinook salmon in the Duwamish/Green River basin is summer/fall ocean-type. In fact, ocean-type chinook is the predominant behavioral form found south of 56 ° N (i.e., in the continental United States; Healey 1991). Ocean-type chinook tend to depend heavily on estuaries for juvenile rearing, more so than stream-type chinook and the other species of salmon. In addition to providing important opportunities for juvenile salmon to achieve a larger size before moving offshore, estuaries are important transitional zones for the juvenile fishes' physiological transition to the marine environment (Simenstad et al. 1982; Aitkin 1998). Juvenile chinook are considered particularly dependent on estuarine habitat for rearing (Grette and Salo 1986). They frequently rear in estuaries for several months before heading out to sea (USACOE 2000). Adult salmonids use estuaries primarily for migration en route to their natal streams for spawning.

Duwamish/Green River Watershed

Chinook salmon in the Duwamish/Green River basin originated from both native and hatchery fish (i.e., are of mixed origin; WDFW 1994). However, the hatchery stock of chinook salmon is currently believed to have descended from the wild run (Grette and Salo 1986). Escapement in the mainstem Green River ranged from 5,000 to 10,050 between 1987 and 1991, with an average of 7,600 (WDFW 1994). In its review of the Puget Sound chinook ESU, NMFS classified the Green River stock as healthy based on high levels of escapement (Myers et al. 1998).

Adult summer/fall chinook migrate upstream through the Duwamish River to spawning grounds in the Green River from late June to mid-November. Spawning occurs from mid-September through mid-November. Chinook juveniles occur in the Duwamish estuary from early April through late July (Meyer et al. 1980), with a peak in late May (Weitkamp and Campbell 1979; Taylor et al. 1999). Juvenile salmonids are known to use both shallow and deep-water habitat in the Duwamish estuary (USACE et al. 1994). The availability of preferred habitat such as emergent marshes and intertidal mudflats has been reduced 97 percent since 1898 (USACE 2000). As a result, juvenile salmonids have less food available and are more exposed to predators. Typically, juvenile chinook would be found in side channels feeding, resting, and undergoing physiological changes to salt water. In the Duwamish from the Airport to Elliott Bay, the riverbanks have been straightened and simplified. Fish use is higher in areas such as Kellogg Island, where remnant intertidal shallows are available, than in the main channel.

Bull Trout

General Overview

Bull trout and Dolly Varden (*Salvelinus malma*) are the only char in the family Salmonidae that are native to Washington (Johnson 1991). Prior to 1978, bull trout and Dolly Varden were classified as the same species. Cavender (1978) identified them as separate species based on an examination of morphology, meristic counts, and bone structures. This research was further supported and confirmed by Haas and McPhail (1991). In 1991, the American Fisheries Society supported the decision to split them into two distinct species. Information on the distribution and life history of each species is not yet distinct because the species are biologically similar and methods to separate them are new and not widely applied (Bonar 1997).

Four life history strategies are known to be used by bull trout and could potentially be used by individuals in the Duwamish River watershed. The anadromous form is most likely to occur in the river reach near the project area. Anadromous bull trout spawn in freshwater, then have some period of development and growth in saltwater/estuary. The other three life history strategies are carried out entirely in freshwater: *adfluvial* (i.e., spawning and rearing occurs in streams, but most growth and maturation occurs in lakes or reservoirs), *fluvial* (i.e., spawning and early rearing occurs in smaller tributaries with major growth and maturation occurring in mainstem rivers), and resident bull trout (i.e., all life stages occur in small headwater streams).

Bull trout require cold, clean water and are typically associated with headwater reaches of watersheds. Bull trout prefer water temperatures below 13°C (WDFW 1999). Their distribution is strongly influenced by water temperature (Rieman and McIntyre 1993; Bonneau and Scarnechia 1996; Lee et al. 1997), and they are found to be associated with the coldest stream reached in basins (Lee et al. 1997). However, mature adult anadromous char were found migrating and staging in Puget Sound tributaries when stream temperatures were 20 to 24 °C, suggesting that sub-adult and adult migratory char are fairly temperature tolerant (Kraemer in prep.)

Bull trout spawn in October and November as stream temperatures decrease below 9 or 10oC (McPhail and Murray 1979; Fraley and Shepard 1989). Survival of incubating bull trout eggs has been found to be optimal at constant exposure to 2 to 4°C water, with mortality increasing markedly above 8 °C (McPhail and Murray 1979; Weaver and White 1985). Due to the cold water temperatures they spawn in, egg incubation extends to as long as 6 months.

Duwamish/Green River Watershed

There is little to no information on the presence, abundance, distribution, or life history of Dolly Varden/Bull trout populations in the Duwamish/Green River basin (WDFW 1997, USFWS 1998a). Adult native char have been recorded in the Duwamish estuary (Mavros 2000), but the 1998 WDFW bull trout/Dolly Varden stock inventory states "No studies confirm reproduction of bull trout/Dolly Varden in the green River Basin." There is no survey protocol currently endorsed by the USFWS for establishing absence of bull trout, so its presence is assumed where there is suitable habitat (USFWS 1999b).

The timing of anadromous bull trout juvenile presence in the Duwamish River would presumably be similar to other salmonids. In the north Puget Sound area, many of the sub-adult smolts move downstream in the spring to the river mouths and nearby beaches (Johnston 1995). The sub-adults typically spend the spring and most of the summer in the marine environment where they experience rapid growth. Data from the Skagit River indicates bull trout out-migration peaks in May and return migration peaks in July, although repeat spawners can migrate out as early as the first of the year and return in June (Kraemer 2000).

Coho Salmon

General Overview

Coho salmon are similar in basic life stages to chinook, but are smaller, and prefer smaller streams and side channels for spawning and rearing (Grette and Salo 1986). Juvenile coho salmon rear in freshwater for at least one year, typically in tributary streams and rivers (Sandercock 1991), although they also use off-channel sloughs and wetlands (Grette and Salo 1986). After emergence from the gravel between early March and late May, many juvenile coho salmon remain in the same tributary they were spawned. Juvenile coho salmon are very territorial and typically maintain distinct feeding territories (Sandercock 1991). Others may migrate downstream to larger streams to rear prior to smoltification the following spring. Juvenile coho prefer low velocities, typically stream margins and off-channel areas (Grette and Salo 1986). Juvenile coho tend to use the shallow nearshore habitats less than other salmon species (Simenstad 1983). Coho smolt outmigration to the estuary typically occurs between late April and early July.

Duwamish/Green River Watershed

Coho salmon in the Duwamish/Green River basin originated from both native and hatchery fish (i.e., are of mixed origin; Grette and Salo 1986, WDFW 1994). Most Green River coho spend eighteen months in freshwater followed by eighteen months in the ocean, but a small percentage spends a third year in the ocean. Spawning populations also contain male coho that have only spent five or six months in saltwater (Grette and Salo 1986). The bulk of Duwamish/Green coho return between late October and the end of December (Grette and Salo 1986).

Coho smolts move rapidly through the lower river and estuary (Bostick 1955, Weitkamp and Campbell 1980), perhaps due in part to the greatly reduced habitat availability in the lower Duwamish. Juvenile salmonids are known to use both shallow and deep-water habitat in the Duwamish estuary (USACE et al. 1994), and are present from mid-April through early June (Meyer et al. 1981).

Bird Use

Bald eagles, *Haliaeetus leucocephalus*, are federally listed as threatened; the USFWS has identified bald eagle as potentially wintering in the vicinity of the project area. "Wintering activities occur from October 31 through March 1." Bald eagles use "predominantly coniferous, uneven-aged stands with old-growth components" for breeding (Anthony et al. 1982), typically near waterbodies. In Washington, courtship and nest-building activities begin in January and February, egg-laying in March and early April, eaglet hatching from mid-April to early May, and eaglet fledging in mid-July (Rodrick and Milner 1991). There are no bald eagle nests within a mile of the project site. Surrounded by urban Seattle, lacking old growth forest and snags, there is no suitable bald eagle roosting habitat within a mile of the project site. Bald eagles' diet is varied and in estuarine areas includes gulls, waterfowl, and fish. Salmon are important for eagle feeding in the fall.

Disturbance from construction activities in the context of bald eagle nests is considered to be work that generates noise above ambient levels and is within 800 meters and within sight or within 400 meters and out of the line of sight of a nest; for activities such as pile driving, the distance is up to a mile (USFWS 1999b).

Analysis of Effects

Potential Direct Effects

The following potential short-term effects may be associated with the proposed construction project:

- Increased sedimentation into the Duwamish River during construction activities
- Risk of accidental spills from construction equipment

The potential for increased sedimentation into the Duwamish River is relevant to an analysis of the threatened salmonid stocks as well as Essential Fish Habitat. The potential for increased sedimentation would be minimized or avoided through the implementation of Best Management Practices (BMPs) contained in the King County Storm Water Pollution Control Manual. The BMPs that would be implemented include a combination of silt fences, check dams, and straw bales.

Potential Indirect Effects

The following potential indirect effect may be associated with the proposed construction project:

- Increased runoff into the Duwamish River from 6.5 new acres of impervious surface

This potential long-term effect is relevant to an analysis of the threatened salmonid stocks as well as Essential Fish Habitat. A Storm Water Pollution Prevention Plan is used to provide operational source control and treatment Best Management Practices (BMPs), which eliminate or reduce the level of pollution entering the storm water (KCIA 1993). The increased run-off created by the added impervious surface would be routed through the existing storm drain system to the outfalls on the Duwamish Waterway. This would be an alteration to the flow/hydrology pathway of the environmental baseline in Table 1. The following discussion explains why this alteration is not expected to degrade current conditions.

The deicing chemicals currently used by the Airport are also discussed below in reference to concerns about the chemical contamination pathway in Table 1, but the proposed actions will not change the current use patterns.

Stormwater System Overview

All of the stormwater from the KCIA discharges into the Duwamish Waterway. The Airport's stormwater drainage is divided into four drainage basins. Two of the drainage basins discharge to pumping stations that lift the water to Outfalls 03 and 04. There are also two gravity lines (Outfalls 01 and 02) which discharge into the Duwamish River. The southern most drainage basin connects to a Boeing Company system and then interties with a Metro overflow line before discharging at Outfall 01.

Methods

A design storm hydrograph for each of the potentially impacted drainage basins was calculated to reflect the existing conditions. A second hydrograph was then developed for the same drainage area to reflect the runoff conditions anticipated with implementation of the master plan. The hydrographs were developed using the Santa Barbara Urban Hydrograph Method as presented in the King County Surface Water Design Manual. Runoff hydrographs were calculated using a storm duration of 24 hours and at the following storm recurrence intervals.

Table 2 – Hydrograph Model Data

Recurrence Interval or Frequency (years)	Duration (hours)	Precipitation (inches)
2	24	2.0
5	24	2.5
10	24	2.9
25	24	3.5
50	24	3.7
100	24	4.1

The configuration of drainage features associated with the modifications proposed in the master plan are not completely designed. It was assumed that the stormwater drainage features associated the master plan would resemble the design of the Airport's existing drainage systems.

The following runoff curve numbers were used in the development of the each hydrograph (SCS, 1982); for paved surfaces a value of 98 was used and for pervious surfaces such as grass, a value of 85 was used.

Outfall 04

The majority of the new impervious areas proposed in the master plan are in the drainage basin discharging to Outfall 04. The proposed pavement will be in four specific sections.

Table 3 – Proposed Activities in Outfall 04 Basin

Proposed Master Plan Element	Added Impervious Area (Acres)
Extend 13R/31L runway about 880 feet to the north. Because of the existing blast pad, only 730 feet of impervious area will be added. Addition of a taxiway to service the northern extension of 13R/31L. (Area A1 in Figure 2).	6.0
Installation of a new taxiway from the eastern aprons to 13L/31R (Area A4 in Figure 2).	0.5
Installation of a new taxiway between runways (Area A5 in Figure 2).	0.7
Widening of existing Taxiway B2 (Areas A2 and A3 in Figure 2).	0.4
Total	7.6

The existing impervious surface for the helispot on the northeast end of the Airport will be relocated, but will not alter the existing stormwater drainage system.

All of these proposed improvements are in a drainage basin that discharges to the north pump station. The north pump station pumps the stormwater into a pipe that discharges to the Duwamish River at Outfall 04. The current capacity of the northern pump station is 60.2 cubic feet per second (cfs). The last comprehensive analysis of the stormwater drainage system was performed by Sagan Inc. in 1995.

A hydrograph analysis of the peak runoff of each of the affected sub-basins was performed to determine the cumulative increase of peak flow to Outfall 04. The following table gives the total and increase peak flow at each storm recurrence frequency.

Table 4 – Estimated Alterations to the Outfall 04 Basin Hydrograph

Storm Recurrence Interval (years)	Increased Peak Flow to the North Pump Station Resulting from the Implementation of the Master Plan in cfs	Current Discharge from the North Pump Stations in cfs	Projected Total Flow from the North Pump Stations with the Implementation of the Master Plan in cfs	Percent Increase at Outfall 04 Resulting from the Implementation of the Master Plan
2	1.9	NA	NA	NA
5	1.3	NA	NA	NA
10	1.7	NA	NA	NA
25	1.9	NA	NA	NA
50	1.9	48.3*	50.2	4.0
100	2.1	58.9*	60.2**	2.2**

* King County International Airport Stormwater Drainage Study, April 1995

** Peak flow and percent increase are constrained by the pump station's capacity of 60.2 cfs.

At the higher flows the discharge rate to the Duwamish River is constrained by the capacity of the north pump station. The northern pump station currently has the capacity to accommodate the flows associated with a 100 year – 24-hour storm. With the proposed improvements the flow associated with a 100 year – 24-hour storm would slightly exceed the capacity of the pump station.

Outfall 03

The implementation of the master plan would remove 3.0 acres of impervious surface within the drainage area discharging at Outfall 03 (R1 in Figure 2). This basin discharges to the south pump station and then to the Duwamish River. Table 5 gives the anticipated reduction in peak flow, at each of the storm recurrence frequencies.

Table 5 – Estimated Alterations to the Outfall 03 Basin Hydrograph

Storm Recurrence Interval (years)	Peak Flow in cubic feet/second		
	Current Conditions	After Removal of the Impervious Area	Anticipated Reduction in Peak Flow at Outfall 03, with the Implementation of the Master Plan
2	1.6	1.00	0.6
5	2.13	1.47	0.66
10	2.55	1.86	0.69
25	3.18	2.47	0.71
50	3.39	2.67	0.72
100	3.82	3.09	0.73

The south pump station current has the capacity to accommodate a 100 year – 24 hour storm. The capacity of the south pump station is 80.0 cfs. The total estimated runoff for a 100 year – 24 hour 64.5 cfs. Implementation of the proposed master plan would slightly reduce the discharge at Outfall 03.

Outfall 02

Implementation of the master plan would add a taxiway and widen an existing taxiway in the drainage basin of Outfall 02 (areas A6 and A7 in Figure 2). Addition of the taxiway and widening the existing taxiway would add 0.6 acres of additional impervious area. The stormwater in this basin drains by gravity to Outfall 02. The following table gives the anticipated increase in peak flows at each storm recurrence frequency.

Table 6 – Estimated Alterations to the Outfall 02 Basin Hydrograph

Storm Recurrence Interval (years)	Peak Flow in cubic feet/second		
	Current Conditions	After addition of Taxiway and Widening of A11	Increase in Peak Flow at Outfall 02, with the Implementation of The Master Plan
2	2.00	2.08	0.08
5	2.73	2.84	0.11
10	3.35	3.46	0.11
25	4.29	4.42	0.13
50	4.61	4.75	0.14
100	5.26	5.41	0.15

Outfall 01

There are no additional impervious surfaces planned in the subbasin draining to Outfall 01. Therefore, there would be no change to the stormwater system in this area.

The small net increase in impervious surface created by this project, approximately 1 percent of total impervious surface at airport, would not increase peak flows above the existing capacity of the storm water system. The additional 1.65 cfs generated during a 10-year storm event is about 0.01 percent of the 12,000 cfs 10 year flood as measured at the closest gauging station in Auburn. The volume of the river at the Airport outfalls would be greater than at Auburn, given the additional land area drained and the tidal flux, so the influence of the extra stormwater would be further diluted. The additional stormwater would be insignificant compared to the natural seasonal and annual variations in flow of the Duwamish.

Deicing Chemicals

This storm drain system is designed to minimize the introduction of the chemicals used during operation of the Airport to the Duwamish River. The storm water collection and treatment system recently underwent a thorough inspection and mapping by the IT group in 2000, in preparation for renewing the Airport's National Pollutant Discharge Elimination System (NPDES) permit. All stormwater lines were inspected and cleaned after the February 28, 2001, earthquake. Sediment from the stormwater lines was collected and disposed offsite.

One deicing chemical (Cyrotech E36) is expected to be applied to the added runway areas. Cyrotech E36 is a potassium acetate-based liquid runway deicer approved for use in the United States in 1992. It is considered a more environmentally friendly and effective deicing material than glycol-based products. The two primary concerns regarding the environmental impacts of deicing activities relate to: 1) the oxygen consumed during the decomposition of deicing chemicals contained in runoff, and 2) the breakdown products of the deicing material (Mericas and Wagoner 1996). Oxygen consumption occurs when bacteria decompose organic materials (including deicing chemicals) and use oxygen in the process. The potential for oxygen consumption through this process is commonly referred to as Biological Oxygen Demand (BOD). Cyrotech E36 has a lower BOD than urea or glycol-based deicers and it decomposes at lower temperatures (Mericas and Wagoner 1996). In addition, Cyrotech E36 biodegrades at into carbon dioxide and water. The absence of ammonia as a decomposition product is an environmental benefits because ammonia is potentially toxic to aquatic life and contributes to the BOD.

Given the mild climate of western Washington, the need for runway deicers is typically limited to one or two applications each year (Renaud pers. comm.). In the last five years, less than 1000 gallons of Cyrotech E36 has been applied to the airport runway (Renaud pers. comm.). This is also due in part to the need to apply Cyrotech E36 for pre-wetting at an application rate of approximately 60 percent that of glycol.

Deicing and anti-icing are performed on aircraft to minimize ice buildup on the wings and body during cold weather conditions. As stated above, the moderate winter weather conditions in western Washington and the limited number of aircraft that have to meet schedules limit the use of deicing chemicals on aircraft departing KCIA. The primary aircraft deicing material used at KCIA contains ethyl glycol or propylene glycol. The Storm Water Pollution Prevention Plan for KCIA (1993) estimates that about 1,500 gallons were used in 1992. Deicing areas at KCIA drain to the sanitary sewer system (Renaud pers. comm.).

Through use of the BMPs outlined in the Storm Water Pollution Prevention Plan (KCIA 1993), the storm water from the airport and the impervious surfaces added in the proposed project are not expected to adversely affect the quality of habitat conditions for salmonids in the Duwamish River. The combination of the partial treatment system at the airport, the low application rates of chemicals, and use of environmentally-responsible chemical products eliminate or minimize the introduction of potentially harmful chemicals to the river. Sediment and associated debris from the airport surfaces are addressed through a frequent sweeping of the runway surfaces (Renaud pers. comm.). The temperature of the storm water inputs to the Duwamish River is not expected to vary from ambient temperatures. In an effort to reduce potential temperature increases, a white concrete surface is used for the runway surfaces, as opposed to black asphalt.

Potential Interrelated Effects

This shift would not enable a greater number of flights nor would it enable bigger planes, however the proposed Master Plan does predict that regional demand for air travel would result in a continued increase in aircraft operations at KCIA. The forecast of demand indicates that activity could increase from today's 422,800 operations to 502,000 operations by 2020.

The Balanced Program of Accommodating Growth Needs at the airport may include:

- Consolidated cargo use on parcels immediately to the south of the Terminal and Arrivals Buildings (east side);
- Consolidated cargo use on several other east side land parcels;

- Consolidated corporate use on parcels between the existing general aviation areas and cargo designated areas;
- Small general aviation use of the far ends of the east side, midfield on the west side, and adjacent to the Museum of Flight;
- General aviation uses on the north end of the airport presently occupied by non-aviation uses;
- Redevelopment of area on northwest side of airport for large general aviation/corporate users; and
- Maximizing conversion of non-aviation uses on west side of airport for general aviation uses.

Conservation Measures

- All contractors would be required to follow the King County Stormwater Pollution Control Manual, Best Management Practices for Businesses;
- All contractors would be required to follow the latest Washington Department of Ecology Storm Water Management Manual for Western Washington, currently in final draft form;
- An emergency spill containment kit would be located onsite, and a pollution prevention plan detailing planned fueling, materials storage, equipment storage, and waste storage areas would be prepared to address prevention and cleanup of accidental spills;
- 3 acres of impervious pavement would be removed and converted to regularly-mown grass; and
- Minimize use of fertilizers and de-icing chemicals on the airport runways.

Effects Determination

Given available information, the potential for a take to occur (as defined by the Endangered Species Act) is negligible.

The proposed project would have **no effect** on bald eagles. There are no bald eagle nests within 2 miles of the proposed project. Bald eagles have wide foraging territories. Bald eagles might avoid foraging in the vicinity during the project, however the project is not expected to cause unusual avoidance.

The shift of the runway and associated master plan improvements at the King County International Airport **may affect, but are not likely to adversely affect bull trout, chinook salmon or critical and Essential Fish Habitat** for these species. Impacts from the proposed work would be insignificant and therefore determined **not to have negative impacts on coho salmon**, a candidate species, should they be listed.

These determinations and impact statement are based on the following reasons:

- The proposed project is more than 1,800 feet from the Duwamish Waterway and would not adversely modify salmon habitat;
- The storm water collection and treatment system in place can handle the added volume created by the increased impervious area created. The BMPs and operational source controls outlined in the airport's Storm Water Pollution Prevention Plan (KCIA 1993) eliminate or reduce the level of pollution entering the storm water. The impact of the additional stormwater on chinook salmon, bull trout, and coho salmon would be insignificant;
- Best management practices, including water quality protection measures such as silt fences, check dams, and straw bales, would be fully implemented to avoid or minimize all potential short-term adverse effects of construction activities;
- The proposed project does not include any in-water work; and
- The proposed project does not reduce riparian habitat and requires no tree removal.

References

Aitkin, J. K. 1998. The importance of estuarine habitats to anadromous salmonids of the Pacific Northwest: A literature review. U.S. Fish and Wildlife Service, Olympia, WA.

Anthony, R.G., R.L. Knight, G.T. Allen, B.R. McClelland, and J.I. Hodges. "Habitat used by nesting and roosting bald eagles in the Pacific Northwest," Transactions of the North American Wildlife Natural Resources Conference, 47:332-342.

Bonar, S.A., Diverns, M., and Bolding, B. 1997. Methods for sampling the distribution and abundance of bull trout/Dolly Varden. Washington Department of Fish and Wildlife, Inland Fisheries Investigations. Resources Assessment Division, Report # RAD97-05, Olympia WA

Bonneau, J.L. and D.L. Scarnechia. 1996. Distribution of juvenile bull trout in a thermal gradient of a plunge pool in Granite Creek, Idaho. Trans. Am. Fish. Soc. 125:628-630.

Bostick, W.E. et al. 1955. Pink, chinook, and silver escapement (1955). Puget Sound Stream Studies (1953-1956), Washington Department of Fisheries.

Fraley, J. J., and B. B. Shepard. 1989. Life history, ecology, and population status of migratory bull trout (Salvelinus confluentus) in the Flathead Lake and River system, Montana. Northwest Science 63(4):133-143.

Grette, G. B. and E. O. Salo. 1986. The status of anadromous fishes of the Green/Duwamish river system. Prepared for the U.S. Army Corps of Engineers.

Haas, G.R. and J.D. McPhail. 1991. Systematics and distributions of Dolly Varden (*Salvelinus malma*) and bull trout (*S. confluentus*) in North America. Can. J. Fish. Aquat. Sci. 48:2191-2211.

Healey, M.C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). In: Groot, C. and L. Margolis [eds]. Pacific Salmon Life Histories. University of British Columbia Press. Vancouver, British Columbia. 564 pp.

Johnston, J. 1995. Biological assessment of impact of proposed Grandy Creek steelhead hatchery on Skagit River Dolly Varden/bull trout. Extracted from WDFW report attached to EIS on Proposed Grandy Creek Hatchery.

King County International Airport (KCIA). 1993. Storm Water Pollution Prevention Plan. November 1993.

Kraemer, C. *in prep.* Some observations on the life history and behavior of the native char, Dolly Varden (*Salvelinus malma*) and bull trout (*Salvelinus confluentus*) of the north Puget Sound region. WDFW manuscript in preparation.

Kraemer, C. 2000. Personal communication from Curt Kraemer of WDFW to Margaret McCauley of Anchor Environmental at the *Salvelinus confluentus* Curiosity Society Meeting, August 17, 2000, Forks, WA.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale assessment of aquatic species and habitats. In: T.M. Quigley and S.J.

Arbelbide [eds.] An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, General Technical Report PNW-GTR-405.

Mavros, W. 2000. Presentation to the *Salvelinus confluentus* Curiosity Society Meeting. King County Biologist, August 17, 2000, Forks, WA.

McPhail, J. D. and C. D. Murray. 1979. The early life history and ecology of Dolly Varden (*Salvelinus malma*) in the upper Arrow Lakes. Report to BC Hydro and Ministry of Environment, Fisheries Branch. 113 p.

Mericas, D. and B. Wagoner. 1996. Runway deicers: a varied menu. Airport Magazine. American Association of Airport Executives, Alexandria, VA. August/September 1996.

Meyer, J.H., T.A. Pearce, and S.B. Patlan, 1980. Distribution and food habits of juvenile salmonids in the Duwamish Estuary, Washington, 1980. Report submitted to the U.S. Army Corps of Engineers, Seattle District by Fisheries Assistance Office, U.S. Fish and Wildlife Service, Olympia WA.

Myers, J. M., R. G. Kope, G. J. Bryant, D. Teel, L. J. Lierheimer, T. C. Wainwright, W. S. Grant, F. W. Waknitz, K. Neely, S. T. Lindley, and R. S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-NWFCS-35. 443 p.

Parametrix and King County DNR. 1999. King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay. Volume 1: Overview and interpretation. Prepared by the Duwamish River and Elliott Bay Water Quality Assessment Team, February 1999. http://splash.metrokc.gov/wlr/waterres/wqa/wqrep.htm.

Renaud, R. 2000. Personal communication from Rick Renaud of King County International Airport to Paul Schlenger Anchor Environmental in a telephone conversation, September 12, 2000.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements of bull trout *Salvelinus confluentus*. General Technical Report INT-GTR-302. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Rodrick E. and R. Milner 1991. "Management recommendation for Washington's priority habitats and species," Washington Department of Fisheries, Olympia, Washington.

Sagan Inc. 1995. King County International Airport Stormwater Drainage Study, April 1995.

Sandercock, F.C. 1991. Life history of coho salmon (*Oncorhynchus kisutch*). In: Groot, C. and L. Margolis [eds]. Pacific Salmon Life Histories. University of British Columbia Press. Vancouver, British Columbia. 564 pp.

Simenstad, C. A., K. L. Fresh, and E. O. Salo. 1982. The role of Puget Sound and Washington coastal estuaries in the life history of Pacific Salmon: An unappreciated function. In:

V. S. Kennedy [ed.]. Estuarine Comparisons. Academic Press, New York, NY. Pages 343-364.

Simenstad, C.A. 1983. The ecology of estuarine channels of the Pacific Northwest coast: a community profile. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-83/05.

National Marine Fisheries Service (NMFS). 2000. Habitat Conservation Division, Northwest Region Species List. http://www.nwr.noaa.gov/1habcon/habweb/listnwr.htm, referenced July 17, 2000.

Taylor, W. J., D. K. Shreffler, and J. R. Cordell. 1999. Alternative dredge disposal sites juvenile salmonid and epibenthic prey assessment. Preliminary Draft Technical Report. Prepared for Port of Seattle by Taylor Associates, Seattle, WA.

Underwood, Keith D., Steven W. Martin, Mark L. Schuck, and Allan T. Scholz. 1992. Investigations of Bull Trout (*Salvelinus confluentus*), Steelhead trout (*Oncorhynchus mykiss*), and Spring Chinook (*Oncorhynchus tshawytscha*) interactions in southeast Washington streams, 1992 Final Report. Prepared for Bonneville Power Administration, US Department of Energy.

United States Army Corps of Engineers (USACE), Washington Department of Ecology, and Port of Seattle. 1994. Southwest Harbor Cleanup and Redevelopment Project Joint Federal/State Final Environmental Impact Statement, Volume 1. USACE, Seattle District, November 1994.

United States Army Corps of Engineers (USACE), 2000. "Green/Duwamish River Basin Ecosystem Restoration Study, King County Washington," USACE, Seattle District, August 2000.

United States Fish and Wildlife Service (USFWS). 1998a. A framework to assist in making Endangered Species Act determinations of effect for individual or grouped actions at the bull trout subpopulation watershed scale. USFWS (adapted from National Marine Fisheries Service). February 1998. 45pp.

United States Fish and Wildlife Service (USFWS). 1998b. Bull Trout Interim Conservation Guidance, December 9, 1998.

United States Fish and Wildlife Service (USFWS), Pacific Region. 1999a. Service lists two more populations of bull trout as threatened. USFWS, Pacific Region. http://www.r1.fws.gov/news/9971.htm, referenced October 28, 1999, also published in the November 1, 1999 Federal Register.

United States Fish and Wildlife Service (USFWS). 1999b. Biological Assessment Preparation and Review. USFWS, Western Washington Office. Workshop handout, October 20, 1999, revision of March 10, 1993 document.

Washington Department of Ecology. 1999. Storm Water Management Manual for Western Washington. Final Draft. Publication Number 99-14 (revised from 91-75), Olympia, WA.

Washington State Department of Fisheries, A Catalog of Washington Streams and Salmon Utilization, Volume 1, Puget Sound Region, November 1975.

Washington Department of Fish and Wildlife (WDFW). 1994. 1992 Washington salmon and salmonid stock inventory: Appendix 1, South Puget Sound. WDFW and Western Washington Treaty Indian Tribes Olympia, WA, September 1994

Washington Department of Fish and Wildlife (WDFW). 1998. 1997 Washington salmonid stock inventory: bull trout/Dolly Varden. WDFW, Olympia, WA

Washington Department of Fish and Wildlife (WDFW). 1999. Washington's native chars. http://www.wa.gov/wdfw/outreach/fishing/char.htm, referenced September 29, 2000.

Weaver, T. M. and R. G. White. 1985. Coal Creek fisheries monitoring study No. III. Quarterly progress report. Montana State Cooperative Fisheries Research Unit, Bozeman, MT.

Weitkamp, D. E., and R. F. Campbell. 1979. Port of Seattle, Terminal 107 fisheries study. Document No. 79-1120-034FD. Parametrix, Inc., Kirkland, WA.

Weitkamp, D. E., and R. F. Campbell. 1980. Port of Seattle, Terminal 107 fisheries study. Document No. 80-1229-026F. 53 pp. Parametrix, Inc., Kirkland, WA.

PAGE INTENTIONALLY LEFT BLANK

Appendix A: Photographs

PAGE INTENTIONALLY LEFT BLANK

Photograph 1: Looking southwest towards the south end of the runway.

Photograph 2: Looking west from the eastern perimeter of the airport.

Photograph 3: Looking south at the north end of the runway.

Photograph 4: A general aviation area at the northeast end of the runway.

Appendix B: Agency Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Washington Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 534-9331

RECEI...
JAN 2 2
BY:

JAN 1 7 2001

Dear Species List Requester:

You have requested a list of listed and proposed threatened and endangered species, candidate species and species of concern (Attachment A) that may be present within the area of your proposed project. This response fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Federal agency compliance under the Act (Attachment B).

Should the Federal agency determine that a listed species is likely to be affected (adversely or beneficially) by the project, you should request section 7 consultation through this office. If the Federal agency determines that the proposed action is "not likely to adversely affect" a listed species, you should request Service concurrence with that determination through the informal consultation process. Even if there is a "no effect" situation, we would appreciate receiving a copy for our information.

Species of concern are those species whose conservation standing is of concern to the Service, but for which further status information is still needed. Conservation measures for species of concern are voluntary, but recommended. Protection provided to these species now may preclude possible listing in the future.

There may be other federally listed species that may occur in the vicinity of your project which are under the jurisdiction of the National Marine Fisheries Service (NMFS). Please contact NMFS at (360) 753-9530 to request a species list.

In addition, please be advised that federal and state regulations may require permits in areas where wetlands are identified. You should contact the Seattle District of the U.S. Army Corps of Engineers for Federal permit requirements and the Washington State Department of Ecology for State permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Yvonne Dettlaff (360) 753-9582 or Bobbi Barrera (360) 753-6048.

Sincerely,

John Grettenberger for

Gerry A. Jackson, Manager
Western Washington Office

Enclosure(s)

cc: FAA
WDFW R4

ATTACHMENT A

January 10, 2001

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED KING COUNTY INTERNATIONAL AIRPORT PROJECT IN KING COUNTY, WASHINGTON

(T23N R04E S03-04; T24N R04E S28-29,33-34)

FWS REF: 1-3-01-SP-0453

LISTED

Bald eagle (*Haliaeetus leucocephalus*) - wintering bald eagles may occur in the vicinity of the project. Wintering activities occur from October 31 through March 31.

Bull trout (*Salvelinus confluentus*) - may occur in the vicinity of the project.

Major concerns that should be addressed in your biological assessment of the project impacts to listed species are:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project construction (i.e., habitat loss, increased noise levels, increased human activity) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None.

CANDIDATE

None.

SPECIES OF CONCERN

The following species of concern may occur in the vicinity of the project:

Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Pacific lamprey (*Lampetra tridentata*)
River lamprey (*Lampetra ayresi*)

ATTACHMENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threatened species to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after it has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affected by a construction project. The process is initiated by a federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with the Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to be affected by the proposal, which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Service, state conservation department, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. Upon completion, the report should be forwarded to our Endangered Species Division, 510 Desmond Drive SE, Suite 102, Lacey, WA 98503-1273.

---

* "Construction project" means any major federal action which significantly affects the quality of the human environment (requiring an EIS), designed primarily to result in the building or erection of human-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as permits, grants, licenses, or other forms of federal authorization or approval which may result in construction.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

February 23, 2001

Margaret McCauley
Anchor Environmental LLC
1411 4th Ave – Ste 1210
Seattle WA 98101

SUBJECT: King County International Airport Work
(T23N R04E S03,04)

We've searched the Natural Heritage Information System for information on significant natural features in your project area. Currently, we have no records for rare plants or high quality ecosystems in the vicinity of your project.

The information provided by the Washington Natural Heritage Program is based solely on existing information in the database. In the absence of field inventories, we cannot state whether or not a given site contains high quality ecosystems or rare species; there may be significant natural features in your study area of which we are not aware.

The Washington Natural Heritage Program is responsible for information on the state's endangered, threatened, and sensitive plants as well as high quality ecosystems. We have begun to add information to our database on selected groups of animals of conservation concern, such as freshwater mussels, butterflies and bats. However, the authority for protection of animal species in Washington rests with the Department of Fish and Wildlife. To ensure that you receive information on all animal species of concern, please contact Priority Habitats and Species, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia, WA 98501-1091, or by phone (360) 902-2543.

If you have the opportunity, visit our website at http:// www.wa.gov/dnr and click on *Conservation/Protection*. Please do not hesitate to call me at (360) 902-1667 if you have any questions, or by E-Mail: sandra.moody@wadnr.gov.

Sincerely,

Sandy Swope Moody

Sandy Swope Moody, Environmental Coordinator
Washington Natural Heritage Program
PO Box 47014
Olympia WA 98504-7014

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - HABITATS AND SPECIES REPORT
IN THE VICINITY OF T24R04E SECTION 33
Report Date: January 09, 2001

This map contains the following species and/or habitat locations that are deemed sensitive by the Washington Department of Fish and Wildlife Sensitive Fish and Wildlife Policy.

PHS CODE/ SPPCODE	COMMON NAME	USE CODE	USE DESCRIPTION
HALE	BALD EAGLE	B	BREEDING OCCURRENCE

PHS POLYGON FORM LIST - CROSS REFERENCE REPORT
IN THE VICINITY OF T24R04E SECTION 33

PHSPOLY#	FORM NUMBER/ PHS CODE*USE CODE
2	904754 ESTUR*-
3	900000 *-
4	902036 UNOS*-
5	902525 WET*-
6	917601 HALE*B-
7	902038 UNOS*-
8	902038 UNOS*-
9	902037 RIPAR*-
10	902525 WET*-
11	902525 WET*-
12	902525 WET*-
13	902525 WET*-
14	902525 WET*-
15	902525 WET*-
16	902525 WET*-
17	902037 RIPAR*-
18	900000 *-

PHS POLYGON - SPECIES AND HABITAT LIST

PHS FORM#	PRIORITY	PHS CODE	COMMON NAME	USE CODE	USE DESCRIPTION
900,000					
902,036	YES	UNOS	URBAN NATURAL OPEN SPACE		
902,037	YES	RIPAR	RIPARIAN ZONES		
902,038	YES	UNOS	URBAN NATURAL OPEN SPACE		
902,525	YES	WET	WETLANDS		
904,754	YES	ESTUR	ESTURINE ZONE		
917,601	YES	HALE	BALD EAGLE	B	BREEDING OCCURRENCE

Form number 900000 indicates presence of PHS is unknown or the area was not mapped. Form numbers 909998, 909997, or 909996 indicate compilation errors.

YES under the "PRIORITY" column indicates that the species or habitat is considered a priority and is on the Priority Habitats and Species List and/or the Species of Concern List.

WILDLIFE HERITAGE POINT - SPECIES LIST AND REPORT
IN THE VICINITY OF T24R04E SECTION 33

QUADPT	PRIORITY	SPPCODE	COMMON NAME	USE CODE	USE DESCRIPTION
4712253019	NO	PAHA	OSPREY	B	BREEDING OCCURRENCE

YES under the "PRIORITY" column indicates that the species or habitat is considered a priority and is on the Priority Habitats and Species List and/or the Species of Concern List.

quadpt: 4712253019 sppcode: PAHA use: B name: OSPREY
year: 2000 class: SA accuracy: C state status: SM fed status:
township - range - section: T23N R04E S04 SWOFNE occur#: 1127 seqno: 1
general description:

form: 902,036 species/habitat: UNOS species use: season: accuracy: 1
sitename: BEACON HILL I-5 ROW AND ADJACENT LAND.
general description:
STEEP WOODED HILLSIDE ON WEST SIDE OF BEACO HILL.

source: FORESTER, BRET; DAVID EVANS & ASSOC.; PERSONAL OBSERVATION.
date: 032891 code: PROF
synopsis:
BIOLOGIST WITH CONSULTING FIRM CALLED REQUESTING STATUTORY AUTHORITY FOR HAWK NE STS. HE CONFIRMED DISCOVERY OF ACTIVE REDTAIL NEST IN THIS AREA.

source: MULLER, TED; WDW; PERSONAL OBSERVATION.
date: 031091 code: PROF
synopsis:
WITNESSED TWO RED-TAILED HAWKS IN WHAT APPEARED TO BE COURTSHIP FLIGHT.

form: 902,037 species/habitat: RIPAR species use: season: accuracy: 1
sitename: SOUTHERN HEIGHTS TRIBUTARIES TO DUWAMISH R.
general description:
RELATIVELY STEEP FORESTED RAVINES WITH SMALL PERENNIAL STREAM.

source: MULLER, TED; WDW; PERSONAL OBSERVATION.
date: 08 89 code: PROF
synopsis:
VISITED SITE IN 1989 TO ESTABLISH MITIGATION FOR HPA.

form: 902,038 species/habitat: UNOS species use: season: accuracy: 1
sitename: SOUTH BEACON HILL/EMPIRE WAY. OPEN SPACES.
general description:
FORESTED HILLSIDES ON SOUTH BEACON HILL.

source: MULLER, TED; WDW; PERSONAL OBSERVATION.
date: 03 91 code: PROF
synopsis:
HAVE DRIVEN BY THESE SITES NUMEROUS TIMES.

form: 902,525 species/habitat: WET species use: season: accuracy: 1
sitename: GREEN RIVER WETLANDS (LOWER RIVER).
general description:
VARIOUS TYPES OF WETLANDS THROUGHOUT THE LOWER GREEN RIVER VALLEY (DOWNSTREAM FR
OM FLAMING GEYSR PARK). SOME OF THESE ALSO HAVE OPEN WATER COMPONENTS.

source: KING COUNTY SENSITIVE AREAS MAPS.
date: 12 90 code: GSMAP
synopsis:
A USGS BASED MAP SYSTEM ALSO USING NWI INFORMATION.

source: MULLER, TED; ET AL; WDW, SCS, AND COUNTY.
date: 91 code: PROF
synopsis:
MANY OF THESE SITES HAVE BEEN VISITED BY FIELD STAFF.

form: 904,754 species/habitat: ESTUR species use: season: accuracy: 1
sitename:
general description:
BAY/ESTUARY-COASTAL ZONE ATLAS CODE 54-MODERATELY PROTECTED MARINE EMBAYMENTS WI
TH FREE CONNECTIONS WITH THE OPEN SEA. BLUFFS, REACH SUBSTRATES MARSHES, EELGRAS
S BEDS, AND OTHER INTERTIDAL HABITATS ARE ASSOCIATED WITH IT.

source: COASTAL ZONE ATLAS OF WASHINGTON. STATE OF WASHINGTON DEPT OF ECOLOGY.
date: 78 code: CZA
synopsis:

source: SCHIRATO, MARGIE WDFW AREA HABITAT BIOLOGIST
date: 051500 code: PROF
synopsis:
FIELD VISIT TO NORTH BAY.

source: MOLENAAR, DAVE WDFW AREA HABITAT MARINE BIOLOGIST
date: 05 00 code: PROF
synopsis:
SITE VISITS TO WOLLOCHET BAY, ORO BAY, HENDERSON INLET, MAYO COVE, ROCKY BAY,
VON GELDERN COVE, VAUGHN BAY, AND OTHERS.

form: 917,601 species/habitat: HALE species use: B season: WSU accuracy: 1
sitename: SEWARD PARK SOUTH
general description:
BALD EAGLE BREEDING TERRITORY.

source: NEGRI, STEVE WDFW
date: 061798 code: PROF
synopsis:
ON-SITE OBSERVATION.

PRIORITY ANADROMOUS AND RESIDENT FISH PRESENCE REPORT FROM THE STREAMNET DATABASE
IN THE VICINITY OF T24R04E SECTION 33
Report Date: January 09, 2001

PRIORITY ANADROMOUS FISH PRESENCE

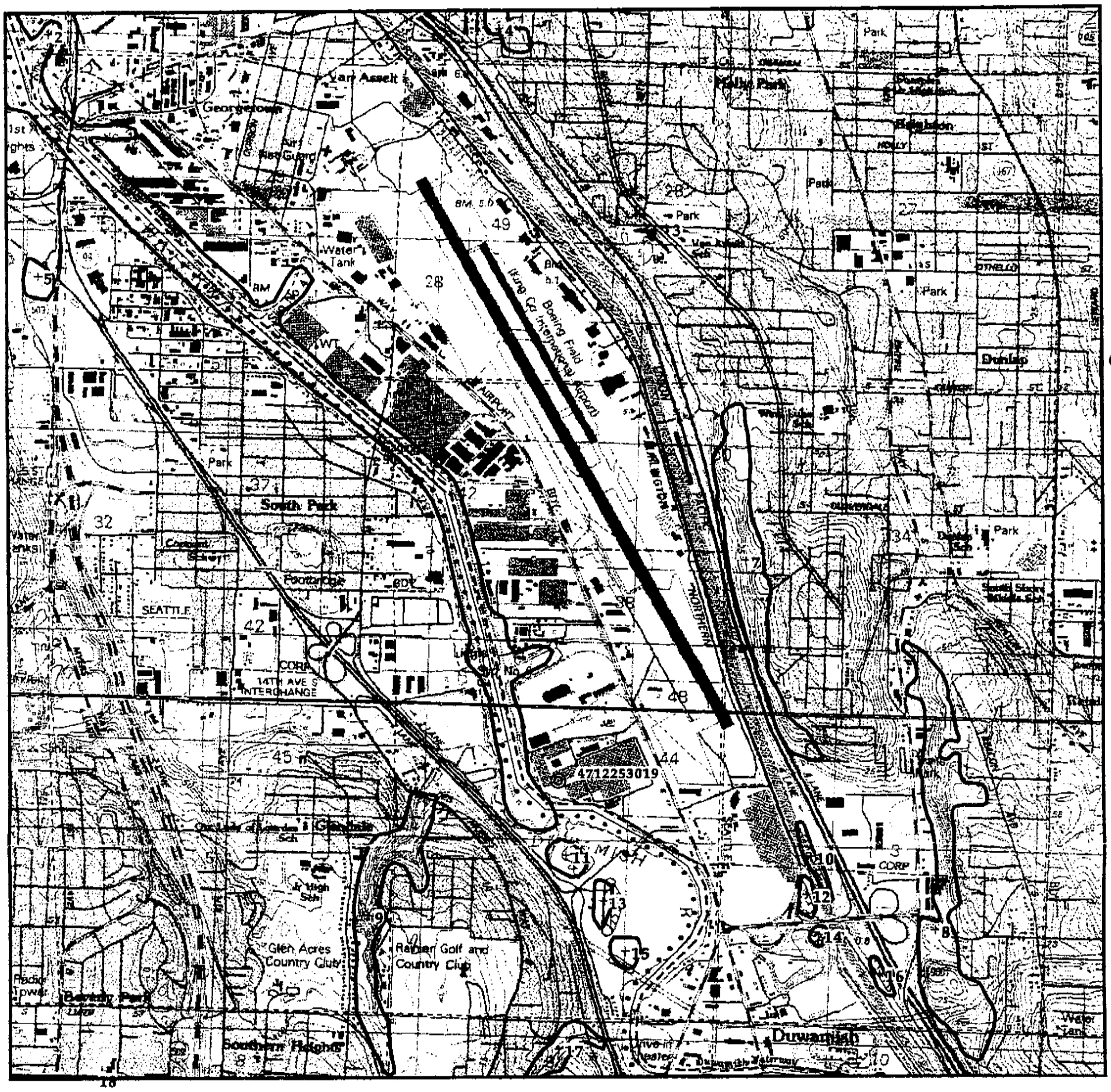
CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE
CHFA	Fall Chinook	Duwamish Waterway	1223588475856	05-21-97	C. Smith, WDFW
CHUM	Chum Salmon	Duwamish Waterway	1223588475856	07-07-97	R. Egan, WDFW
COHO	Coho Salmon	Duwamish Waterway	1223588475856	04-21-97	C. Boranski, WDFW
SOCK	Sockeye Salmon	Duwamish Waterway	1223588475856	07-07-97	R. Egan, WDFW
STSU	Summer Steelhead	Duwamish Waterway	1223588475856	06-17-97	P. Castle, WDFW
STWI	Winter Steelhead	Duwamish Waterway	1223588475856	01-18-97	T. Crop, WDFW

PRIORITY RESIDENT FISH PRESENCE

CODE	COMMON NAME	STREAM NAME	STREAM LLID	RECORD DATE	SOURCE

The fish information in this report only includes data that the Washington Department of Fish and Wildlife (WDFW) maintains in a central database. This information only documents the location of important fish resources to the best of our knowledge. It is not a complete inventory of the fish species in the state. Fish are identifed as priority by WDFW if they meet 1 of 3 criterion as listed in the Priority Habitats and Species List.

For questions on the StreamNet Database, please contact Martin Hudson at (360) 902 2487.



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

HABITATS AND SPECIES MAP IN THE VICINITY OF T24R04E SECTION 33

Map Scale – 1 : 24000
Coordinate System – State Plane South Zone 5626 (NAD27)
Production Date – January 09, 2001
Cartography by WDFW Habitat Program GIS

PLEASE NOTE

This map may contain some species not considered priority. If known occurences of spotted owls and marbled murrelets exist they will be displayed on this map, however, detailed information for them are not included in accompanying reports.

DISCLAIMER

This map only includes information that Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and is is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necessary to rule out the presence of priority resources.

Locations of mapped wildlife and habitat features are generally within a quarter mile of the locations displayed on this map. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using maps more than six months old.

To insure appropriate use of this information, users are encouraged to consult with WDFW biologists.

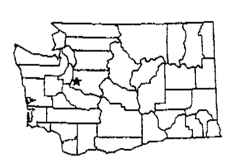
MAIN DATA SOURCES

Priority Habitats and Species polygon and Habitat point data: WDFW Habitat Program.
Wildlife Heritage, Spotted Owls, and Marbled Murrelet data: WDFW Wildlife Program.
1:100,000 Streams and fish presence data: WDFW StreamNet Database.
National Wetlands Inventory data: US Fish and Wildlife Service.
Seabird Colony data: US National Oceanic and Atmospheric Administration.
Kelp Bed, Oak Stand, Eelgrass, Turf Algae and Township/Section data: Wa. Dept. of Natural Resouces.
Columbia River Tidal Marsh data: Oregon State Service Center for Geolgraphic Information Systems (1988).
7.5-minute quadrangle image from US Geological Survey.

MAP LEGEND

- Priority Habitats and Species (PHS) Polygon Borders
- ◎ Wildlife Heritage Points
- ⊕ Marbled Murrelet Points (Occupancy Sites Only)
- ○ Habitat Points
- △ Seabird Colonies
- * Spotted Owl Site Centers (Official Status 1-4)
- Spotted Owl Management Circles Established Territory
- Spotted Owl Management Circles Insufficient Data To Establish Territory
- Township Lines
- Section Lines
- Rivers and Streams at 1:100,000 Scale Resolution
- Anadromous Fish Presence
- Resident Fish Presence
- Priority Anadromous/Resident Fish Presence
- National Wetlands Inventory

Washington Department of FISH and WILDLIFE



AREA LOCATION

0 0.5 1
MILES

APPENDIX G

ARCHAEOLOGICAL RESOURCES AND TRADITIONAL CULTURAL PLACES ASSESSMENT

Document on File with the Washington State Historic Preservation Officer

Copies available from King County upon request

PAGE INTENTIONALLY LEFT BLANK

APPENDIX H

MEMORANDUM OF AGREEMENT CONCERNING THE WINDOW MITIGATION FOR THE GEORGETOWN STEAM PLANT, COMMUNICATION AND VIBRATION STUDY

PAGE INTENTIONALLY LEFT BLANK

MEMORANDUM OF AGREEMENT

WHEREAS, King County ("the County") has prepared a Master Plan for King County International Airport ("KCIA" or "the Airport") that identified that the existing runway safety areas ("RSAs") do not meet the FAA's current standards;

WHEREAS, King County and FAA have reviewed all prudent and feasible alternatives and determined that only two primary alternatives exist: shift the runway about 880 feet to the north to achieve the standards or shorten the runway by about 880 feet to meet the standards;

WHEREAS, the shortening of the runway will create significant effects on the operational capability of the Airport and adversely affect the ability of The Boeing Company to service critical aircraft such as the AWACs and to test and deliver commercial aircraft;

WHEREAS, the Georgetown Steam Plant ("the Steam Plant"), a National Historic Landmark is located at the Airport. It is the last working example of vertical Curtis turbines and is an example of the innovative fast-track design and construction method pioneered by Frank Gilbreth, a nationally recognized efficiency engineer;

WHEREAS, the City of Seattle Light owns the Steam Plant and leases the facility to a museum foundation whose purpose is to preserve the historical integrity of the Georgetown Steam Plant;

WHEREAS; the Georgetown Steam Plant is located approximately 1,200 feet from the existing runway end and taxiway and would be about 420 feet with the proposed runway shift;

WHEREAS, a noise analysis was conducted for the State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) for the Master Plan. The analysis found that the runway shift would not create a significant noise impact, as defined by FAA Order 5050.4A. Therefore, no aircraft noise mitigation at the Steam Plant is warranted by this project;

WHEREAS, a special vibration analysis conducted at the Georgetown Steam Plant to evaluate the effects of the runway shift on the physical structure found that with conservative mitigation assumptions, the glass window panels could be vibrated loose which would constitute an adverse impact;

WHEREAS, the County has proposed to conduct a window mitigation project on behalf of the City of Seattle Light;

WHEREAS, the County and Federal Aviation Administration have consulted with the Washington State Department of Community, Trade and Economic Development - Office of Archaeology and Historic Preservation (otherwise commonly known as the State Historic Preservation Officer -- SHPO), and other signing parties to this agreement, pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act, concerning the Georgetown Steam Plant;

WHEREAS, King County, City of Seattle, State of Washington, National Park Service, Seattle Landmarks Board, and the Advisory Council on Historic Preservation (collectively referred to as "the parties") were invited to participate in the consultation, and having participated are in concurrence with this Memorandum of Agreement;

WHEREAS, there are no other alternatives to the runway shift and the anticipated impacts can be mitigated;

NOW, THEREFORE, the parties agree that prior to operation of the shifted runway at the Airport, all reasonable attempts will be made to address vibration impacts to the facility.

King County will ensure the following:

1. Prior to mitigating the vibration effects on any windows, the County or its agents, with oversight by the City of Seattle, will conduct a photographic documentation of the facility in accordance with the requirements of the SHPO. Copies of the documentation will be provided to the Washington State Department of State Photographic Archives and City of Seattle and to the SHPO for inclusion in the Washington Master Site File.

2. King County will conduct a supplemental analysis (and associated coordination) of the effect of the project on the Georgetown Steam Plant to facilitate the design of the window mitigation. The existing study, based on an 800 –foot shift, showed that the using conservative criteria the need for replacing the windows. The additional study will be based on 880 feet. In addition to final quantification of vibration effect, the study will include a window conditions evaluation, which will identify the possible means of addressing vibration mitigation, such as re-caulking the glass, storm windows and window replacement. The County will continue to coordinate the results of this study with the signators of this agreement. The mitigation options will be evaluated in accord with the Secretary of Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (U.S. Department of Interior, National Park Service, 1983). The County will propose to the signators a recommended window vibration mitigation project that ensures the windows are protective of the anticipated vibration levels.

3. The County will ensure that the window mitigation project is compatible with the historic and architectural qualities of the Plant in terms of current scale, massing, color, and materials, and is responsive to the recommended approaches to rehabilitation and new construction set forth in the Secretary of Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (U.S. Department of Interior, National Park Service, 1983). The County, using a qualified window restoration consultant, will further ensure that the design and specifications for the undertaking are developed in consultation with the SHPO and submitted to the SHPO for approval. No construction, alteration, remodeling or any other physical action to the Plant subject to the window mitigation project will be undertaken which would affect the appearance or structural integrity of the plant without the express written permission of the SHPO.

4. The County shall ensure that any change order to the project design required subsequent to the approval of the project will be developed in consultation with the SHPO, and all such changes will be submitted to the SHPO for approval.

5. Should the SHPO object within 20 calendar days to any plans, specifications, change orders, or construction documents provided for review pursuant to the terms of this Agreement, the County shall consult with the SHPO to resolve the objection. If the County determines that the objections can not be resolved, the County shall request the further comments of the SHPO pursuant to 36 CFR 800.6(b). Any SHPO comment provided in response to such a request shall be taken into account by the County in accordance with 36 CFR 800.6(c)(2) with reference only to the subject of the dispute under this agreement. In the event that a SHPO comments are not resolved, the County will refer the issue to FAA for resolution.

6. Should any signatory to this Agreement determine that the terms of this Agreement cannot be met or believes that a change is necessary, that signatory is responsible for immediately requesting that other signatories consider voiding, amending, or affecting an amendment to this Agreement. Such an agreement or addendum shall be executed in the same manner as the original agreement.

EXECUTION OF THIS MEMORANDUM OF AGREEMENT and implementation of its terms evidences that King County has afforded the SHPO, National Park Service, Seattle Landmarks Board, and City of Seattle an opportunity to comment on the proposed window mitigation project and its effect on the Plant, and that the County has taken into account the effect of the runway shift and window mitigation on this historic property.

King County	Date
Federal Aviation Administration	Date

CONCUR:

City of Seattle – Seattle Light	Date
City of Seattle – Historic Preservation Program	Date

Duwamish Tribal Council	Date
King County Landmarks and Heritage Program	Date
Muckleshoot Tribal Council	Date
National Park Service	Date
Suquamish Tribal Council	Date
Washington Office of Archaeology and Historic Preservation	Date

EVALUATION OF NOISE INDUCED BUILDING VIBRATION

AT THE HISTORIC GEORGETOWN STEAM PLANT

KING COUNTY INTERNATIONAL AIRPORT/BOEING FIELD PROPOSED RUNWAY EXTENSION

September 3, 1999

PREPARED FOR

Synergy Consultants, Inc.
4742 42nd Ave. SW, Suite 9
Seattle, Washington 98116

PREPARED BY

THE GREENBUSCH GROUP, INC.
1900 W. Nickerson St, Suite 201
Seattle, Washington 98119

PAGE INTENTIONALLY LEFT BLANK

SUMMARY

Measurements were made of noise-induced vibration levels in the historic Georgetown SteamPlant during aircraft events at Boeing Field. Results of these measurements were used to develop the "signature" associated with the building response to the sound pressure levels. These signatures were then applied to the predicted increases in sound pressure due to the relocation of the runway 800 feet nearer to the Plant. The predicted increase in vibrational response of the building was then evaluated for potential of resulting structural damage.

The generally accepted threshold for "safe" levels of peak velocity vibration is 50 mm/sec. for modern building structures. Additional research has been conducted to determine the threshold for structural damage for historic buildings. Consensus has not been reached by the researchers to date, with thresholds varying from 2.5 mm/sec to 47 mm/sec. Assuming the most conservative of these thresholds, 2.5 mm/sec., the predicted peak velocity response of most of the Steam Plant building elements fall well below this level. The exception to this is the glazing.

Peak velocities predicted for the glass response during the noisiest aircraft events approaches the threshold of 2.5 mm/sec. The predicted levels have a 95% confidence, with a potential for the response to exceed the threshold on occasion. This could result in cracking of some of the units, particularly for glass units held loosely in place by deteriorating stopping material. Levels of vibration necessary to break the panels, shattering the glass, would likely not be reached with noise levels generated by aircraft using Boeing Field. This type of response is typically associated with the super-sonic aircraft.

INTRODUCTION

Measurements were made on August 16, 1999 of noise-induced building vibration levels at the Georgetown SteamPlant. The facility is an historic 1906 structure, located at 6511 Ellis Avenue South, Seattle, Washington, approximately 1250 feet North and 450 feet West of the end of Runway 13R/31L at King County International Airport/Boeing Field. The building is owned by Seattle City Light and is currently being operated by the Georgetown PowerPlant Museum as a museum and teaching facility to promote education on steam turbine generators. The plant is a National Historic Mechanical Engineering Landmark and contains the last operating examples of original large scale steam turbines.

King County is proposing to extend Runway 13R/31L approximately 800 feet to the North and removing 800 feet of runway to the South to bring the airport into compliance with FAA Safety Area requirements. The proposed extension relocates the runway to within approximately 450 feet South and 450 feet East of the South end of the Steam Plant.

The purpose of this study was to assess the potential for noise-induced vibration to cause structural damage to the Steam Plant with the extension of the runway.

STEAM PLANT STRUCTURE

The Steam Plant is constructed primarily of reinforced concrete, with additional structural pilings and isolation incorporated into the original design of the structure to withstand the weight of the equipment and the forces imposed on the building by the operating generators.

A section at the Northeast corner of the building deviates from this construction with an exterior envelope of corrugated metal attached to studs. The metal skin is the extent of the construction at this point, with the studs and back side of the metal panel exposed to the interior of the building. This is an historic feature of the Plant, as this construction was characteristic of steam plants of this era, as an access point to remove generators for repair or replacement.

Upper floor structure in the majority of the building is reinforced concrete. Flooring in the upper levels of the "access" section of the building is consistent with the removable walls and has been constructed from 4" thick wood decking.

Glazing throughout the building is single strength glass. Some of the glass panels contain an integral wire mesh, although most do not have this additional reinforcement. Glazed areas consist of many smaller panes of glass, none exceeding 12" by 12". Clerestory windows along the upper ridge have some panels filled with glass, although many of these panels appear to be missing. Corrugated fiberglass panels currently cover the celerstory areas.

Air intake louvres currently open directly into the building. These openings are not ducted and occur in areas used for instruction.

Doors are typically large, double leaf panels constructed of wood with large areas of glazing. The glass is similar to the building windows, small panes of single strength glass. Doors are ill fitting in the openings. Large gaps around the perimeter and at the meeting stiles of paired doors are significant areas of sound infiltration.

MEASUREMENT METHODOLOGY

The approach to the assessment of the noise induced vibration levels involved the simultaneous measurements of both airborne and vibration levels within the Plant and around the Plant grounds.

Preliminary measurements were taken to aid in the development of the test methodology. Various factors such as; transducer location, mounting techniques, ample gain setting, recording techniques, statistical uncertainties, and measurement variations were determined prior to final testing.

Transducer positions were selected based on preliminary field data. The microphones and accelerometers were calibrated at the beginning and at the end of every test period. Actual aircraft operations from Boeing Field were used as the source to excite the Steam Plant building. Recordings were made of aircraft taxi, run-up and departure, as well as recordings of helicopter departure and landing directly east of the building. Data collected by the microphones and accelerometers in or near the Plant were stored on an 8 channel Sony DAT Recorder (PC208). Additional airborne sound levels were also measured at a distance 800 feet South of the Plant. This location was selected to approximate the relationship from the runway end to the South edge of the Steam Plant with the proposed runway extension. The data collected at this far position was captured using a Larson Davis 2900 Analyzer.

MEASUREMENT EQUIPMENT

Equipment utilized for these measurements included the following:

- Sony PC208AX, DAT Recorder
- Larson Davis 2900, Analyzer
- Larson Davis 2560, ½ inch microphones
- Larson Davis 2200C, Pre-amp. Power supply
- B&K 4384, Accelerometers
- B&K 4369, Accelerometers
- B&K 2635, Charge Amplifier

Transducer locations for these measurements are as follows:

Microphones

- Mic. 1: 800 feet south of the south wall of the Steam Plant; 4 feet above ground.
- Mic. 2: 50 feet East of the Northeast wall of the Steam Plant; 4 feet above ground.
- Mic. 3: Center of the East classroom on 2nd level of the Steam Plant; 4 feet above floor.

Accelerometers

- Accel. 1: Outside 3rd bay east concrete wall of steam plant; 6 feet above ground.
- Accel. 2: Inside 3rd bay east concrete wall of steam plant; attached to 2nd level concrete floor.
- Accel. 3: Center of east classroom on 2nd level of the steam plant; attached to classroom wood floor. (note: Accel. 3 was moved in the East Classroom on the 2nd level of the Steam Plant; attached to South window during a helicopter event.)

CONDITIONS MEASURED

Conditions documented during the measurements are shown below:

- Ambient
- AWACS (707); Departure South
- B-52; Departure South
- Helicopter; Directly East of Plant,
- Business Jet; Departure South
- Internal to Steam plant; Overhead crane; No aircraft
- Internal to Steam plant; Compressor; No aircraft
- Internal to Steam plant; Engine start-up

CRITERIA

Vibration is a rapidly fluctuating motion. Various terms have been developed to describe and quantify this motion; displacement, velocity and acceleration. Displacement is a description of the amount of movement from the static condition and is probably the easiest of the three descriptors to understand. Velocity represents the instantaneous speed of the movement and acceleration defines the rate of change of speed. While displacement is the most easily understood, human perception of the motion is most accurately described and measured by either velocity or acceleration.

Tactile perceptibility is defined as surface motion or vibration which is discernible by humans. Perception of vibration does not indicate that structural damage is imminent. The threshold for tactile perception of vibration is significantly below the level of potentially damaging energy.

The potential for damage of any structure is dependent upon the construction methods, mass and stiffness of materials used in the structure and the condition and age of the building. Cracking of plaster typically is one of the first indications of distress for a building, thus it is the basis upon which many of the criteria for structural damage to buildings have been developed.

Much research has been done to determine the threshold of structural damage. Some of the criterion have been defined in velocity, while others were developed in acceleration. Various reference quantities have also been used for describing these limits of tolerable vibrational energy. For the purposes of this study, peak particle velocity with a reference of mm/sec has been selected as the descriptor. Peak particle velocity is defined as the maximum instantaneous peak of the vibration signal. This criteria is often used in monitoring blasting, to determine the stresses that are experienced by a building. Criteria not listed in this format, has been converted for comparison. Table 1 below compares several of the more applicable criteria.

TABLE 1 COMPARISON OF DAMAGE CRITERIA.

Resource	***Vibration type***	***Type and condition of structure***	***Maximum Peak Particle Velocity mm/sec***
Rudder [1]	Traffic	All	2.5
Esteves [1]	Blasting	Special Care Historic Monuments-loose soil	2.5
Swiss Association of Standards [1]	Machines, Traffic	Objects of Historic Interest and other sensitive construction	3 (10-30 Hz) 3-5 (30-60 Hz)
American Society of Civil Engineers[1]	Blasting	Historic and Sensitive Older Buildings	6 (1-10 Hz) 13 (10-100 Hz)
Swiss Association of Standards [1]	Blasting	Objects of Historic Interest and other sensitive construction	8 (10-30 Hz) 8-12 (30-60 Hz)
Ashley [1]	Blasting	Ancient and historic monuments	8
NASA [3]	Concorde Aircraft	Historic Sulley Plantation	25 (ave level, not peak)
Hubbard [4]	Blasting, Explosion, Sonic Booms	Residential	47 (glass breakage)
US Corps of Engineers/Bureau of Mines* [1]	Blasting	General	50
Wiss [2]	Blasting	Residential	50
Wiss [2]	Blasting	Commercial/Engineered Structures	100

Source: Various

There has generally been consensus among researchers as to the accepted damage criterion for "safe" levels of vibration for modern building types. This limit has been set at a peak particle velocity not exceeding 2"/sec or 50 mm/sec. It is clear, from a review of the criteria listed above, that the consensus for more fragile, historic structures has not yet been reached. However, it is also evident from the above research, that the limit of 50 mm/sec is not adequate to protect sensitive, older buildings.

ANALYSIS

The simultaneous sound and vibration level data were compared and evaluated to determine the functional relationship between the structural response of the building and level of airborne sound pressure associated with the various aircraft events. A general trend, or building "signature" was developed from this relationship. The signature varied very little between aircraft type. Only the amplitude, or the magnitude, of the response varied. Thus, louder events caused more response from the structure, although the frequency response of the building was consistent.

These building "signatures" were then applied to the sound pressure data for the closer proximity to the runway, to predict the building response to the potential increase in sound pressure levels associated with the relocation of aircraft operations. The AWACS departure had the greatest sound pressure levels associated with the event, so this aircraft was used as the model for the prediction. The AWACS tested was an older 707 aircraft and is considered to have a higher sound characteristic that the newer 737 models.

Enclosed are graphs of various conditions measured and predicted. Predictably, the concrete structure was less responsive than the lighter weight metal and wood structure. Assuming the most conservative approach of 2.5 mm/sec as the criteria for "safe" levels of peak vibration for this historic structure, none of the measured or predicted levels exceed this value. The levels, in fact, are significantly below this threshold for every element, except the glass.

Predicted peak velocities at the glazing, during the louder aircraft events approach this threshold for the proposed extended runway location. The statistical confidence level for the predicted values is 95%. It is conceivable that this value could, on occasion, exceed this threshold.

CONCLUSION

The potential for noise-induced structural damage to the Georgetown SteamPlant is low for every element except the glazing. The predicted levels of vibrational energy associated with the noisiest events at the proposed runway location approach the most conservative threshold for structural damage for historic buildings. However, the conclusion from the research listed in Table 1 is that a level of vibrational energy slightly exceeding the 2.5 mm/sec may cause some of the glass panels to crack. A significantly higher level of 47 mm/sec would likely be required for the glass to shatter. It is not likely that sub-sonic aircraft would generate this level of response from the glazing.

The risk of damaged glazing units due to cracking is a possibility. For panels where the stop is brittle or missing and the glazing fits loosely in the opening, there is a potential for greater levels of movement due to the lack of edge constraint. Additional stress would be experienced by these panels during an aircraft event as the increased sound pressure levels cause them to rattle and impact the trim pieces restraining them.

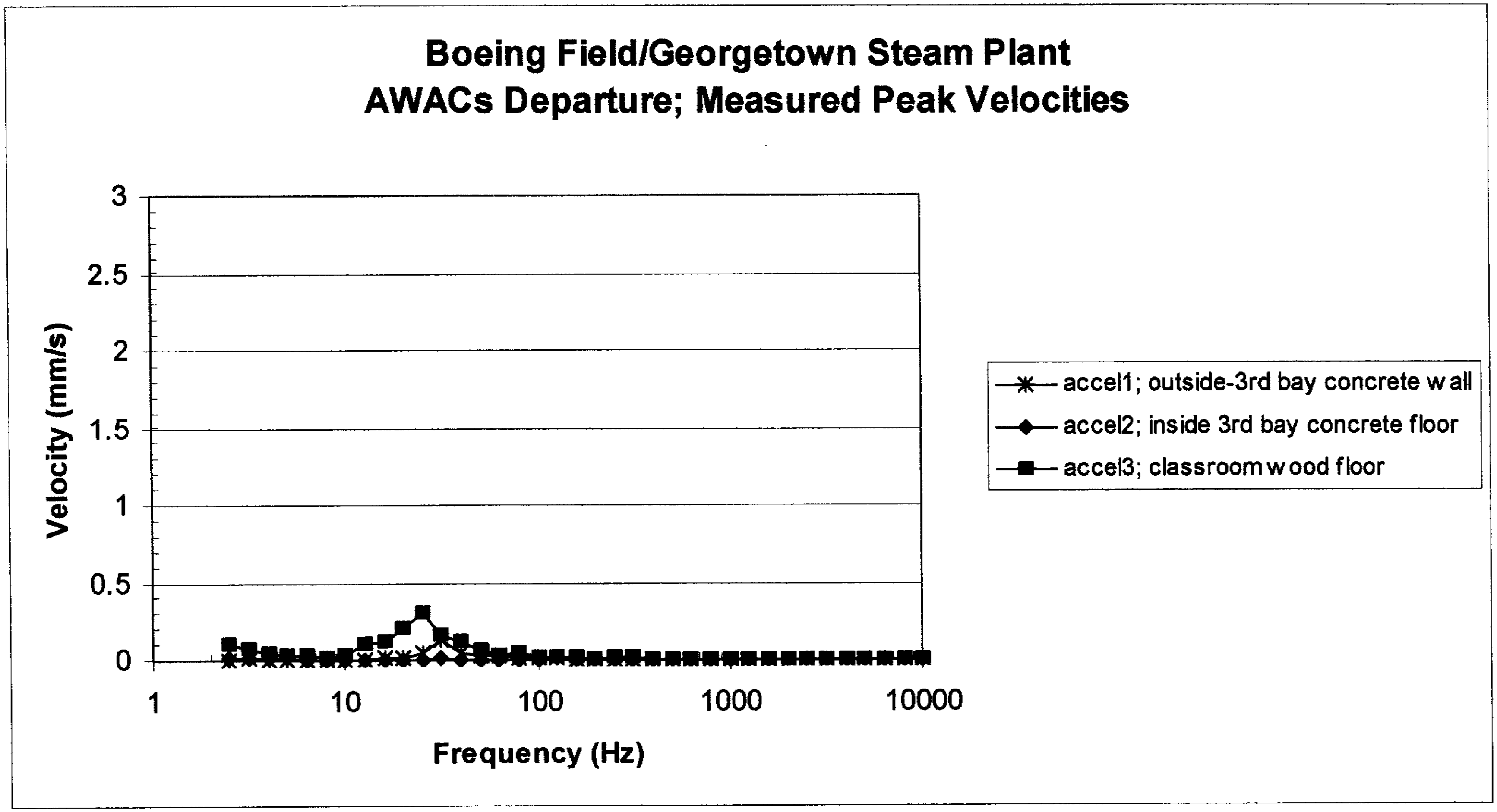
REFERENCES:

1. Konon, W., Schuring, J. R., "Vibration Criteria for Historic and Sensitive Older Buildings," ASCE, Houston, Texas, October 1983.

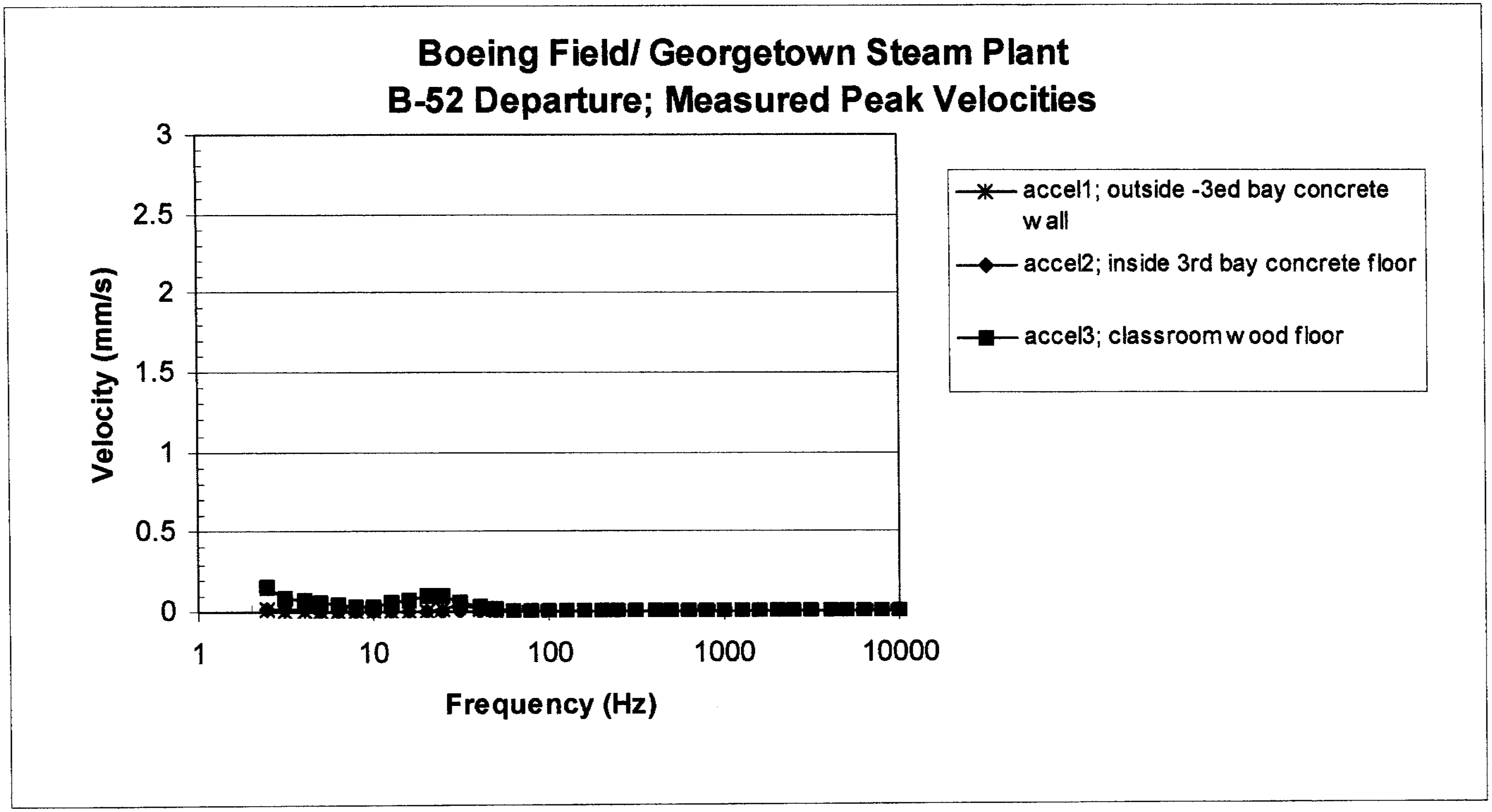
2. Lo, Mei-Ban. "Prediction of Ground Vibration Induced by Pile Driving," 1st Conference on Structural Engineering, Phillipines, October, 1981.

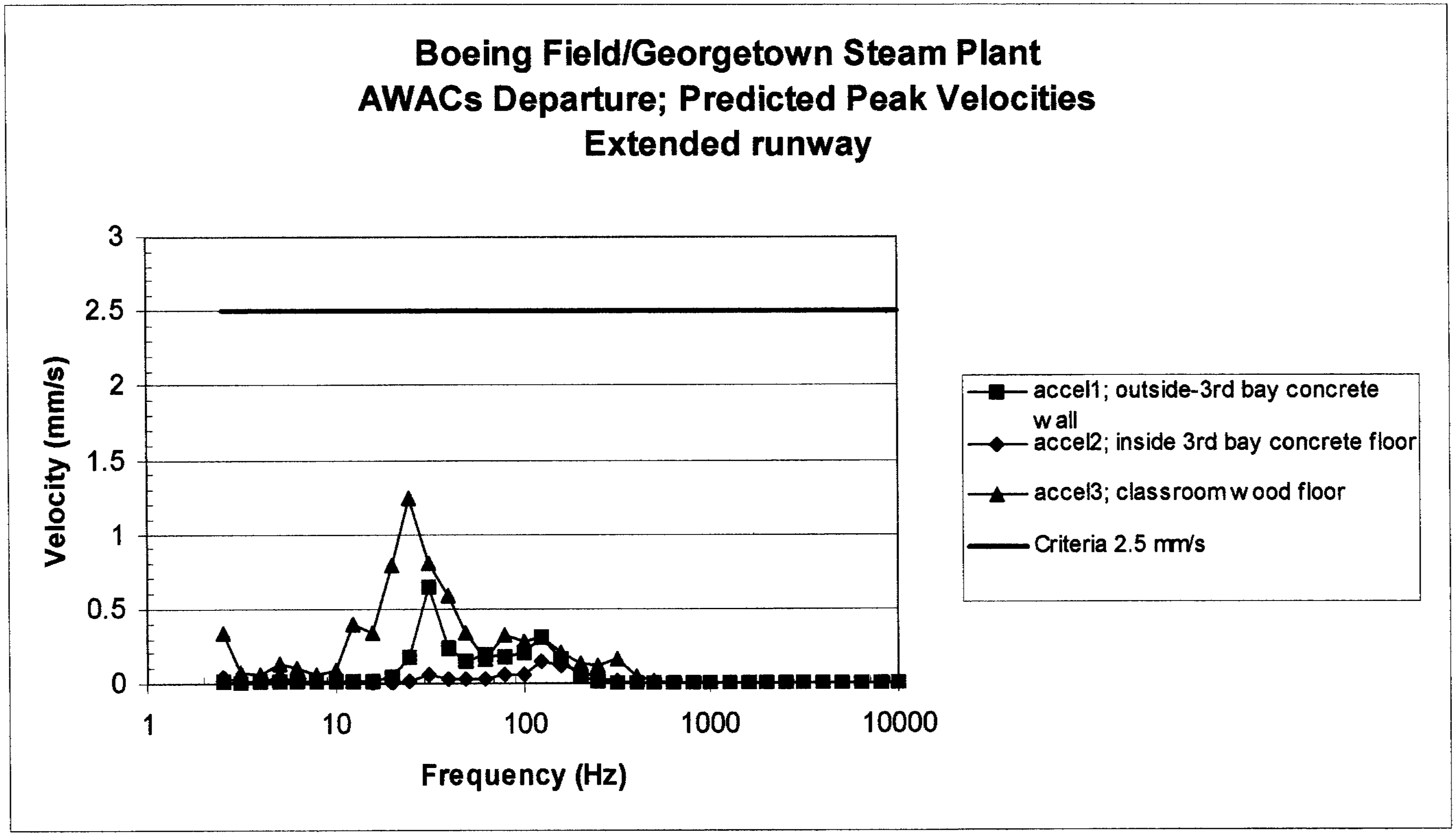
3. Langely Research Center Staff, "Noise-Induced Building Vibration Caused by Concorde and Conventional Aircraft Operations at Dulles and Kennedy International Airports", NASA Technical Memorandum 78769, August 1978

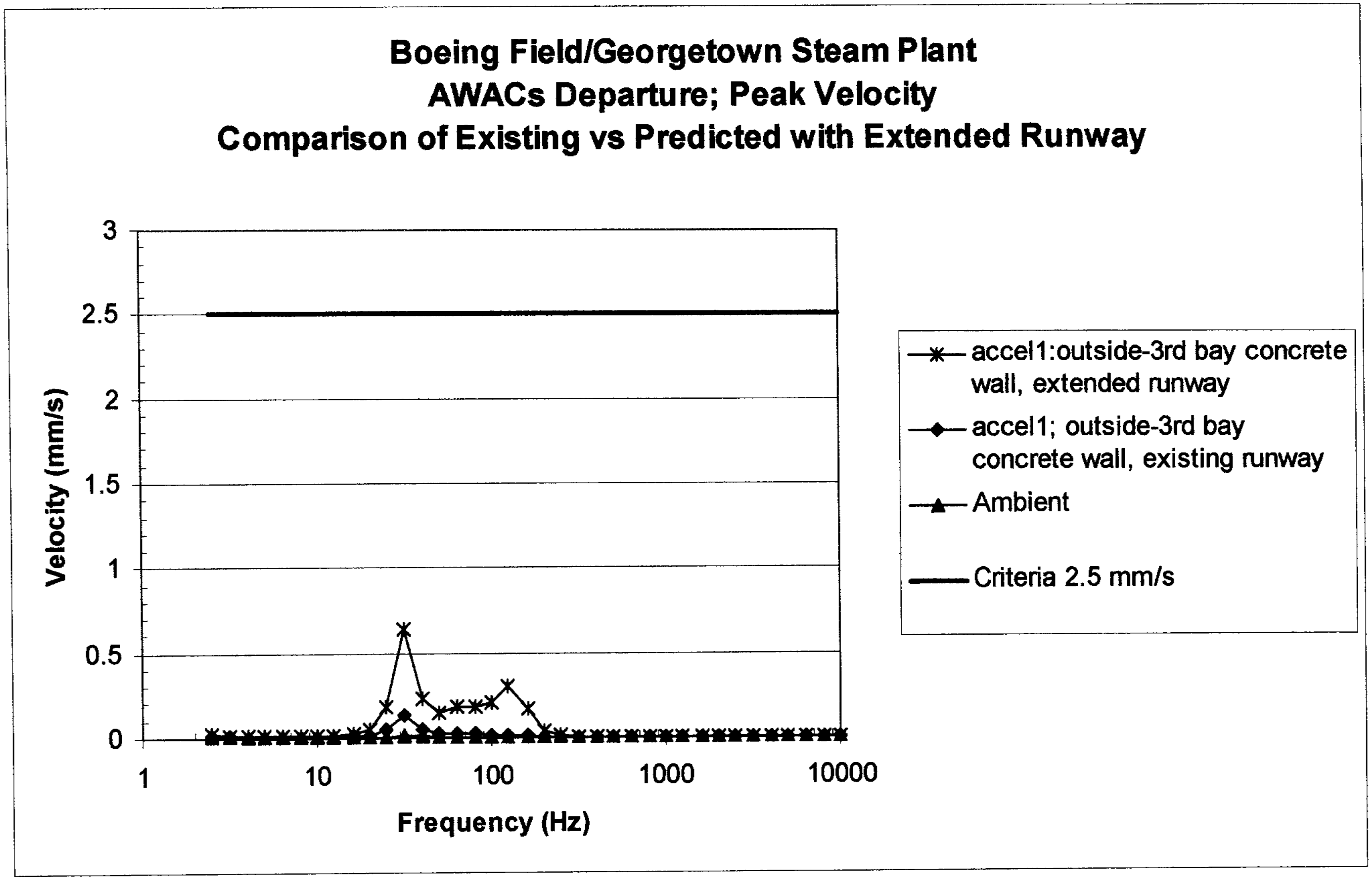
4. Hubbard, Harvey H. "Noise Induced House Vibrations and Human Perception", Noise Control Engineering Jouranal, Volume 19/Number 2, September-October 1982

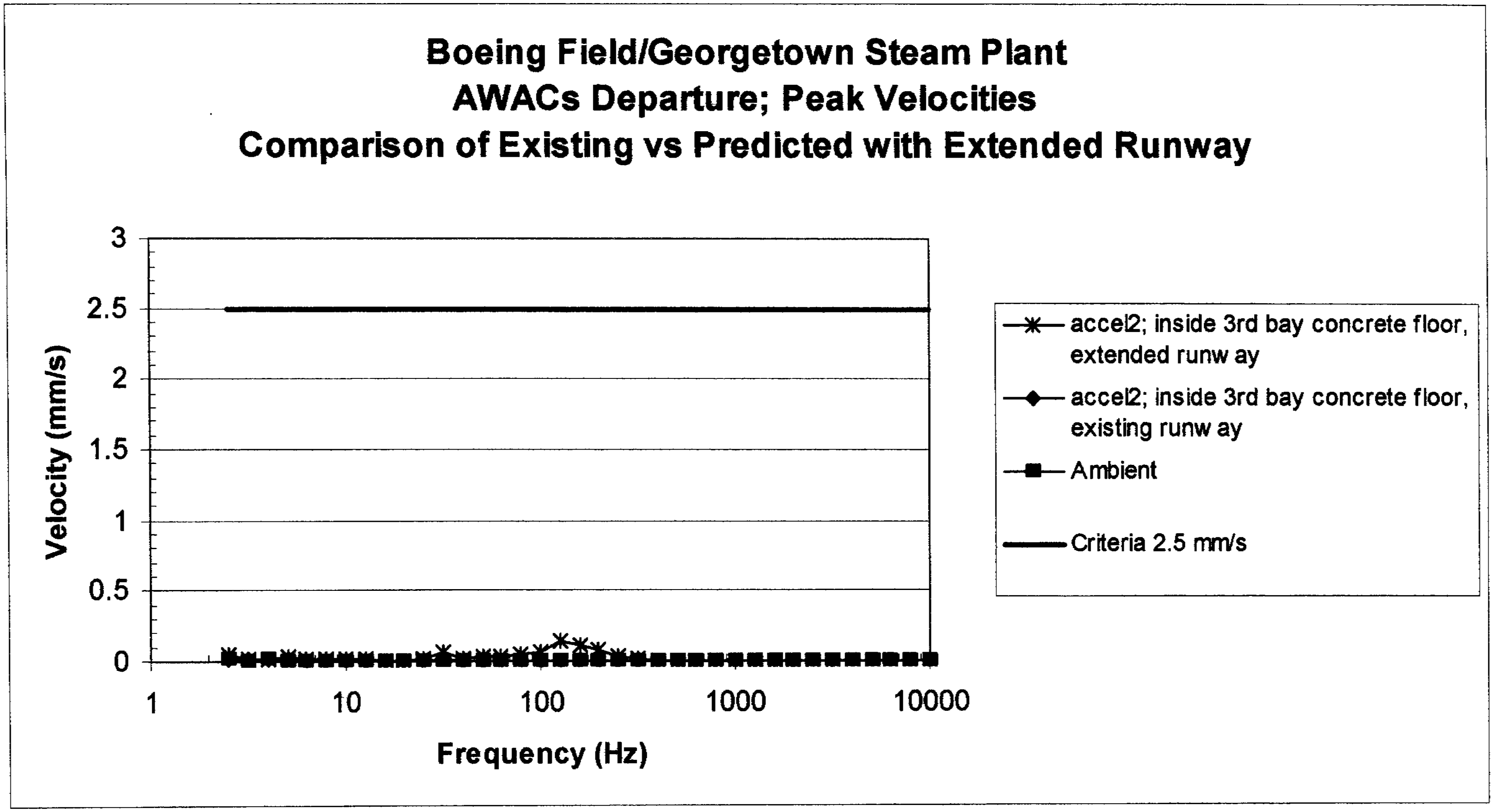


Boeing Field/Georgetown Steam Plant
AWACs Departure; Measured Peak Velocities
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel1; outside-3rd bay concrete wall
accel2; inside 3rd bay concrete floor
accel3; classroom wood floor

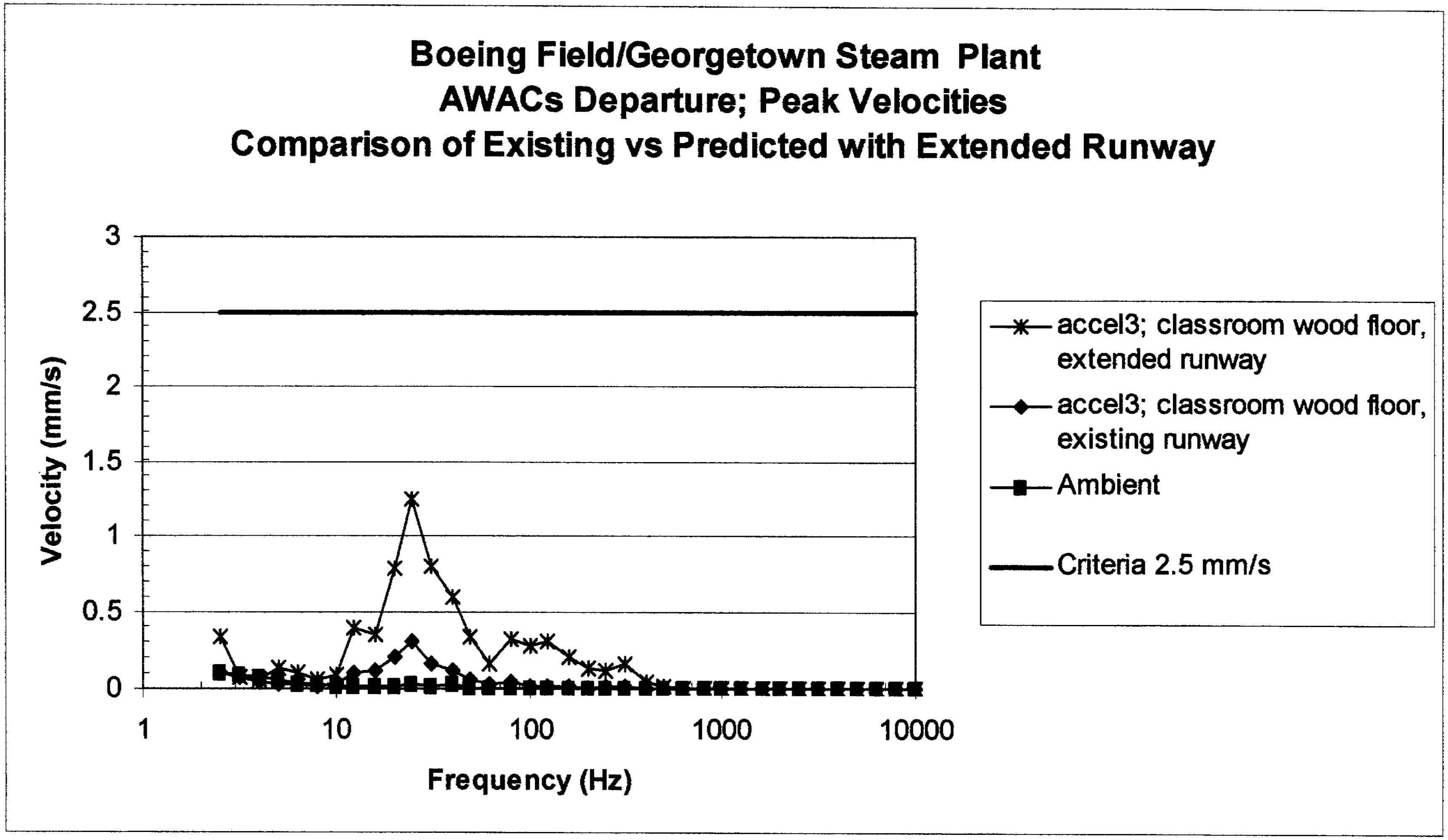

Boeing Field/ Georgetown Steam Plant
B-52 Departure; Measured Peak Velocities
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel1; outside -3ed bay concrete wall
accel2; inside 3rd bay concrete floor
accel3; classroom wood floor

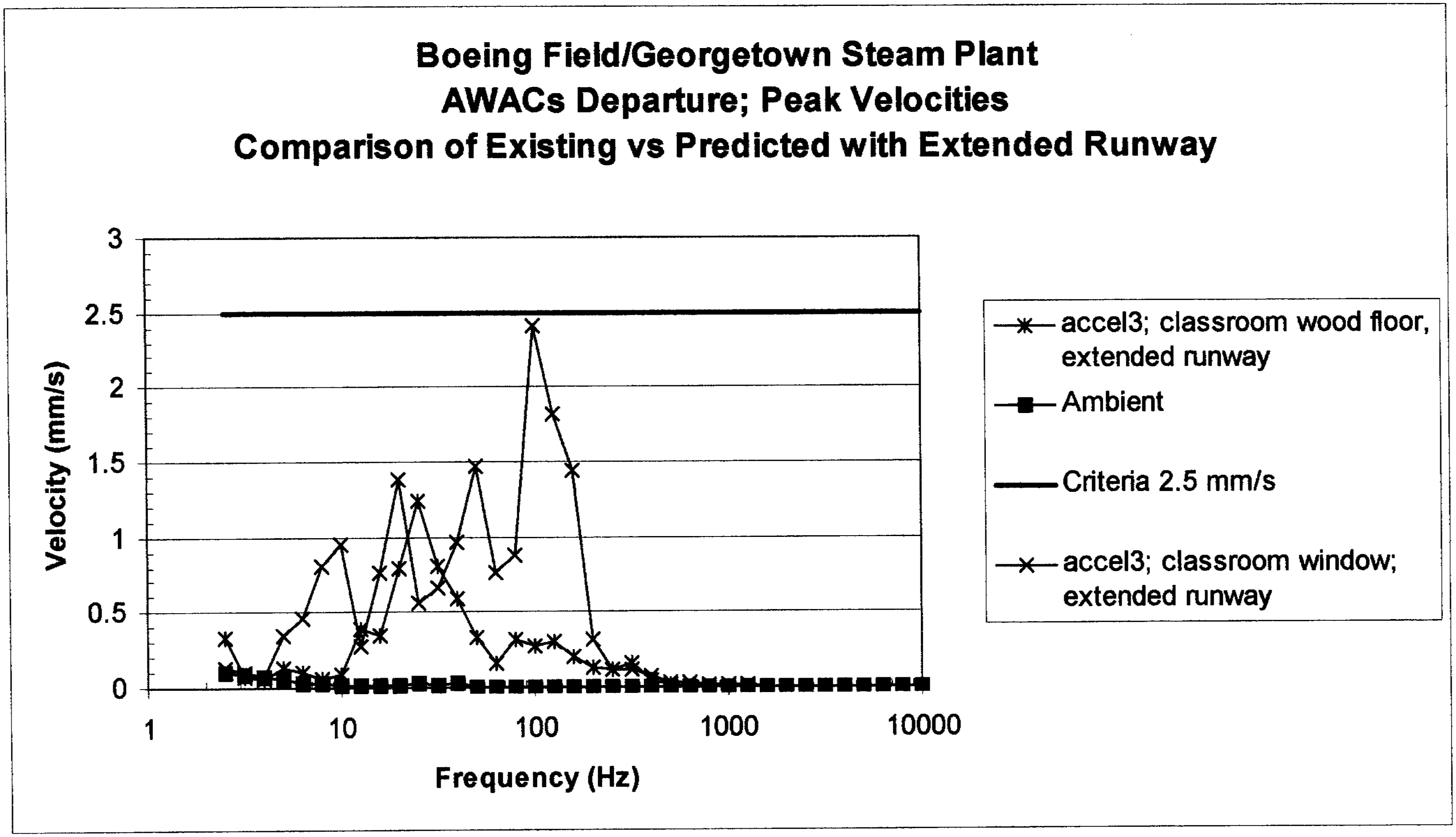

Boeing Field/Georgetown Steam Plant
AWACs Departure; Predicted Peak Velocities
Extended runway
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel1; outside-3rd bay concrete wall
accel2; inside 3rd bay concrete floor
accel3; classroom wood floor
Criteria 2.5 mm/s


Boeing Field/Georgetown Steam Plant
AWACs Departure; Peak Velocity
Comparison of Existing vs Predicted with Extended Runway
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel1:outside-3rd bay concrete wall, extended runway
accel1; outside-3rd bay concrete wall, existing runway
Ambient
Criteria 2.5 mm/s



Boeing Field/Georgetown Steam Plant
AWACs Departure; Peak Velocities
Comparison of Existing vs Predicted with Extended Runway
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel2; inside 3rd bay concrete floor, extended runw ay
accel2; inside 3rd bay concrete floor, existing runw ay
Ambient
Criteria 2.5 mm/s


Boeing Field/Georgetown Steam Plant
AWACs Departure; Peak Velocities
Comparison of Existing vs Predicted with Extended Runway
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel3; classroom wood floor, extended runway
accel3; classroom wood floor, existing runway
Ambient
Criteria 2.5 mm/s



Boeing Field/Georgetown Steam Plant
AWACs Departure; Peak Velocities
Comparison of Existing vs Predicted with Extended Runway
Velocity (mm/s)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
Frequency (Hz)
accel3; classroom wood floor, extended runway
Ambient
Criteria 2.5 mm/s
accel3; classroom window; extended runway

City of Seattle
Strategic Planning Office

Mary Jean Ryan, Director
Gregory J. Nickels, Mayor

March 21, 2002

Gary Molyneaux
King County International Airport
P.O. Box 80245
Seattle, WA 98108

Cayla Morgan
FAA, Airports District Office
1601 Lind Ave SW, Suite 250
Renton, WA 98055

Re: Draft Memorandum of Agreement for Georgetown Steam Plant Vibration Mitigation

Dear Mr. Molyneaux and Ms. Morgan:

City of Seattle staff have discussed the latest draft of the Memorandum of Agreement (MOA) for Georgetown Steam Plant vibration mitigation, and we still have some concerns on the MOA language. Our comments and concerns are summarized below.

The 8th Whereas clause:

"*WHEREAS, a noise analysis was conducted for the State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) for the Master Plan. The analysis found that the runway shift would not create a significant noise impact, as defined by FAA Order 5050.4A. Therefore, no aircraft noise mitigation at the Steam Plant is warranted;*"

We question the appropriateness of this whereas clause in the MOA. If the purpose of the MOA is specifically for vibration, then there is no need for this clause. If the purpose of the MOA is to cover all potential impacts analyzed in the Section 106 process, or specifically for the steam plant, reference to all potential impacts should be included.

If this is included, the last sentence in this clause is of concern to us. We understand that, using the guidelines in FAA Order 5050.4A, there are no impacts as a result of shifting the runway under the prefered alterantive. However, we do not want to eliminate the possibility that the steam plant may be eligible for noise mitigation under other circumstances, such as Part 150. The tenants of the steam plant hold classes, which may make is eligible as an educational facility or public building. Our preference is to eliminate the last sentence.

The 9th Whereas Clause

"*WHEREAS, a special vibration analysis conducted at the Georgetown Steam Plant to evaluate the effects of the runway shift on the physical structure found that with conservative mitigation assumptions, the glass window panels could be vibrated loose;*"

The MOA does not state the underlying assumption that vibration could result in an adverse effect on the windows of the Steam Plant. As this is the reason for the MOA, we suggest adding something like "...constituting an adverse impact" to the end of this clause.

Section 5

"5. *Should the SHPO object within 20 calendar days to any plans, specifications, change orders, or construction documents provided for review pursuant to the terms of this Agreement, the County shall consult with the SHPO to resolve the objection. If the County determines that the objections can not be resolved, the County shall request the further comments of the SHPO pursuant to 36 CFR 800.6(b). Any SHPO comment provided in response to such a request shall be taken into account by the County in accordance with 36 CFR 800.6(c)(2) with reference only to the subject of the dispute under this agreement.*"

We agree with the comment from Allyson Brooks in an email dated November 16, 2001. Her suggestion is that if the County and the SHPO cannot resolve the SHPO's objections, the FAA should be the entity that makes the final decision.

Signators and Concurring Parties

What is the difference between the signators (King County and Federal Aviation Administration) and the concurring parties? Shouldn't all be signators.?. Also, the Advisory Council on Historic Preservation should be included.

Please feel free to call me to discuss these issues. I think that we should be able to resolve them quickly, without impacting your EIS schedule. My phone number is 684-8834.

Sincerely,

Eric Tweit

cc: Laurie Geissinger, City Light
Karen Gordon, Department of Neighborhoods
Nancy Ousley, Strategic Planning Office

King County
Office of Cultural Resources

Arts Commission
Landmarks and Heritage Program
Public Art Program

506 Second Avenue, Suite 200
Seattle, WA 98104
Phone (206) 296-7580 V/TDD
Fax (206) 296-8629
www.metrokc.gov

September 28, 2001 SENT BY ELECTRONIC MAIL

TO: Gary Molyneaux, Program & Planning Manager, King County International Airport

FR: Charlie Sundberg, Preservation Planner

RE: Draft Georgetown Steam Plant Section 106 Consultation Memorandum of Agreement

Thank you for the opportunity to review the above referenced draft document. The substantive issues that have been discussed in the consultation process appear to be adequately addressed. There are some small but significant omissions and unnecessary additions that should be remedied, however.

City of Seattle Landmark Status

Although the MOA owes its existence to the National Register listing of the Steam Plant, the historic resource is also a designated City of Seattle Landmark under the jurisdiction of the Seattle Landmarks Preservation Board per Seattle Municipal Code 25.12. Seattle's Historic Preservation Program is certified by the National Park Service and is thus a participant in the Section 106 process. The MOA should recognize the landmark status of the Steam Plant and require approval by the Landmarks Preservation Board (along with the SHPO) in items 3 and 4. Appeals of Board decisions are provided under SMC 20.12.620 and should be referenced in item 5. Inclusion of these requirements would make the MOA more accurate and efficient and could avoid the need for a separate agreement.

Documentation

Item 1 of the MOA requires photographic documentation of the existing windows in the Steam Plant prior to any disturbance. If they are not already available, I recommend that measured drawings (or typical details if all or groups of windows are substantially equivalent) be done as well, to insure that the materials, dimensions and configuration of the frames, casements, surrounds and panes are accurately recorded. Photographs do not capture the dimensional and material detail that drawings illustrate.

Concurring Parties

The MOA appears to address no issues of tribal concern, so tribal concurrence seems unnecessary and may invite unwanted future complications. In addition, the Section 106 process involves tribes as such only when they are federally recognized. One of the proposed concurring tribal parties is not federally recognized and would be participating only as a member of the interested public, which is unclear. I strongly recommend that any issues of concern to the tribes, if there are any, be addressed in separate documents and that, if such documents are needed, the legal status of tribes be addressed appropriately.

Please feel free to contact me at (206) 296-8673 if you have any questions about these comments.

cc: Cayla Morgan, Federal Aviation Administration
Allyson Brooks, State Historic Preservation Officer
Greg Griffith, Deputy State Historic Preservation Officer
G.I. James, Tribal Liaison, Executive Office
Julie Koler, Historic Preservation Officer

Date: 08/30/2001 10:33 AM
Sender: "Molyneaux Gary" <Gary.Molyneaux@METROKC.GOV>
To: '"allysonB@cted.wa.gov'" <allysonB@cted.wa.gov>; '"Hank_Florence@nps.gov'" <Hank_Florence@nps.gov>; Laurie.Geissinger@ci.seattle.wa.us; Karen.Gordon@ci.seattle.wa.us; '"Eric.Tweit@ci.seattle.wa.us'" <Eric.Tweit@ci.seattle.wa.us>; "Sundberg Charlie" <Charlie.Sundberg@METROKC.GOV>; '"csigo@suquamish.nsn.us'" <csigo@suquamish.nsn.us>; '"DTS@eskimo.com'" <DTS@eskimo.com>; Cayla Morgan
cc: "Stewart Cynthia" <Cynthia.Stewart@METROKC.GOV>
Priority: Normal
Subject: Georgetown Steam Plant MOA draft

------_=_NextPart_001_01C13179.EAEA9310
Content-Type: text/plain;
charset="iso-8859-1"

Dear Colleagues,

Please find attached a copy of the draft Georgetown Steam Plant Section 106 Consultation Memorandum of Agreement (MOA). The draft agreement reflects the identified issues and the resolutions developed through the Section 106 process.

The draft MOA will be included in the EIS/EA review process as part of the proposed mitigation package. After agencies have had an opportunity for review, the document will be forwarded to the FAA for signatures. If you have questions or comments, please call or email them to me.

After the appropriate signatures are gathered work will begin as outlined in
the MOA. A report will be developed and forwarded to you as the work progresses. Thank you all for participating in the Section 106 Consultation
process.

Best regards,

Gary

Gary Molyneaux
Program & Planning Manager
King County International Airport
7233 Perimeter Road
P.O. Box 80245
Seattle, WA 98108
206.205.8357 Office
206.296.0190 FAX

<<Steam Plant Sec106-MOA-v3.doc>>

------_=_NextPart_001_01C13179.EAEA9310
Content-Type: text/html;
charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>
<HEAD>
<META HTTP-EQUIV=3D"Content-Type" CONTENT=3D"text/html; =
charset=3Diso-8859-1">
<META NAME=3D"Generator" CONTENT=3D"MS Exchange Server version =

MEMORANDUM OF AGREEMENT

WHEREAS, King County ("the County") has prepared a Master Plan for King County International Airport ("KCIA" or "the Airport") that identified that the existing runway safety areas ("RSAs") do not meet the FAA's current standards;

WHEREAS, King County and FAA have reviewed all prudent and feasible alternatives and determined that only two primary alternatives exist: shift the runway about 880 feet to the north to achieve the standards or shorten the runway by about 880 feet to meet the standards;

WHEREAS, the shortening of the runway will create significant effects on the operational capability of the Airport and adversely affect the ability of The Boeing Company to service critical aircraft such as the AWACs and to test and deliver commercial aircraft;

WHEREAS, the Georgetown Steam Plant ("the Steam Plant"), a National Historic Landmark is located at the Airport. It is the last working example of vertical Curtis turbines and is an example of the innovative fast-track design and construction method pioneered by Frank Gilbreth, a nationally recognized efficiency engineer;

WHEREAS, the City of Seattle Light owns the Steam Plant and leases the facility to a museum foundation whose purpose is to preserve the historical integrity of the Georgetown Steam Plant;

WHEREAS; the Georgetown Steam Plant is located approximately 1,200 feet from the existing runway end and taxiway and would be about 420 feet with the proposed runway shift;

WHEREAS, a noise analysis was conducted for the State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) for the Master Plan. The analysis found that the runway shift would not create a significant noise impact, as defined by FAA Order 5050.4A. Therefore, no aircraft noise mitigation at the Steam Plant is warranted;

WHEREAS, a special vibration analysis conducted at the Georgetown Steam Plant to evaluate the effects of the runway shift on the physical structure found that with conservative mitigation assumptions, the glass window panels could be vibrated loose;

WHEREAS, the County has proposed to conduct a window mitigation project on behalf of the City of Seattle Light;

WHEREAS, the County and Federal Aviation Administration have consulted with the Washington State Department of Community, Trade and Economic Development - Office of Archaeology and Historic Preservation (otherwise commonly known as the State Historic Preservation Officer -- SHPO), and other signing parties to this agreement, pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act, concerning the Georgetown Steam Plant;

WHEREAS, King County, City of Seattle, State of Washington, National Park Service, Seattle Landmarks Board, and the Advisory Council on Historic Preservation (collectively referred to as "the parties") were invited to participate in the consultation, and having participated are in concurrence with this Memorandum of Agreement;

WHEREAS, there are no other alternatives to the runway shift and the anticipated impacts can be mitigated;

NOW, THEREFORE, the parties agree that prior to operation of the shifted runway at the Airport, all reasonable attempts will be made to address vibration impacts to the facility.

King County will ensure the following:

1. Prior to mitigating the vibration effects on any windows, the County or its agents, with oversight by the City of Seattle, will conduct a photographic documentation of the facility in accordance with the requirements of the SHPO. Copies of the documentation will be provided to the Washington State Department of State Photographic Archives and City of Seattle and to the SHPO for inclusion in the Washington Master Site File.

2. King County will conduct a supplemental analysis (and associated coordination) of the effect of the project on the Georgetown Steam Plant to facilitate the design of the window mitigation. The existing study, based on an 800 –foot shift, showed that the using conservative criteria the need for replacing the windows. The additional study will be based on 880 feet. In addition to final quantification of vibration effect, the study will include a window conditions evaluation, which will identify the possible means of addressing vibration mitigation, such as re-caulking the glass, storm windows and window replacement. The County will continue to coordinate the results of this study with the signators of this agreement. The mitigation options will be evaluated in accord with the Secretary of Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (U.S. Department of Interior, National Park Service, 1983). The County will propose to the signators a recommended window vibration mitigation project that ensures the windows are protective of the anticipated vibration levels.

3. The County will ensure that the window mitigation project is compatible with the historic and architectural qualities of the Plant in terms of current scale, massing, color, and materials, and is responsive to the recommended approaches to rehabilitation and new construction set forth in the Secretary of Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (U.S. Department of Interior, National Park Service, 1983). The County, using a qualified window restoration consultant, will further ensure that the design and specifications for the undertaking are developed in consultation with the SHPO and submitted to the SHPO for approval. No construction, alteration, remodeling or any other physical action to the Plant subject to the window mitigation project will be undertaken which would affect the appearance or structural integrity of the plant without the express written permission of the SHPO.

4. The County shall ensure that any change order to the project design required subsequent to the approval of the project will be developed in consultation with the SHPO, and all such changes will be submitted to the SHPO for approval. what about NPS?

5. Should the SHPO object within 20 calendar days to any plans, specifications, change orders, or construction documents provided for review pursuant to the terms of this Agreement, the County shall consult with the SHPO to resolve the objection. If the County determines that the objections can not be resolved, the County shall request the further comments of the SHPO pursuant to 36 CFR 800.6(b). Any SHPO comment provided in response to such a request shall be taken into account by the County in accordance with 36 CFR 800.6(c)(2) with reference only to the subject of the dispute under this agreement.

6. Should any signatory to this Agreement determine that the terms of this Agreement cannot be met or believes that a change is necessary, that signatory is responsible for immediately requesting that other signatories consider voiding, amending, or affecting an amendment to this Agreement. Such an agreement or addendum shall be executed in the same manner as the original agreement.

EXECUTION OF THIS MEMORANDUM OF AGREEMENT and implementation of its terms evidences that King County has afforded the SHPO, National Park Service, Seattle Landmarks Board, and City of Seattle an opportunity to comment on the proposed window mitigation project and its effect on the Plant, and that the County has taken into account the effect of the runway shift and window mitigation on this historic property.

King County	Date
Federal Aviation Administration	Date
CONCUR:	
City of Seattle – Seattle Light	Date
City of Seattle – Historic Preservation Program	Date
Duwamish Tribal Council	Date
King County Landmarks and Heritage Program	Date
Muckleshoot Tribal Council	Date
National Park Service	Date
Suquamish Tribal Council	Date

______________________________ ______________________

Washington Office of Archaeology and Historic Preservation Date

KCIA/Georgetown Steam Plant – Section 106 Consultation
Friday, July 13, 2001
MEETING NOTES

Attendees

Mary Vigilante, Synergy Consultants; John Current, KCIA; Cynthia Stewart, KCIA; Eric Tweit, City of Seattle SPO; Liz Warman, Boeing; Steve Hagen, City Light; Laurie Geissinger, City Light; Beth Chave, City of Seattle Historic Preservation Office; Julie Wiebusch, Greenbusch; Cayla Morgan, FAA; Marnie McGrath, KCIA; Mike Alvine, King County Council.

Project Overview & Status Update

FAA reports that they have a received a final copy of the archaeological study completed by Larson Anthropological Archaeological Services Limited which found that there were no probable significant hunter-gatherer or historic period resources in the areas in question. Therefore, the process should move forward.

- Vibration from future aircraft operations are considered the most significant impact.
- After completion of archaeological survey, FAA determination of APE remains unchanged.

Runway Safety Area Mitigation (Mitigation measures for vibration impacts to windows)

- National Park Service participation on this issue is needed (no one from NPS was able to attend this meeting). A follow up with the NPS will be arranged.
- Beth Chave explained that "in-kind" repair is recommended over full replacement per the Secretary of Interior Standards (These standards are followed by both the Seattle Landmarks Board and the National Parks Service).
- Julie stated that that there appears to be no problem to remove panes and then replace and re-glaze them to make the windows less likely to crack during vibration. There is already evidence that cracking and breaking is occurring now and the museum is replacing window panes as needed.
- There is a need to do a "Window Condition Survey" in order to get a certificate of approval from the Landmarks Board (They meet twice a month).
- Mary Vigilante of Synergy Consultants will draft MOU language and send to Seattle City Light, the Seattle Landmarks Board and Allyson Brooks (SHPO) for review.

Access Issue

- All agreed with the GTSP Discussion Issues document (attached) with the following two clarifications made: on #1, SCL needs maintenance access to the plant through the King County DNR yard …. & #7, All property exchanges and purchases may be subject to appropriate environmental due diligence policies of both King County and the City of Seattle.
- Environmental Checklist process may suffice.
- KCIA indicated the access proposal/issue would not be part of the NEPA/SEPA EIS on the runway safety zone.
- Mary Vigilante will coordinate with KCIA on draft MOU for the Access Issue.

GTSP Access Discussion Points

1. SCL needs maintenance access to the plant through the King County DNR yard on a very infrequent basis. These infrequent visits will be on an appointment basis.
2. Regarding a new public access route to the plant, there is agreement that a thirty foot driveway plus eight feet for pedestrian access is sufficient.
3. Some parking, perhaps 10 car and 2 or 3 bus spaces will be constructed initially, along with a turnaround. Further parking and circulation for vehicles will be constructed as the need arises, within a designated area that the Boeing Company has agreed to release from a lease with KC and agreement with SCL.
4. The City of Seattle will, subject to City Council ordinance, release its existing easement on 13th Avenue South for the new access, initial and future parking area easement. (Square footages and values appear to be comparable making this a straight-forward one-for-one swap.)
5. The new access driveway, pedestrian access, initial parking, and turnaround will be constructed at the City's expense, subject to #6.
6. The City of Seattle will quit claim, subject to City Council ordinance, its interest in vacated South Greely Street to King County in exchange for fair market value. (Both parties will abide by a mutually acceptable appraisal process to establish the fair market value of this property.)
7. All property exchanges and purchases may be subject to appropriate environmental due diligence policies of both King County and the City of Seattle.
8. Windows in the plant are not an issue for City Light, rather disposition depends on meeting requirements of the Seattle Landmarks Board and consultations with the State Historic Preservation Officer and National Park Service. KC and SCL both acknowledge however, that the windows issue needs to be addressed.

P. 01

TRANSACTION REPORT

JUN-29-2001 FRI 03:44 PM

DATE	START	RECEIVER	TX TIME	PAGES	TYPE	NOTE	M#	DP
JUN-29	03:43 PM	913605986295	42"	1	SEND	OK	994	

TOTAL : 42S PAGES: 1

To: Charlie Sigo, Donna Hogerhuis, Walter Pacheco

Date: 06/29/2001 1:36 PM
Sender: Cayla Morgan
To: allysonb@cted.wa.gov; hank_florence@nps.gov; eric.tweitAci.seattle.wa.us; charlie.sundberg@metrokc.gov; john.current@metrokc.gov; cynthia.stewart@metrokc.gov; karen.gordon@ci.seattle.wa.us; laurie.geissenger@ci.seattle.wa.us; stephanie_toothman@nps.gov
Priority: Normal
Subject: Boeing Field 106 Meeting

Good Afternoon Everyone,

I wanted to let everyone know that we would like to schedule another meeting amongst the affected parties for the 106 consultation for the Runway Safety Area and access road projects at King County International Airport/Boeing Field.

Pursuant to the request of the Indian Tribes, an archeaological survey was performed on the sites affected by the Runway Safety Area mitigation and the Georgetown Steam Plant access projects. This report is being finalized and should be available next week. During field reconnaissance, the archaeologist identifed no significant hunter-fisher-gatherer or historic period archaeological resources and determined that the proposed construction is not expected to disturb such resources. Therefore, we have not changed our APE from that identified in our February 16, 2001 letter.

We would like to meet with everyone (please note that the Suquamish, Duwamish and Muckleshoot Indian Tribes are not on this mailing list as I am in the process of getting their e-mail addresses, but will fax this message to each, at a minimum) to resolve any remaining issues and move forward with the process.

We will be sending a letter out next week to formally invite you to this meeting, but wanted to get a message out so that you could reserve this time on your calendars.

The meeting is scheduled for:

Friday, July 13, 2001 ~ 10:00
Room 124 of the Terminal Building
King County International Airport

P.01

TRANSACTION REPORT

JUN-29-2001 FRI 03:43 PM

DATE	START	RECEIVER	TX TIME	PAGES	TYPE	NOTE	M#	DP
JUN-29	03:42 PM	912538336177	43"	1	SEND	OK	993	

TOTAL : 43S PAGES: 1

To: Charlie Sigo, Donna Hogerhuis, Walter Pacheco

Date: 06/29/2001 1:36 PM
Sender: Cayla Morgan
To: allysonb@cted.wa.gov; hank_florence@nps.gov; eric.tweitAci.seattle.wa.us; charlie.sundberg@metrokc.gov; john.current@metrokc.gov; cynthia.stewart@metrokc.gov; karen.gordon@ci.seattle.wa.us; laurie.geissenger@ci.seattle.wa.us; stephanie_toothman@nps.gov
Priority: Normal
Subject: Boeing Field 106 Meeting

Good Afternoon Everyone,

I wanted to let everyone know that we would like to schedule another meeting amongst the affected parties for the 106 consultation for the Runway Safety Area and access road projects at King County International Airport/Boeing Field.

Pursuant to the request of the Indian Tribes, an archeaological survey was performed on the sites affected by the Runway Safety Area mitigation and the Georgetown Steam Plant access projects. This report is being finalized and should be available next week. During field reconnaissance, the archaeologist identifed no significant hunter-fisher-gatherer or historic period archaeological resources and determined that the proposed construction is not expected to disturb such resources. Therefore, we have not changed our APE from that identified in our February 16, 2001 letter.

We would like to meet with everyone (please note that the Suquamish, Duwamish and Muckleshoot Indian Tribes are not on this mailing list as I am in the process of getting their e-mail addresses, but will fax this message to each, at a minimum) to resolve any remaining issues and move forward with the process.

We will be sending a letter out next week to formally invite you to this meeting, but wanted to get a message out so that you could reserve this time on your calendars.

The meeting is scheduled for:

Friday, July 13, 2001 - 10:00
Room 124 of the Terminal Building
King County International Airport

File copy

U.S. Department
of Transportation
Federal Aviation Administration

Seattle Airports District Office
1601 Lind Avenue, S.W., Suite 250
Renton, Washington 98055-4056

July 9, 2001

Dr. Allyson Brooks
Washington State Historic Preservation Officer
Office of Archaeology & Historic Preservation
P.O. Box 48343
Olympia, Washington 98504-8343

Dear Dr. Brooks:

King County International Airport/Boeing Field
Runway Safety Area Project (RSA) and Access to Georgetown Steam Plant

The Federal Aviation Administration (FAA) in accordance with Section 106 of the National Historic Preservation Act of 1966 ("NHPA") and implementing regulations 36 CFR Part 800 has made our final determination of the Area of Potential Effect (APE) for the aforementioned projects.

As you are aware, the FAA initiated consultation on the access road on January 4, 2000 and the (RSA) project with a letter to you dated October 16, 2000. We also defined a proposed APE for each project in the October 16, 2000 letter and invited your comments. Since then, we have taken comments on the APEs from you and other interested parties at both the November 17, 2000 meeting in Olympia and the subsequent correspondence from both the City of Seattle, Strategic Planning Office and the Muckleshoot Tribe. After consideration of those comments, we revised the APE for the road access, but did not change the APE for the RSA project. The airport also hired Larson Anthropological Archaeological Services Limited to conduct an archaeological resources and traditional cultural places assessment, which is enclosed for your perusal. This assessment was coordinated with the Muckleshoot, Suquamish and Duwamish Indian Tribes prior to finalization. The findings of this report identified no significant hunter-fisher-gatherer or historic period archaeological resources and the proposed construction excavation is not expected to disturb significant hunter-fisher-gatherer or historic period archaeological resources. Therefore, our determination on the APE's for both projects remains the same.

We have scheduled another consultation meeting for July 13, 2001 at 10:00 a.m. in Room 124 of the Terminal Building at the airport. We would like to resolve any remaining issues and move forward with the process. We hope that you will be able to attend. If you are unable to attend, please let us know your comments.

If you have any questions or comments, give me a call at (425) 227-2653. Thank you so much for all of your assistance with this process.

Sincerely,

Cayla D. Morgan
Environmental Specialist

(1) Enclosure

Cc: Hank Florence, National Park Service
Karen Gordon, City of Seattle, Department of Neighborhoods
Laurie Geissinger, Seattle City Light
Donna Hogerhuis, Muckleshoot Tribe, Cultural Program
Charlie Sundberg, King Count Cultural Resources
Eric Twiet, City of Seattle, Strategic Planning Office
Cecile Hansen, Duwamish Tribe
Charlie Sigo, Suquamish Tribal Council
Cynthia Stewart, King County International Airport

U.S. Department
of Transportation
Federal Aviation
Administration

Idaho, Oregon, Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

May 10, 2001

Cecile Hansen
Duwamish Tribe
14235 Ambaum Boulevard
Seattle, Washington 98166

Re: Proposed Boeing Field Runway Safety Area Project and Access to Georgetown Steam Plant Archaeological Resources and Traditional Cultural Places Assessment

Dear Ms. Hansen:

This is written in furtherance of our Section 106 of the National Historic Preservation Act of 1966 ("NHPA") and implementing regulations 36 CFR Part 800 consultation on the above referenced projects. Our February 16, 2001 letter defined the area of potential affect for each of the projects and the rationale for such. Regretfully, the Federal Aviation Administration (FAA) did not include the Duwamish Tribe in the initial APE consultation process. The FAA would like to take this opportunity to formally consult with the Duwamish Tribe as part of the archaeological and traditional cultural places assessment currently being conducted by Larson Anthropological Archaeological Services Limited (LAAS). The assessment was initiated because of a tribal request. The construction activities are proposed for construction on the north end of the existing runway and taxiway of the King County International Airport, also known as Boeing Field. King County International Airport proposes to extend the existing 200 foot wide runway by 680 feet and extend the adjacent, existing 100 foot taxiway by 880 feet. In addition, King County International Airport proposes to construct an alternative access road from Ellis Street to the Georgetown Steam Plant, a National Historic Landmark, to provide unrestricted visitor access to the historic property. Improvements to the runway and taxiway and construction of the access road will require removal of a sheet metal building, a fence, two trees, and airfield guiding lights and grading and excavation for access road construction and installation of a concrete pad. Ground disturbance would be as deep as two feet in some areas.

A National Environmental Policy Act (NEPA) Environmental Assessment and a State Environmental Policy Act (SEPA) Environmental Impact Statement are also being prepared for these projects.

LAAS' archaeological and traditional cultural places assessment for the project currently consists of field reconnaissance, archival and literature review, and production of a technical report. They are gathering existing archaeological, historic, ethnographic, and historic Indian data from the Washington State Office of Archaeology and Historic Preservation, Seattle Public

Library and the University of Washington Libraries. However, they are aware that the Duwamish Indian Tribe may have information gathered from elders regarding the project area and/or the Tribe may currently use areas for traditional cultural activities near the proposed project.

We encourage the Duwamish Tribe's cultural representative to contact LAAS if the Tribe has information that might be useful in the assessment, or if the Tribe has comments or concerns regarding the project area. We also understand that traditional cultural use areas are private, but would welcome the opportunity to work with the Tribe regarding incorporation of this type of information in a secure and respectful manner. Please contact Leonard Forsman, LAAS archaeologist at lforsman.laas@attglobal.net at your earliest convenience if you would like to discuss the matter further. Otherwise, Leonard Forsman from LAAS will contact the Tribe's cultural representative within the two weeks. Should you wish to discuss anything with me, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

ORIGINAL SIGNED BY

Cayla D. Morgan
Environmental Specialist

cc: James Rasmussen, Tribal Council Member, Duwamish Tribe
Charlie Sigo, Suquamish Tribe
Donna Hogerhuis, Muckleshoot Tribe, Cultural Program
Allyson Brooks, Ph.D., State Historic Preservation Office
Hank Florence, National Park Service
Laurie Geissinger, Seattle City Light
Karen Gordon, City of Seattle, Department of Neighborhoods
Eric Tweit, City of Seattle, Strategic Planning Office
Charlie Sundberg, King County Cultural Resources

U.S. Department of Transportation
Federal Aviation Administration

Idaho, Oregon, Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

May 10, 2001

Mr. Charlie Sigo
Suquamish Tribal Council
P.O. Box 298
Suquamish, Washington 98392

Re: Proposed Boeing Field Runway Safety Area Project and Access to Georgetown Steam Plant Archaeological Resources and Traditional Cultural Places Assessment

Dear Mr. Sigo:

This is written in furtherance of our Section 106 of the National Historic Preservation Act of 1966 ("NHPA") and implementing regulations 36 CFR Part 800 consultation on the above referenced projects. Our February 16, 2001 letter defined the area of potential affect for each of the projects and the rationale for such. The construction activities are proposed for construction on the north end of the existing runway and taxiway of the King County International Airport, also known as Boeing Field. King County International Airport proposes to extend the existing 200 foot wide runway by 680 feet and extend the adjacent, existing 100 foot taxiway by 880 feet. In addition, King County International Airport proposes to construct an alternative access road from Ellis Street to the Georgetown Steam Plant, a National Historic Landmark, to provide unrestricted visitor access to the historic property. Improvements to the runway and taxiway and construction of the access road will require removal of a sheet metal building, a fence, two trees, and airfield guiding lights and grading and excavation for access road construction and installation of a concrete pad. Ground disturbance would be as deep as two feet in some areas.

A National Environmental Policy Act (NEPA) Environmental Assessment and a State Environmental Policy Act (SEPA) Environmental Impact Statement are also being prepared for these projects.

LAAS' archaeological and traditional cultural places assessment for the project currently consists of field reconnaissance, archival and literature review, and production of a technical report. They are gathering existing archaeological, historic, ethnographic, and historic Indian data from the Washington State Office of Archaeology and Historic Preservation, Seattle Public Library and the University of Washington Libraries. However, they are aware that the Suquamish Indian Tribe may have information gathered from elders regarding the project area and/or the Tribe may currently use areas for traditional cultural activities near the proposed project.

We encourage the Suquamish Tribe's cultural representative to contact LAAS if the Tribe has information that might be useful in the assessment, or if the Tribe has comments or concerns regarding the project area. We also understand that traditional cultural use areas are private, but would welcome the opportunity to work with the Tribe regarding incorporation of this type of information in a secure and respectful manner. Please contact Leonard Forsman, LAAS archaeologist at lforsman.laas@attglobal.net at your earliest convenience if you would like to discuss the matter further. Otherwise, Leonard Forsman from LAAS will contact the Tribe's cultural representative within the two weeks. Should you wish to discuss anything with me, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

ORIGINAL SIGNED BY

Cayla D. Morgan
Environmental Specialist

cc: James Rasmussen, Tribal Council Member, Duwamish Tribe
Donna Hogerhuis, Muckleshoot Tribe, Cultural Program
Allyson Brooks, Ph.D., State Historic Preservation Office
Hank Florence, National Park Service
Laurie Geissinger, Seattle City Light
Karen Gordon, City of Seattle, Department of Neighborhoods
Eric Tweit, City of Seattle, Strategic Planning Office
Charlie Sundberg, King County Cultural Resources

U.S. Department
of Transportation
Federal Aviation
Administration

Idaho, Oregon, Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

May 10, 2001

Donna Hogerhuis
Cultural Resources Specialist
Tribal Historic Preservation Office
Muckleshoot Tribal Council
39015 172nd Avenue, S.E.
Auburn, Washington 98092

Re: Proposed Boeing Field Runway Safety Area Project and Access to Georgetown Steam Plant Archaeological Resources and Traditional Cultural Places Assessment

Dear Ms. Hogerhuis:

This is written in furtherance of our Section 106 of the National Historic Preservation Act of 1966 ("NHPA") and implementing regulations 36 CFR Part 800 consultation on the above referenced projects. Our February 16, 2001 letter defined the area of potential affect for each of the projects and the rationale for such. The construction activities are proposed for construction on the north end of the existing runway and taxiway of the King County International Airport, also known as Boeing Field. King County International Airport proposes to extend the existing 200 foot wide runway by 680 feet and extend the adjacent, existing 100 foot taxiway by 880 feet. In addition, King County International Airport proposes to construct an alternative access road from Ellis Street to the Georgetown Steam Plant, a National Historic Landmark, to provide unrestricted visitor access to the historic property. Improvements to the runway and taxiway and construction of the access road will require removal of a sheet metal building, a fence, two trees, and airfield guiding lights and grading and excavation for access road construction and installation of a concrete pad. Ground disturbance would be as deep as two feet in some areas.

A National Environmental Policy Act (NEPA) Environmental Assessment and a State Environmental Policy Act (SEPA) Environmental Impact Statement are also being prepared for these projects.

LAAS' archaeological and traditional cultural places assessment for the project currently consists of field reconnaissance, archival and literature review, and production of a technical report. They are gathering existing archaeological, historic, ethnographic, and historic Indian data from the Washington State Office of Archaeology and Historic Preservation, Seattle Public Library and the University of Washington Libraries. However, they are aware that the Muckleshoot Indian Tribe may have information gathered from elders regarding the project area and/or the Tribe may currently use areas for traditional cultural activities near the proposed project.

We encourage the Muckleshoot Tribe's cultural representative to contact LAAS if the Tribe has information that might be useful in the assessment, or if the Tribe has comments or concerns regarding the project area. We also understand that traditional cultural use areas are private, but would welcome the opportunity to work with the Tribe regarding incorporation of this type of information in a secure and respectful manner. Please contact Leonard Forsman, LAAS archaeologist at lforsman.laas@attglobal.net at your earliest convenience if you would like to discuss the matter further. Otherwise, Leonard Forsman from LAAS will contact the Tribe's cultural representative within the two weeks. Should you wish to discuss anything with me, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

ORIGINAL SIGNED BY

Cayla D. Morgan
Environmental Specialist

cc: James Rasmussen, Tribal Council Member, Duwamish Tribe
Charlie Sigo, Suquamish Tribe
Allyson Brooks, Ph.D., State Historic Preservation Office
Hank Florence, National Park Service
Laurie Geissinger, Seattle City Light
Karen Gordon, City of Seattle, Department of Neighborhoods
Eric Tweit, City of Seattle, Strategic Planning Office
Charlie Sundberg, King County Cultural Resources

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

MAR - 5 2001

February 28, 2001

Karen Gordon
City of Seattle Urban Conservation
400 Arctic Bldg., 700 3rd Ave.
Seattle, WA 98104

Dear Karen:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
✓Cayla Morgan, FAA

Enclosure: SAC Roster

King County Airport Part 150 Study Advisory Committee (SAC)

The Part 150 Study Advisory Committee consists of the full Roundtable advisory committee and additional members from other regional aviation and planning-related agencies.

ROUNDTABLE MEMBERS

Jim Combs, Roundtable Chair
Pilots' Association
Randy Eatherton, Vice-Chair
Georgetown Community
Georgianne Ray
Unincorporated King County Communities
Ed Wojeck
Magnolia/North Seattle Communities
Rosemary Unterseher
Tukwila Community
Larry Crim
Renton/Rainier Valley Communities
Lynn Tucker
Beacon Hill/Rainier Valley Communities
Duane Anderson
At-Large Communities
Randy Bannecker
Indirect Business Leader
Daniel Hartley
SPEEA Labor
Larry Brown
Labor Representative
Liz Warman
Boeing Representative
Doug Baker
UPS/Cargo
Peter Anderson
Corporate Tenant
Karen Walling
Small General Aviation
Edwin Hanson
West Seattle Community

SAC MEMBERS from OTHER AGENCIES

Cayla Morgan
FAA Representative
Eric Tweit
City of Seattle
Ron Seymour
Sea-Tac International Airport
Ron Fincher
FAA, Sea-Tac Airport
Oliver Dallas
FAA, King County International Airport
Rocky Piro
Puget Sound Regional Council
Theresa Smith
Aeronautics Division, WASHDOT
Pam Linder
City of Tukwila
Ron Beckerdite
FAA

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Charles Sundberg
KC Office of Cultural Resources
506 2nd Ave., Rm 200
Seattle, WA 98104

Dear Charles:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
✓Cayla Morgan, FAA

Enclosure: SAC Roster

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Donna Hogerhuis
Muckleshoot Tribal Council
39015 - 172nd Ave. SE
Auburn, WA 98092

Dear Donna:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
Cayla Morgan, FAA

Enclosure: SAC Roster

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Charlie Sigo
Suquamish Tribal Council
PO Box 298
Suquamish, WA 98392

Dear Charlie:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
Cayla Morgan, FAA

Enclosure: SAC Roster

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Laurie Geissinger
Seattle City Light
700 - 5th Ave., Ste. 3300
Seattle, WA 98104

Dear Laurie:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
✓Cayla Morgan, FAA

Enclosure: SAC Roster

RECYCLED PAPER

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Allyson Brooks
Dept. of Community Dev.
PO Box 48343
Olympia, WA 98504

Dear Allyson:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
Cayla Morgan, FAA

Enclosure: SAC Roster

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 28, 2001

Hank Florence
Nat. Park Srvc.,US Dept. of Interior
909 First Ave.
Seattle, WA 98104

Dear Hank:

The King County International Airport/Boeing Field (KCIA) is currently conducting a Part 150 Noise Remedies Study that examines a variety of alternatives for mitigating noise generated by aircraft using KCIA. Because you are an interested party in the KCIA Section 106 Historic Preservation Consultation related to impacts from KCIA operations on the historic Georgetown Power Plant, I would like to let you know of ways that you can participate in or monitor the progress of the KCIA Part 150 Study.

Cayla Morgan, FAA, recently wrote that the Section 106 consultation will not include mitigation for current KCIA activities, and that, rather, the Part 150 Study is the mechanism to address noise impacts from current activities. The FAA will be formally inviting you to participate in discussions related to the proposed Noise Reduction Work Plan that results from the Part 150 Study; but in the meantime, you may want to also be involved in its development.

The Study is guided by a Study Advisory Committee (SAC) consisting of community, aviation, labor and agency representatives. The SAC meets on the second Monday of each month, from 4:00 to 6:00 p.m., at KCIA. You are invited to attend meetings of the SAC any time you would like to do so. We have added your name to the mailing list for meeting notices. The SAC would like to be sure that your interests are addressed along with the other relevant concerns. In addition, I would call your attention to the KCIA web page, www.metrokc.gov/airport, where there is background information about the Part 150 Study. I would like to be sure that you are aware of the direction this Study is taking before it has concluded in final recommendations.

If I can provide any additional information, please do not hesitate to contact me at 206-296-7430, or John Current, Planning Manager, 206-205-8357.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: KCIA Roundtable/Part 150 SAC
Cayla Morgan, FAA

Enclosure: SAC Roster

U.S. Department
of Transportation
Federal Aviation Administration

Seattle Airports District Office
1601 Lind Avenue, S.W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE CMM
DATE 2/16/01
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

February 16, 2001

Dr. Allyson Brooks
Washington State Historic Preservation Officer
Office of Archaeology & Historic Preservation
P.O. Box 48343
Olympia, Washington 98504-8343

Dear Dr. Brooks:

Runway Safety Area Project (RSA) and Access to Georgetown Steam Plant

The Federal Aviation Administration (FAA) in accordance with Section 106 of the National Historic Preservation Act of 1966 ("NHPA") and implementing regulations 36 CFR Part 800 has made our final determination of the Area of Potential Effect (APE) for the aforementioned projects. The FAA initiated consultation on the access road on January 4, 2000 and the (RSA) project with a letter to you dated October 16, 2000. We also defined a proposed APE for each project in the October 16, 2000 letter and invited your comments. Since then, we have taken comments on the APEs from you and other interested parties at both the November 17, 2000 meeting in Olympia and the subsequent correspondence from both the City of Seattle, Strategic Planning Office (see enclosure #1) and the Muckleshoot Tribe (see enclosure #2). After consideration of these comments, we have revised the APE for the road access, but have not changed the APE for the RSA project. The following information sets forth these determinations, our rationale behind each, and responds to requests for additional information. We have also outlined the next steps that we will take in this process.

<u>Runway Safety Area Project</u>

The prevailing concern expressed relative to the APE for this project is its scope. A request was made to expand the APE for this project to include all areas within the airport's 65 Day-Night Level (DNL) contour. While we recognize that there is a concern about the level of operations associated with the preferred alternative, as well as the existing noise impacts at the airport, the task before us under the NHPA is to define an APE based upon impacts resulting from this project. We do not believe that it is appropriate to define an APE on the existing operations at the airport. A comprehensive analysis of the preferred alternative (the "federal undertaking" for purposes of the NHPA, and implementing regualtions) was undertaken using a variety of noise metrics. In accordance with FAA Order 5050.4A, <u>Airport Environmental Handbook</u>, a significant change in noise exposure occurs to noise sensitive facilities located within 65 DNL if a project results in a 1.5 DNL increase in noise. (FAA Order 5050.4A, Paragraph 47(e)(1). Based upon the FAA's Integrated Noise Model, the change that would be experienced at the Steam Plant is 0.6 DNL. Without the runway shift, the noise exposure is 69.6 DNL and with the shift, the noise exposure is projected to be 70.2 DNL, with the worse case of 322 flights per year using the shifted runway. Because of the potential vibration impacts, we have decided to include both the Steam Plant building and its property, even though the noise exposure is less than the federally established threshold of significance. Therefore, the APE for this project includes the area within the project's 1.5 DNL contour and the Steam Plant building property.

Relative to the concerns expressed about the impacts of existing operations at the airport, we believe that the Federal Aviation Regulation, Part 150, Noise and Land Use Compatibility Study is the most appropriate venue in which to address such issues. FAR Part 150 requires the development of Noise Exposure Maps (NEM) that depict the existing aircraft noise levels, expressed in terms of the DNL metric, and the five year future noise levels in terms of DNL. In addition to the NEMs, a Noise Compatibility Program (NCP) can be prepared. The NCP contains recommendations for noise mitigation and abatement. The FAA approval of the NCP also makes the airport sponsor eligible for noise set aside funding. A Part 150 study is currently underway at the airport. The study includes both a Citizen Advisory Committee and a Technical Advisory Committee. The NEMs have been developed and noise abatement alternatives are being analyzed at this time. We have discussed expanding the public and agency involvement to any of the affected parties under this consultation with the airport and we both agree that we would like to do this very soon. Subsequent correspondence on this will follow.

The City of Seattle, Strategic Planning Office requested additional information regarding the project. The majority of this information is provided with this letter as follows:

1. A detailed description of the actual points used in the grid analysis for noise modeling. Please see enclosure #3.
2. A comparison of noise levels with and without the RSA Project, using the DNL, maximum noise level (Lmax), and Time Above metrics, for conditions expected *at the time of project completion*. Please see enclosure #4 of this package.
3. A comparison of Lmax values at the Steam Plant and Georgetown area for aircraft departures from Runway 13R (south flow) with and without the RSA project. This comparison is not an accepted method of evaluation as a part of the National Environmental Policy Act (NEPA), or a federally accepted noise metric endorsed by the Federal Interagency Committee on Aircraft Noise, therefore, we do not believe that this will result in any change in our designation. However, we and the County have agreed that this information should be included in the spirit of full disclosure. To this end, this element and both the analysis and findings will be presented in the State Environmental Policy Act (SEPA) Environmental Impact Statement and NEPA Environmental Assessment.

Steam Plant Access

Concerning the APE for the Georgetown Steamplant access, we have revised the APE to reflect the comments made by the National Park Service and King County International Airport staff. We have enclosed a map of this area. (See Enclosure #5)

Next Steps

It is our intention to continue move forward with the NEPA and SEPA environmental evaluation documents. This process will include additional opportunities for public and agency comment. To further document our consultation with the State Historic Preservation Office, we would like very much to receive your written comments on this letter.

Thank you very much for your assistance in this project. We look forward to working with you to complete this process.

Sincerely,

Cayla D. Morgan
Environmental Specialist

Enclosures: 1 - December 5, 2000 letter from Ms. Donna Hogerhuis, Muckleshoot Cultural Program
2 - December 12, 2000 letter from Ms. Denna Cline, City of Seattle
3 - Grid Points/Map of Georgetown Residential Area
4 - Map of the Georgetown residential area
5 - Revised APE for Access Road to Steamplant Project

Cc: Eric Tweit, City of Seattle, Strategic Planning Office
Stephanie Toothman, National Park Service
Donna Hogerhuis, Muckleshoot Tribe, Cultural Program
Charlie Sigo, Suquamish Tribe
Laurie Geissenger, Seattle City Light
Karen Gordon, City of Seattle, Department of Neighborhoods
Charlie Sundberg, King County Cultural Resources
Cynthia Stewart, King County International Airport
Noel Treat, King County Attorney

Enclosure #1

City of Seattle
Strategic Planning Office

Denna Cline, Director
Paul Schell, Mayor

DEC 7 2000

December 5, 2000

Cayla Morgan
Federal Aviation Administration
Seattle Airports District Office
1601 Lind Avenue S.W., Suite 250
Renton, WA 98055-4056

Re: Area of Potential Effect for King County International Airport Runway Safety Area Project and Access to the Georgetown Steam Plant

Dear Ms. Morgan:

We are writing to provide comments on the proposed Area of Potential Effect (APE) for the King County International Airport (KCIA) Runway Safety Area Project and the APE for reorienting access to the Georgetown Steam Plant, pursuant to Section 106 of the National Historic Preservation Act. We appreciate the information that you provided through your October 16 letter to State Historic Preservation Officer Allyson Brooks. Our comments include requests for additional information that we feel will further inform the designation, as well as general concerns about the limited coverage of the APE for the Runway Safety Area (RSA) Project.

As you are aware, we asked our noise consultant, Robert Brown of Brown-Buntin Associates to review the information provided in the letter. Mr. Brown's conclusion is that the FAA and KCIA have provided the information required for determination of the APE. He has recommended, and we request here, that additional information be provided in the spirit of full disclosure. This information will be useful both in determining the APE and in helping residents of the Georgetown neighborhood better understand the potential impacts of the runway shift. Much or all of the following information should be available without a substantial amount of extra work:

1. A detailed description of the actual points used in the grid analysis for noise modeling. Ideally this would be in the form of a map. This will help confirm that the grid analysis adequately covers the areas of concern for noise impacts.

2. A comparison of noise levels with and without the RSA Project, using the day/night average noise level (DNL), maximum noise level (L_{max}), and Time Above metrics, for conditions expected *at the time of project completion.* The letter only provided this comparison for year 2017 when background operations (those operations not using the restricted area of the runway) will have increased substantially compared to the relatively fixed number of operations projected for the restricted area.

3. 5th A comparison of L_{max} values at the Steam Plant and Georgetown area for aircraft departures from Runway 13R (south flow) with and without the RSA Project. This information focuses on the specific impacts of the RSA project, because it identifies the change in maximum noise levels for operations that will change with the RSA Project. Furthermore, it is important to focus on south flow

NEPA

Not pertinent to 106

County is in process of developing a scope of work and will present in the SEPA EIS

Strategic Planning Office - 600 Fourth Ave., Room 300, Seattle, Washington 98104 (206) 684-8080 Fax: (206) 233-0085

departures, because these operations happen approximately two out of three days during the year. The L_{max} sited for north flow only happens one-third of the time. This will answer the question, "what is the change in maximum noise levels for the 220 days a year when the airport is operating in south flow conditions?"

Beyond the data presented or requested, we feel that the APE for the RSA Project should be expanded to include all areas within the 65 DNL contour. Use of the 65 DNL acknowledges that those residents within this area are already impacted by airport noise and any increase in noise has an additional impact. Furthermore, at agency meetings in 1999, KCIA staff and consultants implied that the 65 DNL would be used to determine the APE for Section 106. The EIS consultant scope of services also indicates the same.

An expanded APE would better cover the potential alternatives for the RSA Project. We recognize that the FAA and KCIA have identified a preferred alternative, but it is not the only alternative that has been considered. One alternative is unrestricted use of the new pavement at the north end of the runway. Under this alternative more flights would depart 880 feet closer to the Georgetown neighborhood, and the noise impacts on the neighborhood would increase. Even if the preferred alternative (restricted use) is selected, we are uncertain of the ultimate success of the proposed program to limit use of the new pavement. If substantially more aircraft are allowed to use the new pavement than projected, the impacts of the preferred alternative will be more like the unrestricted alternative.

Concerning the APE for the Georgetown Steam Plant access, we concur with KCIA staff John Current's suggestion that the whole area shown on the drawing (see attached), and not just the shaded portion, be used to delineate the APE. This was discussed at our meeting with the State Historic Preservation Officer on November 11, 2000 and was acceptable to KCIA and the National Park Service as well.

We appreciate your consideration of our comments. We share your interest in moving forward with the Runway Safety Area project and believe that a thorough analysis will be to the benefit of all interested parties.

Sincerely,

Denna Cline

Denna Cline
Director

cc: Seattle City Councilmembers
King County Councilmember Dwight Pelz
Tom Byers, Deputy Mayor
Allyson Brooks, State Historic Preservation Officer
Cynthia Stewart, Airport Manager, KCIA
Stephanie Warden, King County Office of Regional Policy and Planning
Stephanie Toothman, National Parks Service
Jim Diers, Department of Neighborhoods
Gary Zarker, Seattle City Light

Enclosure #2 To: John Current

MUCKLESHOOT CULTURAL PROGRAM

39015 172nd Avenue S.E. • Auburn, Washington 98092-9763

Phone: (253) 939-3311 • FAX: (253) 833-6177

RECEIVED

DEC 18 2000

December 12, 2000

Cayla Morgan
Federal Aviation Administration
Seattle Airports District Offcie
1601 Lind Avenue SW suite 250
Renton WA 98055

Dear Ms. Morgan, RE: Boeing Field runway extension

This letter is in regards to our phone conversation about the Boeing Field runway project. As we discussed, you will be sending me photos of the northern area where the ground disturbing activities will be taking place.

I believe the borehole tests conducted last month were done for noise and/or vibration impacts. As I mentioned, it may be necessary to do an archaeological study that would require a few shovel probes in the northern area that will be added to the runway. I will be able to make comment on the project after I receive the photos and review the information.

For your information, the Wildlife Program and the Fisheries Program are separate departments under the Muckleshoot Indian Tribe. If pertaining to your project, please contact these departments for their input.

If you have any questions, please feel free to contact me at 360-802-2202, x 101. I look forward to working with you.

Sincerely,

Donna Hogerhuis

Donna Hogerhuis, Cultural Specialist

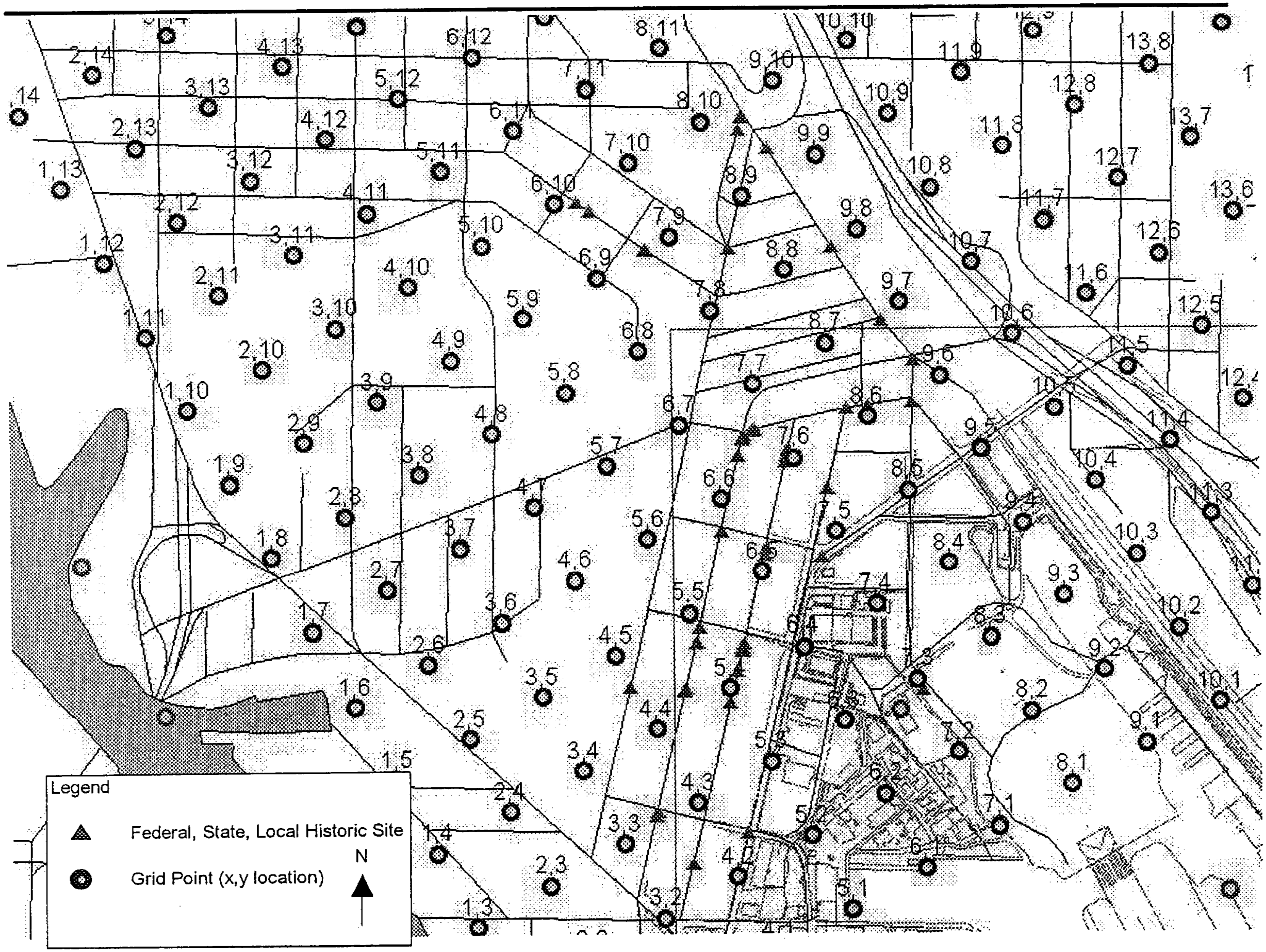
cc: Melissa Calvert, Wildlife and Cultural Resource Programs Coordinator
Dennis Anderson, Council Member and Cultural Resource Committee Chair

12/22/00 - Left message w/Donna Hogerhuis thanking her for the letter and committing to having photos of the northern area no later than January 3rd. Have also confirmed that photos commitment will work for John Current

Enclosure #3

King County International Airport (EA)

Grid Locations



Enclosure #1

Table . Change in Time Above a Threshold of A-Weighted Soun. .)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change 75 dBA	Project Change 85 dBA
29	2	1	47.9	7.3	0.1	48.2	7.4	0.1	0.3	0.1	0.0
30	2	2	44.1	7.3	0.1	44.5	7.5	0.1	0.4	0.2	0.0
31	2	3	39.7	5.2	0.1	40.0	5.5	0.1	0.3	0.3	0.0
32	2	4	39.0	3.1	0.1	39.4	3.4	0.1	0.4	0.3	0.0
33	2	5	32.0	1.0	0.1	32.4	1.1	0.1	0.4	0.1	0.0
34	2	6	27.2	1.0	0.1	27.6	1.0	0.1	0.4	0.0	0.0
35	2	7	20.3	0.9	0.1	20.7	0.9	0.1	0.4	0.0	0.0
36	2	8	19.7	0.9	0.1	20.1	0.9	0.1	0.4	0.0	0.0
37	2	9	17.2	0.9	0.1	17.6	0.9	0.1	0.4	0.0	0.0
38	2	10	14.8	0.8	0.1	15.2	0.9	0.1	0.4	0.1	0.0
39	2	11	12.5	0.8	0.1	12.8	0.9	0.1	0.3	0.1	0.0
40	2	12	12.2	0.8	0.1	12.5	0.8	0.1	0.3	0.0	0.0
41	2	13	11.8	0.6	0.1	12.1	0.7	0.1	0.3	0.1	0.0
42	2	14	11.7	0.6	0.1	11.9	0.6	0.1	0.2	0.0	0.0
57	3	1	65.0	21.0	2.1	65.4	21.1	2.1	0.4	0.1	0.0
58	3	2	61.9	18.9	2.1	62.3	19.1	2.1	0.4	0.2	0.0
59	3	3	57.4	12.6	0.1	57.7	12.8	0.1	0.3	0.2	0.0
60	3	4	47.0	6.4	0.1	47.5	6.7	0.1	0.5	0.3	0.0
61	3	5	43.6	4.1	0.1	44.2	4.5	0.1	0.6	0.4	0.0
62	3	6	36.3	2.0	0.1	36.8	2.2	0.1	0.5	0.2	0.0
63	3	7	27.4	1.8	0.1	27.9	1.9	0.1	0.5	0.1	0.0
64	3	8	24.5	1.7	0.1	25.0	1.8	0.2	0.5	0.1	0.1
65	3	9	22.1	1.7	0.1	22.6	1.7	0.2	0.5	0.0	0.1
66	3	10	19.6	1.6	0.1	20.0	1.7	0.1	0.4	0.1	0.0
67	3	11	17.1	1.6	0.1	17.4	1.6	0.1	0.3	0.0	0.0
68	3	12	16.6	1.5	0.1	16.9	1.5	0.1	0.3	0.0	0.0
69	3	13	16.4	1.3	0.1	16.7	1.4	0.1	0.3	0.1	0.0
70	3	14	16.3	1.0	0.1	16.5	1.1	0.1	0.2	0.1	0.0
85	4	1	92.0	28.0	12.4	92.6	28.2	12.4	0.6	0.2	0.0
86	4	2	84.7	27.7	10.3	85.1	27.9	10.3	0.4	0.2	0.0
87	4	3	75.0	23.4	2.2	75.5	23.7	2.2	0.5	0.3	0.0
88	4	4	65.4	14.8	0.2	66.1	15.2	0.2	0.7	0.4	0.0
89	4	5	52.0	8.3	0.2	52.8	8.7	0.2	0.8	0.4	0.0
90	4	6	48.1	3.8	0.2	48.8	4.2	0.2	0.7	0.4	0.0

Table Change in Time Above a Threshold of A-Weighted Sou... ...)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change (Future With Project - Future No Project) 75 dBA	Project Change (Future With Project - Future No Project) 85 dBA
91	4	7	38.6	3.6	0.2	39.3	3.8	0.2	0.7	0.2	0.0
92	4	8	31.3	3.3	0.2	31.9	3.4	0.2	0.6	0.1	0.0
93	4	9	30.8	3.1	0.2	31.2	3.2	0.2	0.4	0.1	0.0
94	4	10	28.2	3.0	0.2	28.5	3.0	0.2	0.3	0.0	0.0
95	4	11	23.0	2.8	0.2	23.3	2.9	0.2	0.3	0.1	0.0
96	4	12	22.5	2.6	0.2	22.7	2.7	0.2	0.2	0.1	0.0
97	4	13	22.7	2.3	0.2	23.0	2.3	0.2	0.3	0.0	0.0
98	4	14	23.2	1.9	0.2	23.5	1.9	0.2	0.3	0.0	0.0
113	5	1	148.1	44.0	20.9	148.8	44.3	21.0	0.7	0.3	0.1
114	5	2	128.1	37.0	18.6	128.6	37.2	18.9	0.5	0.2	0.3
115	5	3	102.9	30.5	6.5	103.7	30.9	6.7	0.8	0.4	0.2
116	5	4	85.6	23.5	0.3	86.6	24.1	0.4	1.0	0.6	0.1
117	5	5	74.9	10.6	0.3	76.0	11.1	0.3	1.1	0.5	0.0
118	5	6	66.0	6.0	0.3	67.0	6.5	0.3	1.0	0.5	0.0
119	5	7	56.2	5.7	0.3	56.8	5.9	0.3	0.6	0.2	0.0
120	5	8	45.9	5.3	0.3	46.2	5.4	0.3	0.3	0.1	0.0
121	5	9	45.1	5.0	0.3	45.3	5.0	0.3	0.2	0.0	0.0
122	5	10	42.2	4.7	0.3	42.5	4.8	0.3	0.3	0.1	0.0
123	5	11	37.4	4.4	0.3	37.6	4.5	0.3	0.2	0.1	0.0
124	5	12	36.4	4.1	0.3	36.7	4.2	0.3	0.3	0.1	0.0
125	5	13	35.5	3.7	0.3	35.8	3.8	0.3	0.3	0.1	0.0
126	5	14	35.1	3.2	0.3	35.3	3.2	0.3	0.2	0.0	0.0
141	6	1	207.7	64.8	26.5	208.6	65.3	26.7	0.9	0.5	0.2
142	6	2	170.8	50.1	21.7	171.3	50.4	21.9	0.5	0.3	0.2
143	6	3	123.5	37.1	4.8	124.9	37.9	5.3	1.4	0.8	0.5
144	6	4	99.9	23.5	0.4	101.6	24.3	0.8	1.7	0.8	0.4
145	6	5	97.3	13.1	0.4	98.5	13.6	0.4	1.2	0.5	0.0
146	6	6	94.0	8.6	0.4	94.3	8.7	0.4	0.3	0.1	0.0
147	6	7	85.3	8.1	0.4	85.5	8.3	0.4	0.2	0.2	0.0
148	6	8	76.3	7.8	0.4	76.6	7.9	0.4	0.3	0.1	0.0
149	6	9	73.3	7.3	0.4	73.5	7.4	0.4	0.2	0.1	0.0
150	6	10	70.3	7.0	0.4	70.5	7.1	0.4	0.2	0.1	0.0
151	6	11	64.6	6.6	0.3	64.9	6.7	0.4	0.3	0.1	0.1
152	6	12	63.5	6.3	0.3	63.7	6.3	0.4	0.2	0.0	0.1

Table Change in Time Above a Threshold of A-Weighted Sou. .)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change (Future With Project - Future No Project) 75 dBA	Project Change (Future With Project - Future No Project) 85 dBA
153	6	13	62.2	5.8	0.3	62.5	5.9	0.3	0.3	0.1	0.0
154	6	14	61.7	5.2	0.3	62.0	5.3	0.3	0.3	0.1	0.0
169	7	1	286.9	115.2	39.7	287.8	115.7	40.0	0.9	0.5	0.3
170	7	2	159.8	53.8	14.1	161.7	54.8	14.7	1.9	1.0	0.6
171	7	3	144.2	47.6	1.5	146.7	49.0	2.2	2.5	1.4	0.7
172	7	4	140.9	31.3	0.9	141.3	31.5	1.0	0.4	0.2	0.1
173	7	5	137.2	24.3	0.8	137.4	24.5	0.8	0.2	0.2	0.0
174	7	6	132.3	19.6	0.7	132.5	19.7	0.8	0.2	0.1	0.1
175	7	7	119.9	18.5	0.7	120.1	18.6	0.8	0.2	0.1	0.1
176	7	8	111.6	17.7	0.7	111.8	17.8	0.7	0.2	0.1	0.0
177	7	9	108.4	16.7	0.7	108.6	16.8	0.7	0.2	0.1	0.0
178	7	10	101.9	15.7	0.7	102.1	15.8	0.7	0.2	0.1	0.0
179	7	11	95.9	15.1	0.6	96.1	15.2	0.7	0.2	0.1	0.1
180	7	12	93.6	14.5	0.6	93.9	14.6	0.6	0.3	0.1	0.0
181	7	13	91.9	13.7	0.6	92.1	13.8	0.6	0.2	0.1	0.0
182	7	14	90.8	13.0	0.5	91.1	13.1	0.6	0.3	0.1	0.1
197	8	1	149.1	70.4	19.3	150.7	71.3	19.8	1.6	0.9	0.5
198	8	2	147.4	67.8	12.1	149.1	68.8	12.6	1.7	1.0	0.5
199	8	3	148.3	59.6	8.7	148.5	59.7	8.7	0.2	0.1	0.0
200	8	4	149.5	47.5	7.2	149.7	47.6	7.3	0.2	0.1	0.1
201	8	5	148.7	39.9	4.9	148.8	40.0	4.9	0.1	0.1	0.0
202	8	6	139.9	38.2	4.5	140.0	38.3	4.5	0.1	0.1	0.0
203	8	7	124.9	35.2	4.0	125.1	35.3	4.0	0.2	0.1	0.0
204	8	8	121.0	33.6	3.1	121.2	33.8	3.1	0.2	0.2	0.0
205	8	9	119.3	31.8	2.8	119.5	31.9	2.9	0.2	0.1	0.1
206	8	10	114.8	30.7	2.6	115.0	30.8	2.7	0.2	0.1	0.1
207	8	11	105.8	29.2	2.3	106.0	29.3	2.4	0.2	0.1	0.1
208	8	12	104.2	27.4	1.9	104.4	27.5	2.0	0.2	0.1	0.1
209	8	13	101.7	25.3	1.3	101.9	25.4	1.3	0.2	0.1	0.0
210	8	14	100.3	23.2	1.1	100.6	23.3	1.1	0.3	0.1	0.0
225	9	1	294.2	109.6	16.5	295.1	110.1	16.8	0.9	0.5	0.3
226	9	2	186.7	53.3	2.6	188.0	54.0	3.1	1.3	0.7	0.5
227	9	3	153.0	37.9	1.5	155.5	39.3	2.2	2.5	1.4	0.7
228	9	4	149.0	34.6	1.0	149.7	35.0	1.1	0.7	0.4	0.1

Table Change in Time Above a Threshold of A-Weighted Sou)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change (Future With Project - Future No Project) 75 dBA	Project Change (Future With Project - Future No Project) 85 dBA
229	9	5	146.9	29.8	0.6	147.2	30.0	0.7	0.3	0.2	0.1
230	9	6	138.6	27.6	0.6	138.8	27.7	0.6	0.2	0.1	0.0
231	9	7	125.7	23.4	0.6	125.9	23.5	0.6	0.2	0.1	0.0
232	9	8	121.6	20.0	0.5	121.8	20.1	0.6	0.2	0.1	0.1
233	9	9	114.7	18.4	0.5	114.9	18.5	0.5	0.2	0.1	0.0
234	9	10	105.2	17.4	0.5	105.4	17.5	0.5	0.2	0.1	0.0
235	9	11	101.3	16.1	0.5	101.5	16.2	0.5	0.2	0.1	0.0
236	9	12	96.0	14.5	0.5	96.3	14.6	0.5	0.3	0.1	0.0
237	9	13	93.9	12.4	0.4	94.1	12.5	0.5	0.2	0.1	0.1
238	9	14	92.2	11.0	0.4	92.5	11.1	0.4	0.3	0.1	0.0
253	10	1	211.7	47.5	2.1	212.6	48.0	2.3	0.9	0.5	0.2
254	10	2	183.8	34.0	1.4	184.3	34.2	1.6	0.5	0.2	0.2
255	10	3	139.6	18.7	0.6	140.9	19.4	1.2	1.3	0.7	0.6
256	10	4	113.4	15.1	0.4	115.0	15.9	0.7	1.6	0.8	0.3
257	10	5	104.6	14.8	0.4	105.8	15.4	0.4	1.2	0.6	0.0
258	10	6	93.5	15.9	0.4	93.9	16.1	0.4	0.4	0.2	0.0
259	10	7	90.3	14.5	0.3	90.6	14.6	0.4	0.3	0.1	0.1
260	10	8	86.1	10.0	0.3	86.4	10.1	0.4	0.3	0.1	0.1
261	10	9	80.8	7.2	0.3	81.0	7.3	0.3	0.2	0.1	0.0
262	10	10	70.6	6.1	0.3	70.8	6.2	0.3	0.2	0.1	0.0
263	10	11	68.6	5.3	0.3	68.8	5.3	0.3	0.2	0.0	0.0
264	10	12	65.5	4.9	0.3	65.8	4.9	0.3	0.3	0.0	0.0
265	10	13	62.6	4.4	0.3	62.9	4.5	0.3	0.3	0.1	0.0
266	10	14	61.7	3.8	0.3	62.0	3.9	0.3	0.3	0.1	0.0
281	11	1	138.9	19.0	0.7	139.5	19.3	0.8	0.6	0.3	0.1
282	11	2	117.2	9.3	0.5	117.6	9.5	0.8	0.4	0.2	0.3
283	11	3	101.1	8.4	0.4	101.7	8.7	0.6	0.6	0.3	0.2
284	11	4	82.2	9.3	0.3	83.2	9.8	0.3	1.0	0.5	0.0
285	11	5	71.2	10.3	0.3	72.1	10.8	0.3	0.9	0.5	0.0
286	11	6	65.6	10.1	0.3	66.5	10.6	0.3	0.9	0.5	0.0
287	11	7	66.1	11.1	0.3	66.7	11.3	0.3	0.6	0.2	0.0
288	11	8	64.0	10.2	0.2	64.4	10.3	0.3	0.4	0.1	0.1
289	11	9	51.9	5.5	0.2	52.2	5.6	0.3	0.3	0.1	0.1
290	11	10	45.9	3.7	0.2	46.1	3.8	0.2	0.2	0.1	0.0

Table Change in Time Above a Threshold of A-Weighted Sou. .)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change 75 dBA	Project Change 85 dBA
291	11	11	40.2	3.2	0.2	40.5	3.2	0.2	0.3	0.0	0.0
292	11	12	36.9	2.9	0.2	37.1	2.9	0.2	0.2	0.0	0.0
293	11	13	32.8	2.5	0.2	33.0	2.5	0.2	0.2	0.0	0.0
294	11	14	31.6	1.9	0.2	31.9	2.0	0.2	0.3	0.1	0.0
309	12	1	87.5	5.0	0.3	88.0	5.2	0.3	0.5	0.2	0.0
310	12	2	83.6	4.7	0.2	84.0	4.9	0.2	0.4	0.2	0.0
311	12	3	76.2	4.4	0.2	76.7	4.6	0.2	0.5	0.2	0.0
312	12	4	63.3	3.7	0.2	64.0	4.0	0.2	0.7	0.3	0.0
313	12	5	53.0	4.2	0.2	53.8	4.7	0.2	0.8	0.5	0.0
314	12	6	54.2	7.2	0.2	54.9	7.6	0.2	0.7	0.4	0.0
315	12	7	54.9	7.5	0.2	55.6	7.6	0.2	0.7	0.1	0.0
316	12	8	49.6	8.3	0.2	50.1	8.3	0.2	0.5	0.0	0.0
317	12	9	42.8	5.7	0.2	43.2	5.8	0.2	0.4	0.1	0.0
318	12	10	35.7	2.2	0.2	36.0	2.3	0.2	0.3	0.1	0.0
319	12	11	27.7	1.6	0.1	27.9	1.6	0.2	0.2	0.0	0.1
320	12	12	24.1	1.4	0.1	24.3	1.5	0.1	0.2	0.1	0.0
321	12	13	19.9	1.2	0.1	20.2	1.2	0.1	0.3	0.0	0.0
322	12	14	18.8	0.8	0.1	19.1	0.9	0.1	0.3	0.1	0.0

Prepared September 18, 2000

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
29	2	1	91.4	91.1	91.1	0.0
30	2	2	92.1	91.4	91.4	0.0
31	2	3	92.7	91.6	91.6	0.0
32	2	4	93.2	91.7	91.7	0.0
33	2	5	93.7	91.9	91.9	0.0
34	2	6	94.1	92.0	92.0	0.0
35	2	7	94.4	92.2	92.2	0.0
36	2	8	94.7	92.3	92.3	0.0
37	2	9	95.0	92.4	92.4	0.0
38	2	10	95.3	92.5	92.5	0.0
39	2	11	95.6	92.6	92.6	0.0
40	2	12	95.9	92.7	92.7	0.0
41	2	13	96.2	92.7	92.7	0.0
42	2	14	96.4	92.1	92.1	0.0
57	3	1	95.0	94.3	94.3	0.0
58	3	2	95.6	94.5	94.5	0.0
59	3	3	96.2	94.6	94.6	0.0
60	3	4	96.6	94.7	94.7	0.0
61	3	5	97.0	94.7	94.7	0.0
62	3	6	97.4	94.8	94.8	0.0
63	3	7	97.7	94.9	94.9	0.0
64	3	8	98.1	94.9	94.9	0.0
65	3	9	98.4	95.0	95.0	0.0
66	3	10	98.7	95.0	95.0	0.0
67	3	11	98.9	95.0	95.0	0.0
68	3	12	99.2	95.0	95.0	0.0
69	3	13	99.4	95.0	95.0	0.0
70	3	14	99.6	94.2	94.2	0.0
85	4	1	99.3	97.7	97.7	0.0
86	4	2	99.8	97.7	97.7	0.0
87	4	3	100.2	97.7	97.7	0.0
88	4	4	100.7	97.6	97.6	0.0
89	4	5	101.2	97.4	97.4	0.0
90	4	6	101.5	97.4	97.4	0.0
91	4	7	101.8	97.4	97.4	0.0
92	4	8	102.0	97.3	97.3	0.0
93	4	9	102.1	97.2	97.2	0.0
94	4	10	102.2	97.0	97.0	0.0
95	4	11	102.4	96.8	96.8	0.0
96	4	12	102.5	96.7	96.7	0.0
97	4	13	102.6	96.5	96.5	0.0
98	4	14	102.6	96.0	96.0	0.0
113	5	1	108.9	108.9	108.9	0.0
114	5	2	105.4	102.9	102.9	0.0
115	5	3	105.8	100.5	100.5	0.0
116	5	4	106.0	100.0	100.0	0.0
117	5	5	106.1	99.5	99.5	0.0
118	5	6	106.0	99.5	99.5	0.0
119	5	7	105.9	99.3	99.3	0.0

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
120	5	8	105.6	99.0	99.0	0.0
121	5	9	105.2	98.5	98.5	0.0
122	5	10	104.8	98.2	98.2	0.0
123	5	11	104.6	98.0	98.0	0.0
124	5	12	104.4	97.8	97.8	0.0
125	5	13	104.2	97.5	97.5	0.0
126	5	14	103.9	97.3	97.3	0.0
141	6	1	112.0	110.9	110.9	0.0
142	6	2	111.6	105.3	105.3	0.0
143	6	3	110.8	104.5	104.5	0.0
144	6	4	110.0	103.7	103.7	0.0
145	6	5	109.2	102.7	102.7	0.0
146	6	6	108.3	101.8	101.8	0.0
147	6	7	107.5	100.9	100.9	0.0
148	6	8	106.7	100.1	100.1	0.0
149	6	9	106.0	99.3	99.3	0.0
150	6	10	105.4	98.7	98.7	0.0
151	6	11	105.0	98.3	98.3	0.0
152	6	12	104.6	98.0	98.0	0.0
153	6	13	104.3	97.7	97.7	0.0
154	6	14	104.0	97.4	97.4	0.0
169	7	1	114.3	108.1	108.1	0.0
170	7	2	113.0	106.7	106.7	0.0
171	7	3	111.7	105.4	105.4	0.0
172	7	4	110.5	104.2	104.2	0.0
173	7	5	109.5	103.1	103.1	0.0
174	7	6	108.5	102.1	102.1	0.0
175	7	7	107.7	101.1	101.1	0.0
176	7	8	106.9	100.3	100.3	0.0
177	7	9	106.1	99.5	99.5	0.0
178	7	10	105.4	98.8	98.8	0.0
179	7	11	105.1	98.4	98.4	0.0
180	7	12	104.7	98.1	98.1	0.0
181	7	13	104.4	97.8	97.8	0.0
182	7	14	104.1	97.5	97.5	0.0
197	8	1	114.7	108.5	129.8	21.3
198	8	2	113.2	106.9	126.2	19.3
199	8	3	111.8	105.5	107.1	1.6
200	8	4	110.6	104.3	105.8	1.5
201	8	5	109.6	103.2	104.5	1.3
202	8	6	108.6	102.1	103.1	1.0
203	8	7	107.7	101.2	101.8	0.6
204	8	8	106.9	100.4	100.6	0.2
205	8	9	106.2	99.6	99.6	0.0
206	8	10	105.5	98.8	98.8	0.0
207	8	11	105.1	98.4	98.4	0.0
208	8	12	104.8	98.1	98.1	0.0
209	8	13	104.4	97.8	97.8	0.0
210	8	14	104.1	97.5	97.5	0.0

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
225	9	1	114.2	108.0	108.0	0.0
226	9	2	112.7	106.4	106.4	0.0
227	9	3	111.5	105.1	105.1	0.0
228	9	4	110.3	104.0	104.0	0.0
229	9	5	109.3	102.9	102.9	0.0
230	9	6	108.4	101.9	101.9	0.0
231	9	7	107.5	101.0	101.0	0.0
232	9	8	106.7	100.1	100.1	0.0
233	9	9	106.0	99.4	99.4	0.0
234	9	10	105.4	98.7	98.7	0.0
235	9	11	105.0	98.3	98.3	0.0
236	9	12	104.7	98.0	98.0	0.0
237	9	13	104.3	97.7	97.7	0.0
238	9	14	104.0	97.4	97.4	0.0
253	10	1	110.1	103.8	103.8	0.0
254	10	2	109.6	103.3	103.3	0.0
255	10	3	109.0	102.6	102.6	0.0
256	10	4	108.4	102.0	102.0	0.0
257	10	5	107.8	101.3	101.3	0.0
258	10	6	107.2	100.6	100.6	0.0
259	10	7	106.5	99.9	99.9	0.0
260	10	8	105.9	99.3	99.3	0.0
261	10	9	105.3	98.7	98.7	0.0
262	10	10	104.8	98.1	98.1	0.0
263	10	11	104.5	97.8	97.8	0.0
264	10	12	104.2	97.5	97.5	0.0
265	10	13	103.9	97.3	97.3	0.0
266	10	14	103.6	97.0	97.0	0.0

Prepared September 18, 2000

Table C

Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
29	2	1	61.2	61.3	61.3	0.0
30	2	2	61.0	61.1	61.1	0.0
31	2	3	60.5	60.5	60.5	0.0
32	2	4	59.9	59.9	59.9	0.0
33	2	5	59.5	59.3	59.4	0.1
34	2	6	59.1	58.8	58.9	0.1
35	2	7	58.8	58.4	58.5	0.1
36	2	8	58.5	58.1	58.2	0.1
37	2	9	58.3	57.9	57.9	0.0
38	2	10	58.2	57.7	57.7	0.0
39	2	11	58.1	57.5	57.5	0.0
40	2	12	58.0	57.4	57.4	0.0
41	2	13	57.9	57.2	57.3	0.1
42	2	14	57.8	57.1	57.2	0.1
57	3	1	64.9	65.0	65.0	0.0
58	3	2	64.4	64.4	64.5	0.1
59	3	3	63.2	63.2	63.2	0.0
60	3	4	62.2	62.1	62.2	0.1
61	3	5	61.5	61.3	61.3	0.0
62	3	6	60.9	60.6	60.7	0.1
63	3	7	60.6	60.1	60.2	0.1
64	3	8	60.3	59.8	59.9	0.1
65	3	9	60.1	59.6	59.6	0.0
66	3	10	60.0	59.4	59.5	0.1
67	3	11	59.9	59.3	59.3	0.0
68	3	12	59.8	59.2	59.2	0.0
69	3	13	59.7	59.0	59.1	0.1
70	3	14	59.6	58.9	58.9	0.0
85	4	1	71.3	71.3	71.3	0.0
86	4	2	69.8	69.7	69.8	0.1
87	4	3	66.9	66.9	66.9	0.0
88	4	4	64.7	64.6	64.6	0.0
89	4	5	63.5	63.3	63.3	0.0
90	4	6	62.9	62.5	62.6	0.1
91	4	7	62.5	62.0	62.1	0.1
92	4	8	62.3	61.7	61.8	0.1
93	4	9	62.1	61.6	61.6	0.0
94	4	10	62.0	61.4	61.4	0.0
95	4	11	61.9	61.3	61.3	0.0
96	4	12	61.8	61.1	61.1	0.0
97	4	13	61.6	60.9	61.0	0.1
98	4	14	61.4	60.7	60.8	0.1
113	5	1	84.7	84.7	84.7	0.0
114	5	2	78.6	78.6	78.6	0.0
115	5	3	69.9	69.8	69.8	0.0
116	5	4	66.7	66.4	66.5	0.1
117	5	5	65.4	65.0	65.1	0.1
118	5	6	64.9	64.4	64.4	0.0
119	5	7	64.6	64.0	64.0	0.0

Table C

Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
120	5	8	64.3	63.8	63.8	0.0
121	5	9	64.1	63.6	63.6	0.0
122	5	10	64.0	63.4	63.4	0.0
123	5	11	63.8	63.2	63.2	0.0
124	5	12	63.6	63.0	63.0	0.0
125	5	13	63.4	62.7	62.8	0.1
126	5	14	63.2	62.5	62.6	0.1
141	6	1	86.5	86.5	86.5	0.0
142	6	2	72.0	71.9	72.0	0.1
143	6	3	68.9	68.6	68.9	0.3
144	6	4	67.5	67.2	67.3	0.1
145	6	5	67.1	66.7	66.8	0.1
146	6	6	66.8	66.3	66.4	0.1
147	6	7	66.5	66.1	66.1	0.0
148	6	8	66.2	65.8	65.8	0.0
149	6	9	66.0	65.6	65.6	0.0
150	6	10	65.8	65.4	65.4	0.0
151	6	11	65.6	65.2	65.2	0.0
152	6	12	65.3	64.9	65.0	0.1
153	6	13	65.1	64.7	64.7	0.0
154	6	14	64.8	64.4	64.5	0.1
169	7	1	78.8	78.8	79.0	0.2
170	7	2	72.1	72.0	72.9	0.9
171	7	3	70.1	70.1	70.7	0.6
172	7	4	69.7	69.7	69.7	0.0
173	7	5	69.4	69.4	69.4	0.0
174	7	6	69.1	69.1	69.1	0.0
175	7	7	68.8	68.8	68.8	0.0
176	7	8	68.5	68.5	68.5	0.0
177	7	9	68.2	68.2	68.3	0.1
178	7	10	67.9	68.0	68.0	0.0
179	7	11	67.7	67.7	67.7	0.0
180	7	12	67.4	67.5	67.5	0.0
181	7	13	67.1	67.2	67.2	0.0
182	7	14	66.8	66.9	66.9	0.0
197	8	1	76.7	77.1	83.5	6.4
198	8	2	75.0	75.5	80.7	5.2
199	8	3	74.1	74.6	74.6	0.0
200	8	4	73.5	73.9	74.0	0.1
201	8	5	72.9	73.3	73.3	0.0
202	8	6	72.3	72.6	72.7	0.1
203	8	7	71.7	72.0	72.0	0.0
204	8	8	71.1	71.5	71.5	0.0
205	8	9	70.6	71.0	71.0	0.0
206	8	10	70.1	70.5	70.5	0.0
207	8	11	69.7	70.0	70.1	0.1
208	8	12	69.3	69.6	69.6	0.0
209	8	13	68.9	69.2	69.2	0.0
210	8	14	68.4	68.8	68.8	0.0

Table C Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
225	9	1	77.3	77.3	77.5	0.2
226	9	2	72.1	72.1	72.6	0.5
227	9	3	70.3	70.4	70.9	0.5
228	9	4	69.8	69.9	70.0	0.1
229	9	5	69.4	69.6	69.6	0.0
230	9	6	69.0	69.1	69.1	0.0
231	9	7	68.6	68.6	68.6	0.0
232	9	8	68.2	68.2	68.2	0.0
233	9	9	67.9	67.8	67.9	0.1
234	9	10	67.6	67.6	67.6	0.0
235	9	11	67.3	67.3	67.3	0.0
236	9	12	67.0	67.0	67.0	0.0
237	9	13	66.7	66.8	66.8	0.0
238	9	14	66.4	66.5	66.5	0.0
253	10	1	71.6	71.6	71.7	0.1
254	10	2	69.9	69.8	70.0	0.2
255	10	3	68.2	68.1	68.3	0.2
256	10	4	67.3	67.2	67.3	0.1
257	10	5	67.0	66.9	67.0	0.1
258	10	6	66.7	66.8	66.8	0.0
259	10	7	66.3	66.4	66.4	0.0
260	10	8	65.8	65.7	65.7	0.0
261	10	9	65.4	65.2	65.2	0.0
262	10	10	65.1	64.8	64.8	0.0
263	10	11	64.8	64.5	64.5	0.0
264	10	12	64.5	64.2	64.3	0.1
265	10	13	64.2	64.0	64.0	0.0
266	10	14	64.0	63.7	63.7	0.0
281	11	1	67.4	67.5	67.5	0.0
282	11	2	66.7	66.7	66.8	0.1
283	11	3	65.8	65.8	65.9	0.1
284	11	4	65.1	65.0	65.1	0.1
285	11	5	64.8	64.8	64.8	0.0
286	11	6	64.7	64.7	64.7	0.0
287	11	7	64.5	64.7	64.7	0.0
288	11	8	64.0	64.3	64.3	0.0
289	11	9	63.4	63.4	63.4	0.0
290	11	10	63.0	62.7	62.7	0.0
291	11	11	62.6	62.3	62.3	0.0
292	11	12	62.3	61.9	62.0	0.1
293	11	13	62.1	61.7	61.7	0.0
294	11	14	61.8	61.4	61.4	0.0

Prepared September 18, 2000

Table A Change in Time Above a Threshold of A-Weighted Sound (TA)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	75 dBA	85 dBA
29	2	1	47.9	7.3	0.1	48.2	7.4	0.1	0.3	0.1	0.0
30	2	2	44.1	7.3	0.1	44.5	7.5	0.1	0.4	0.2	0.0
31	2	3	39.7	5.2	0.1	40.0	5.5	0.1	0.3	0.3	0.0
32	2	4	39.0	3.1	0.1	39.4	3.4	0.1	0.4	0.3	0.0
33	2	5	32.0	1.0	0.1	32.4	1.1	0.1	0.4	0.1	0.0
34	2	6	27.2	1.0	0.1	27.6	1.0	0.1	0.4	0.0	0.0
35	2	7	20.3	0.9	0.1	20.7	0.9	0.1	0.4	0.0	0.0
36	2	8	19.7	0.9	0.1	20.1	0.9	0.1	0.4	0.0	0.0
37	2	9	17.2	0.9	0.1	17.6	0.9	0.1	0.4	0.0	0.0
38	2	10	14.8	0.8	0.1	15.2	0.9	0.1	0.4	0.1	0.0
39	2	11	12.5	0.8	0.1	12.8	0.9	0.1	0.3	0.1	0.0
40	2	12	12.2	0.8	0.1	12.5	0.8	0.1	0.3	0.0	0.0
41	2	13	11.8	0.6	0.1	12.1	0.7	0.1	0.3	0.1	0.0
42	2	14	11.7	0.6	0.1	11.9	0.6	0.1	0.2	0.0	0.0
57	3	1	65.0	21.0	2.1	65.4	21.1	2.1	0.4	0.1	0.0
58	3	2	61.9	18.9	2.1	62.3	19.1	2.1	0.4	0.2	0.0
59	3	3	57.4	12.6	0.1	57.7	12.8	0.1	0.3	0.2	0.0
60	3	4	47.0	6.4	0.1	47.5	6.7	0.1	0.5	0.3	0.0
61	3	5	43.6	4.1	0.1	44.2	4.5	0.1	0.6	0.4	0.0
62	3	6	36.3	2.0	0.1	36.8	2.2	0.1	0.5	0.2	0.0
63	3	7	27.4	1.8	0.1	27.9	1.9	0.1	0.5	0.1	0.0
64	3	8	24.5	1.7	0.1	25.0	1.8	0.2	0.5	0.1	0.1
65	3	9	22.1	1.7	0.1	22.6	1.7	0.2	0.5	0.0	0.1
66	3	10	19.6	1.6	0.1	20.0	1.7	0.1	0.4	0.1	0.0
67	3	11	17.1	1.6	0.1	17.4	1.6	0.1	0.3	0.0	0.0
68	3	12	16.6	1.5	0.1	16.9	1.5	0.1	0.3	0.0	0.0
69	3	13	16.4	1.3	0.1	16.7	1.4	0.1	0.3	0.1	0.0
70	3	14	16.3	1.0	0.1	16.5	1.1	0.1	0.2	0.1	0.0
85	4	1	92.0	28.0	12.4	92.6	28.2	12.4	0.6	0.2	0.0
86	4	2	84.7	27.7	10.3	85.1	27.9	10.3	0.4	0.2	0.0
87	4	3	75.0	23.4	2.2	75.5	23.7	2.2	0.5	0.3	0.0
88	4	4	65.4	14.8	0.2	66.1	15.2	0.2	0.7	0.4	0.0
89	4	5	52.0	8.3	0.2	52.8	8.7	0.2	0.8	0.4	0.0
90	4	6	48.1	3.8	0.2	48.8	4.2	0.2	0.7	0.4	0.0

Table A — Change in Time Above a Threshold of A-Weighted Sound (TA)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change (Future With Project - Future No Project) 75 dBA	Project Change (Future With Project - Future No Project) 85 dBA
91	4	7	38.6	3.6	0.2	39.3	3.8	0.2	0.7	0.2	0.0
92	4	8	31.3	3.3	0.2	31.9	3.4	0.2	0.6	0.1	0.0
93	4	9	30.8	3.1	0.2	31.2	3.2	0.2	0.4	0.1	0.0
94	4	10	28.2	3.0	0.2	28.5	3.0	0.2	0.3	0.0	0.0
95	4	11	23.0	2.8	0.2	23.3	2.9	0.2	0.3	0.1	0.0
96	4	12	22.5	2.6	0.2	22.7	2.7	0.2	0.2	0.1	0.0
97	4	13	22.7	2.3	0.2	23.0	2.3	0.2	0.3	0.0	0.0
98	4	14	23.2	1.9	0.2	23.5	1.9	0.2	0.3	0.0	0.0
113	5	1	148.1	44.0	20.9	148.8	44.3	21.0	0.7	0.3	0.1
114	5	2	128.1	37.0	18.6	128.6	37.2	18.9	0.5	0.2	0.3
115	5	3	102.9	30.5	6.5	103.7	30.9	6.7	0.8	0.4	0.2
116	5	4	85.6	23.5	0.3	86.6	24.1	0.4	1.0	0.6	0.1
117	5	5	74.9	10.6	0.3	76.0	11.1	0.3	1.1	0.5	0.0
118	5	6	66.0	6.0	0.3	67.0	6.5	0.3	1.0	0.5	0.0
119	5	7	56.2	5.7	0.3	56.8	5.9	0.3	0.6	0.2	0.0
120	5	8	45.9	5.3	0.3	46.2	5.4	0.3	0.3	0.1	0.0
121	5	9	45.1	5.0	0.3	45.3	5.0	0.3	0.2	0.0	0.0
122	5	10	42.2	4.7	0.3	42.5	4.8	0.3	0.3	0.1	0.0
123	5	11	37.4	4.4	0.3	37.6	4.5	0.3	0.2	0.1	0.0
124	5	12	36.4	4.1	0.3	36.7	4.2	0.3	0.3	0.1	0.0
125	5	13	35.5	3.7	0.3	35.8	3.8	0.3	0.3	0.1	0.0
126	5	14	35.1	3.2	0.3	35.3	3.2	0.3	0.2	0.0	0.0
141	6	1	207.7	64.8	26.5	208.6	65.3	26.7	0.9	0.5	0.2
142	6	2	170.8	50.1	21.7	171.3	50.4	21.9	0.5	0.3	0.2
143	6	3	123.5	37.1	4.8	124.9	37.9	5.3	1.4	0.8	0.5
144	6	4	99.9	23.5	0.4	101.6	24.3	0.8	1.7	0.8	0.4
145	6	5	97.3	13.1	0.4	98.5	13.6	0.4	1.2	0.5	0.0
146	6	6	94.0	8.6	0.4	94.3	8.7	0.4	0.3	0.1	0.0
147	6	7	85.3	8.1	0.4	85.5	8.3	0.4	0.2	0.2	0.0
148	6	8	76.3	7.8	0.4	76.6	7.9	0.4	0.3	0.1	0.0
149	6	9	73.3	7.3	0.4	73.5	7.4	0.4	0.2	0.1	0.0
150	6	10	70.3	7.0	0.4	70.5	7.1	0.4	0.2	0.1	0.0
151	6	11	64.6	6.6	0.3	64.9	6.7	0.4	0.3	0.1	0.1
152	6	12	63.5	6.3	0.3	63.7	6.3	0.4	0.2	0.0	0.1

Table A Change in Time Above a Threshold of A-Weighted Sound (TA)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change 75 dBA	Project Change 85 dBA
153	6	13	62.2	5.8	0.3	62.5	5.9	0.3	0.3	0.1	0.0
154	6	14	61.7	5.2	0.3	62.0	5.3	0.3	0.3	0.1	0.0
169	7	1	286.9	115.2	39.7	287.8	115.7	40.0	0.9	0.5	0.3
170	7	2	159.8	53.8	14.1	161.7	54.8	14.7	1.9	1.0	0.6
171	7	3	144.2	47.6	1.5	146.7	49.0	2.2	2.5	1.4	0.7
172	7	4	140.9	31.3	0.9	141.3	31.5	1.0	0.4	0.2	0.1
173	7	5	137.2	24.3	0.8	137.4	24.5	0.8	0.2	0.2	0.0
174	7	6	132.3	19.6	0.7	132.5	19.7	0.8	0.2	0.1	0.1
175	7	7	119.9	18.5	0.7	120.1	18.6	0.8	0.2	0.1	0.1
176	7	8	111.6	17.7	0.7	111.8	17.8	0.7	0.2	0.1	0.0
177	7	9	108.4	16.7	0.7	108.6	16.8	0.7	0.2	0.1	0.0
178	7	10	101.9	15.7	0.7	102.1	15.8	0.7	0.2	0.1	0.0
179	7	11	95.9	15.1	0.6	96.1	15.2	0.7	0.2	0.1	0.1
180	7	12	93.6	14.5	0.6	93.9	14.6	0.6	0.3	0.1	0.0
181	7	13	91.9	13.7	0.6	92.1	13.8	0.6	0.2	0.1	0.0
182	7	14	90.8	13.0	0.5	91.1	13.1	0.6	0.3	0.1	0.1
197	8	1	149.1	70.4	19.3	150.7	71.3	19.8	1.6	0.9	0.5
198	8	2	147.4	67.8	12.1	149.1	68.8	12.6	1.7	1.0	0.5
199	8	3	148.3	59.6	8.7	148.5	59.7	8.7	0.2	0.1	0.0
200	8	4	149.5	47.5	7.2	149.7	47.6	7.3	0.2	0.1	0.1
201	8	5	148.7	39.9	4.9	148.8	40.0	4.9	0.1	0.1	0.0
202	8	6	139.9	38.2	4.5	140.0	38.3	4.5	0.1	0.1	0.0
203	8	7	124.9	35.2	4.0	125.1	35.3	4.0	0.2	0.1	0.0
204	8	8	121.0	33.6	3.1	121.2	33.8	3.1	0.2	0.2	0.0
205	8	9	119.3	31.8	2.8	119.5	31.9	2.9	0.2	0.1	0.1
206	8	10	114.8	30.7	2.6	115.0	30.8	2.7	0.2	0.1	0.1
207	8	11	105.8	29.2	2.3	106.0	29.3	2.4	0.2	0.1	0.1
208	8	12	104.2	27.4	1.9	104.4	27.5	2.0	0.2	0.1	0.1
209	8	13	101.7	25.3	1.3	101.9	25.4	1.3	0.2	0.1	0.0
210	8	14	100.3	23.2	1.1	100.6	23.3	1.1	0.3	0.1	0.0
225	9	1	294.2	109.6	16.5	295.1	110.1	16.8	0.9	0.5	0.3
226	9	2	186.7	53.3	2.6	188.0	54.0	3.1	1.3	0.7	0.5
227	9	3	153.0	37.9	1.5	155.5	39.3	2.2	2.5	1.4	0.7
228	9	4	149.0	34.6	1.0	149.7	35.0	1.1	0.7	0.4	0.1

Fu
With P
Time

Table A **Change in Time Above a Threshold of A-Weighted Sound (TA)**

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change 75 dBA	Project Change 85 dBA
291	11	11	40.2	3.2	0.2	40.5	3.2	0.2	0.3	0.0	0.0
292	11	12	36.9	2.9	0.2	37.1	2.9	0.2	0.2	0.0	0.0
293	11	13	32.8	2.5	0.2	33.0	2.5	0.2	0.2	0.0	0.0
294	11	14	31.6	1.9	0.2	31.9	2.0	0.2	0.3	0.1	0.0
309	12	1	87.5	5.0	0.3	88.0	5.2	0.3	0.5	0.2	0.0
310	12	2	83.6	4.7	0.2	84.0	4.9	0.2	0.4	0.2	0.0
311	12	3	76.2	4.4	0.2	76.7	4.6	0.2	0.5	0.2	0.0
312	12	4	63.3	3.7	0.2	64.0	4.0	0.2	0.7	0.3	0.0
313	12	5	53.0	4.2	0.2	53.8	4.7	0.2	0.8	0.5	0.0
314	12	6	54.2	7.2	0.2	54.9	7.6	0.2	0.7	0.4	0.0
315	12	7	54.9	7.5	0.2	55.6	7.6	0.2	0.7	0.1	0.0
316	12	8	49.6	8.3	0.2	50.1	8.3	0.2	0.5	0.0	0.0
317	12	9	42.8	5.7	0.2	43.2	5.8	0.2	0.4	0.1	0.0
318	12	10	35.7	2.2	0.2	36.0	2.3	0.2	0.3	0.1	0.0
319	12	11	27.7	1.6	0.1	27.9	1.6	0.2	0.2	0.0	0.1
320	12	12	24.1	1.4	0.1	24.3	1.5	0.1	0.2	0.1	0.0
321	12	13	19.9	1.2	0.1	20.2	1.2	0.1	0.3	0.0	0.0
322	12	14	18.8	0.8	0.1	19.1	0.9	0.1	0.3	0.1	0.0

Prepared September 18, 2000

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
29	2	1	91.4	91.1	91.1	0.0
30	2	2	92.1	91.4	91.4	0.0
31	2	3	92.7	91.6	91.6	0.0
32	2	4	93.2	91.7	91.7	0.0
33	2	5	93.7	91.9	91.9	0.0
34	2	6	94.1	92.0	92.0	0.0
35	2	7	94.4	92.2	92.2	0.0
36	2	8	94.7	92.3	92.3	0.0
37	2	9	95.0	92.4	92.4	0.0
38	2	10	95.3	92.5	92.5	0.0
39	2	11	95.6	92.6	92.6	0.0
40	2	12	95.9	92.7	92.7	0.0
41	2	13	96.2	92.7	92.7	0.0
42	2	14	96.4	92.1	92.1	0.0
57	3	1	95.0	94.3	94.3	0.0
58	3	2	95.6	94.5	94.5	0.0
59	3	3	96.2	94.6	94.6	0.0
60	3	4	96.6	94.7	94.7	0.0
61	3	5	97.0	94.7	94.7	0.0
62	3	6	97.4	94.8	94.8	0.0
63	3	7	97.7	94.9	94.9	0.0
64	3	8	98.1	94.9	94.9	0.0
65	3	9	98.4	95.0	95.0	0.0
66	3	10	98.7	95.0	95.0	0.0
67	3	11	98.9	95.0	95.0	0.0
68	3	12	99.2	95.0	95.0	0.0
69	3	13	99.4	95.0	95.0	0.0
70	3	14	99.6	94.2	94.2	0.0
85	4	1	99.3	97.7	97.7	0.0
86	4	2	99.8	97.7	97.7	0.0
87	4	3	100.2	97.7	97.7	0.0
88	4	4	100.7	97.6	97.6	0.0
89	4	5	101.2	97.4	97.4	0.0
90	4	6	101.5	97.4	97.4	0.0
91	4	7	101.8	97.4	97.4	0.0
92	4	8	102.0	97.3	97.3	0.0
93	4	9	102.1	97.2	97.2	0.0
94	4	10	102.2	97.0	97.0	0.0
95	4	11	102.4	96.8	96.8	0.0
96	4	12	102.5	96.7	96.7	0.0
97	4	13	102.6	96.5	96.5	0.0
98	4	14	102.6	96.0	96.0	0.0
113	5	1	108.9	108.9	108.9	0.0
114	5	2	105.4	102.9	102.9	0.0
115	5	3	105.8	100.5	100.5	0.0
116	5	4	106.0	100.0	100.0	0.0
117	5	5	106.1	99.5	99.5	0.0
118	5	6	106.0	99.5	99.5	0.0
119	5	7	105.9	99.3	99.3	0.0

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
120	5	8	105.6	99.0	99.0	0.0
121	5	9	105.2	98.5	98.5	0.0
122	5	10	104.8	98.2	98.2	0.0
123	5	11	104.6	98.0	98.0	0.0
124	5	12	104.4	97.8	97.8	0.0
125	5	13	104.2	97.5	97.5	0.0
126	5	14	103.9	97.3	97.3	0.0
141	6	1	112.0	110.9	110.9	0.0
142	6	2	111.6	105.3	105.3	0.0
143	6	3	110.8	104.5	104.5	0.0
144	6	4	110.0	103.7	103.7	0.0
145	6	5	109.2	102.7	102.7	0.0
146	6	6	108.3	101.8	101.8	0.0
147	6	7	107.5	100.9	100.9	0.0
148	6	8	106.7	100.1	100.1	0.0
149	6	9	106.0	99.3	99.3	0.0
150	6	10	105.4	98.7	98.7	0.0
151	6	11	105.0	98.3	98.3	0.0
152	6	12	104.6	98.0	98.0	0.0
153	6	13	104.3	97.7	97.7	0.0
154	6	14	104.0	97.4	97.4	0.0
169	7	1	114.3	108.1	108.1	0.0
170	7	2	113.0	106.7	106.7	0.0
171	7	3	111.7	105.4	105.4	0.0
172	7	4	110.5	104.2	104.2	0.0
173	7	5	109.5	103.1	103.1	0.0
174	7	6	108.5	102.1	102.1	0.0
175	7	7	107.7	101.1	101.1	0.0
176	7	8	106.9	100.3	100.3	0.0
177	7	9	106.1	99.5	99.5	0.0
178	7	10	105.4	98.8	98.8	0.0
179	7	11	105.1	98.4	98.4	0.0
180	7	12	104.7	98.1	98.1	0.0
181	7	13	104.4	97.8	97.8	0.0
182	7	14	104.1	97.5	97.5	0.0
197	8	1	114.7	108.5	129.8	21.3
198	8	2	113.2	106.9	126.2	19.3
199	8	3	111.8	105.5	107.1	1.6
200	8	4	110.6	104.3	105.8	1.5
201	8	5	109.6	103.2	104.5	1.3
202	8	6	108.6	102.1	103.1	1.0
203	8	7	107.7	101.2	101.8	0.6
204	8	8	106.9	100.4	100.6	0.2
205	8	9	106.2	99.6	99.6	0.0
206	8	10	105.5	98.8	98.8	0.0
207	8	11	105.1	98.4	98.4	0.0
208	8	12	104.8	98.1	98.1	0.0
209	8	13	104.4	97.8	97.8	0.0
210	8	14	104.1	97.5	97.5	0.0

Change in Maximum Sound Level

Table B

Site	I	J	Existing 1999 (Lmax)	2017 No Project (Lmax)	2017 With Project (Lmax)	Change Due to the Project
225	9	1	114.2	108.0	108.0	0.0
226	9	2	112.7	106.4	106.4	0.0
227	9	3	111.5	105.1	105.1	0.0
228	9	4	110.3	104.0	104.0	0.0
229	9	5	109.3	102.9	102.9	0.0
230	9	6	108.4	101.9	101.9	0.0
231	9	7	107.5	101.0	101.0	0.0
232	9	8	106.7	100.1	100.1	0.0
233	9	9	106.0	99.4	99.4	0.0
234	9	10	105.4	98.7	98.7	0.0
235	9	11	105.0	98.3	98.3	0.0
236	9	12	104.7	98.0	98.0	0.0
237	9	13	104.3	97.7	97.7	0.0
238	9	14	104.0	97.4	97.4	0.0
253	10	1	110.1	103.8	103.8	0.0
254	10	2	109.6	103.3	103.3	0.0
255	10	3	109.0	102.6	102.6	0.0
256	10	4	108.4	102.0	102.0	0.0
257	10	5	107.8	101.3	101.3	0.0
258	10	6	107.2	100.6	100.6	0.0
259	10	7	106.5	99.9	99.9	0.0
260	10	8	105.9	99.3	99.3	0.0
261	10	9	105.3	98.7	98.7	0.0
262	10	10	104.8	98.1	98.1	0.0
263	10	11	104.5	97.8	97.8	0.0
264	10	12	104.2	97.5	97.5	0.0
265	10	13	103.9	97.3	97.3	0.0
266	10	14	103.6	97.0	97.0	0.0

Prepared September 18, 2000

Table C

Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
29	2	1	61.2	61.3	61.3	0.0
30	2	2	61.0	61.1	61.1	0.0
31	2	3	60.5	60.5	60.5	0.0
32	2	4	59.9	59.9	59.9	0.0
33	2	5	59.5	59.3	59.4	0.1
34	2	6	59.1	58.8	58.9	0.1
35	2	7	58.8	58.4	58.5	0.1
36	2	8	58.5	58.1	58.2	0.1
37	2	9	58.3	57.9	57.9	0.0
38	2	10	58.2	57.7	57.7	0.0
39	2	11	58.1	57.5	57.5	0.0
40	2	12	58.0	57.4	57.4	0.0
41	2	13	57.9	57.2	57.3	0.1
42	2	14	57.8	57.1	57.2	0.1
57	3	1	64.9	65.0	65.0	0.0
58	3	2	64.4	64.4	64.5	0.1
59	3	3	63.2	63.2	63.2	0.0
60	3	4	62.2	62.1	62.2	0.1
61	3	5	61.5	61.3	61.3	0.0
62	3	6	60.9	60.6	60.7	0.1
63	3	7	60.6	60.1	60.2	0.1
64	3	8	60.3	59.8	59.9	0.1
65	3	9	60.1	59.6	59.6	0.0
66	3	10	60.0	59.4	59.5	0.1
67	3	11	59.9	59.3	59.3	0.0
68	3	12	59.8	59.2	59.2	0.0
69	3	13	59.7	59.0	59.1	0.1
70	3	14	59.6	58.9	58.9	0.0
85	4	1	71.3	71.3	71.3	0.0
86	4	2	69.8	69.7	69.8	0.1
87	4	3	66.9	66.9	66.9	0.0
88	4	4	64.7	64.6	64.6	0.0
89	4	5	63.5	63.3	63.3	0.0
90	4	6	62.9	62.5	62.6	0.1
91	4	7	62.5	62.0	62.1	0.1
92	4	8	62.3	61.7	61.8	0.1
93	4	9	62.1	61.6	61.6	0.0
94	4	10	62.0	61.4	61.4	0.0
95	4	11	61.9	61.3	61.3	0.0
96	4	12	61.8	61.1	61.1	0.0
97	4	13	61.6	60.9	61.0	0.1
98	4	14	61.4	60.7	60.8	0.1
113	5	1	84.7	84.7	84.7	0.0
114	5	2	78.6	78.6	78.6	0.0
115	5	3	69.9	69.8	69.8	0.0
116	5	4	66.7	66.4	66.5	0.1
117	5	5	65.4	65.0	65.1	0.1
118	5	6	64.9	64.4	64.4	0.0
119	5	7	64.6	64.0	64.0	0.0

Table C

Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
120	5	8	64.3	63.8	63.8	0.0
121	5	9	64.1	63.6	63.6	0.0
122	5	10	64.0	63.4	63.4	0.0
123	5	11	63.8	63.2	63.2	0.0
124	5	12	63.6	63.0	63.0	0.0
125	5	13	63.4	62.7	62.8	0.1
126	5	14	63.2	62.5	62.6	0.1
141	6	1	86.5	86.5	86.5	0.0
142	6	2	72.0	71.9	72.0	0.1
143	6	3	68.9	68.6	68.9	0.3
144	6	4	67.5	67.2	67.3	0.1
145	6	5	67.1	66.7	66.8	0.1
146	6	6	66.8	66.3	66.4	0.1
147	6	7	66.5	66.1	66.1	0.0
148	6	8	66.2	65.8	65.8	0.0
149	6	9	66.0	65.6	65.6	0.0
150	6	10	65.8	65.4	65.4	0.0
151	6	11	65.6	65.2	65.2	0.0
152	6	12	65.3	64.9	65.0	0.1
153	6	13	65.1	64.7	64.7	0.0
154	6	14	64.8	64.4	64.5	0.1
169	7	1	78.8	78.8	79.0	0.2
170	7	2	72.1	72.0	72.9	0.9
171	7	3	70.1	70.1	70.7	0.6
172	7	4	69.7	69.7	69.7	0.0
173	7	5	69.4	69.4	69.4	0.0
174	7	6	69.1	69.1	69.1	0.0
175	7	7	68.8	68.8	68.8	0.0
176	7	8	68.5	68.5	68.5	0.0
177	7	9	68.2	68.2	68.3	0.1
178	7	10	67.9	68.0	68.0	0.0
179	7	11	67.7	67.7	67.7	0.0
180	7	12	67.4	67.5	67.5	0.0
181	7	13	67.1	67.2	67.2	0.0
182	7	14	66.8	66.9	66.9	0.0
197	8	1	76.7	77.1	83.5	6.4
198	8	2	75.0	75.5	80.7	5.2
199	8	3	74.1	74.6	74.6	0.0
200	8	4	73.5	73.9	74.0	0.1
201	8	5	72.9	73.3	73.3	0.0
202	8	6	72.3	72.6	72.7	0.1
203	8	7	71.7	72.0	72.0	0.0
204	8	8	71.1	71.5	71.5	0.0
205	8	9	70.6	71.0	71.0	0.0
206	8	10	70.1	70.5	70.5	0.0
207	8	11	69.7	70.0	70.1	0.1
208	8	12	69.3	69.6	69.6	0.0
209	8	13	68.9	69.2	69.2	0.0
210	8	14	68.4	68.8	68.8	0.0

Table C

Day – Night Average Sound Levels (DNL)

Site	I	J	Existing 1999 (DNL)	2017 No Project (DNL)	2017 With Project (DNL)	2017 Change Due to the Project
225	9	1	77.3	77.3	77.5	0.2
226	9	2	72.1	72.1	72.6	0.5
227	9	3	70.3	70.4	70.9	0.5
228	9	4	69.8	69.9	70.0	0.1
229	9	5	69.4	69.6	69.6	0.0
230	9	6	69.0	69.1	69.1	0.0
231	9	7	68.6	68.6	68.6	0.0
232	9	8	68.2	68.2	68.2	0.0
233	9	9	67.9	67.8	67.9	0.1
234	9	10	67.6	67.6	67.6	0.0
235	9	11	67.3	67.3	67.3	0.0
236	9	12	67.0	67.0	67.0	0.0
237	9	13	66.7	66.8	66.8	0.0
238	9	14	66.4	66.5	66.5	0.0
253	10	1	71.6	71.6	71.7	0.1
254	10	2	69.9	69.8	70.0	0.2
255	10	3	68.2	68.1	68.3	0.2
256	10	4	67.3	67.2	67.3	0.1
257	10	5	67.0	66.9	67.0	0.1
258	10	6	66.7	66.8	66.8	0.0
259	10	7	66.3	66.4	66.4	0.0
260	10	8	65.8	65.7	65.7	0.0
261	10	9	65.4	65.2	65.2	0.0
262	10	10	65.1	64.8	64.8	0.0
263	10	11	64.8	64.5	64.5	0.0
264	10	12	64.5	64.2	64.3	0.1
265	10	13	64.2	64.0	64.0	0.0
266	10	14	64.0	63.7	63.7	0.0
281	11	1	67.4	67.5	67.5	0.0
282	11	2	66.7	66.7	66.8	0.1
283	11	3	65.8	65.8	65.9	0.1
284	11	4	65.1	65.0	65.1	0.1
285	11	5	64.8	64.8	64.8	0.0
286	11	6	64.7	64.7	64.7	0.0
287	11	7	64.5	64.7	64.7	0.0
288	11	8	64.0	64.3	64.3	0.0
289	11	9	63.4	63.4	63.4	0.0
290	11	10	63.0	62.7	62.7	0.0
291	11	11	62.6	62.3	62.3	0.0
292	11	12	62.3	61.9	62.0	0.1
293	11	13	62.1	61.7	61.7	0.0
294	11	14	61.8	61.4	61.4	0.0

Prepared September 18, 2000

+.076% +.035% .007%

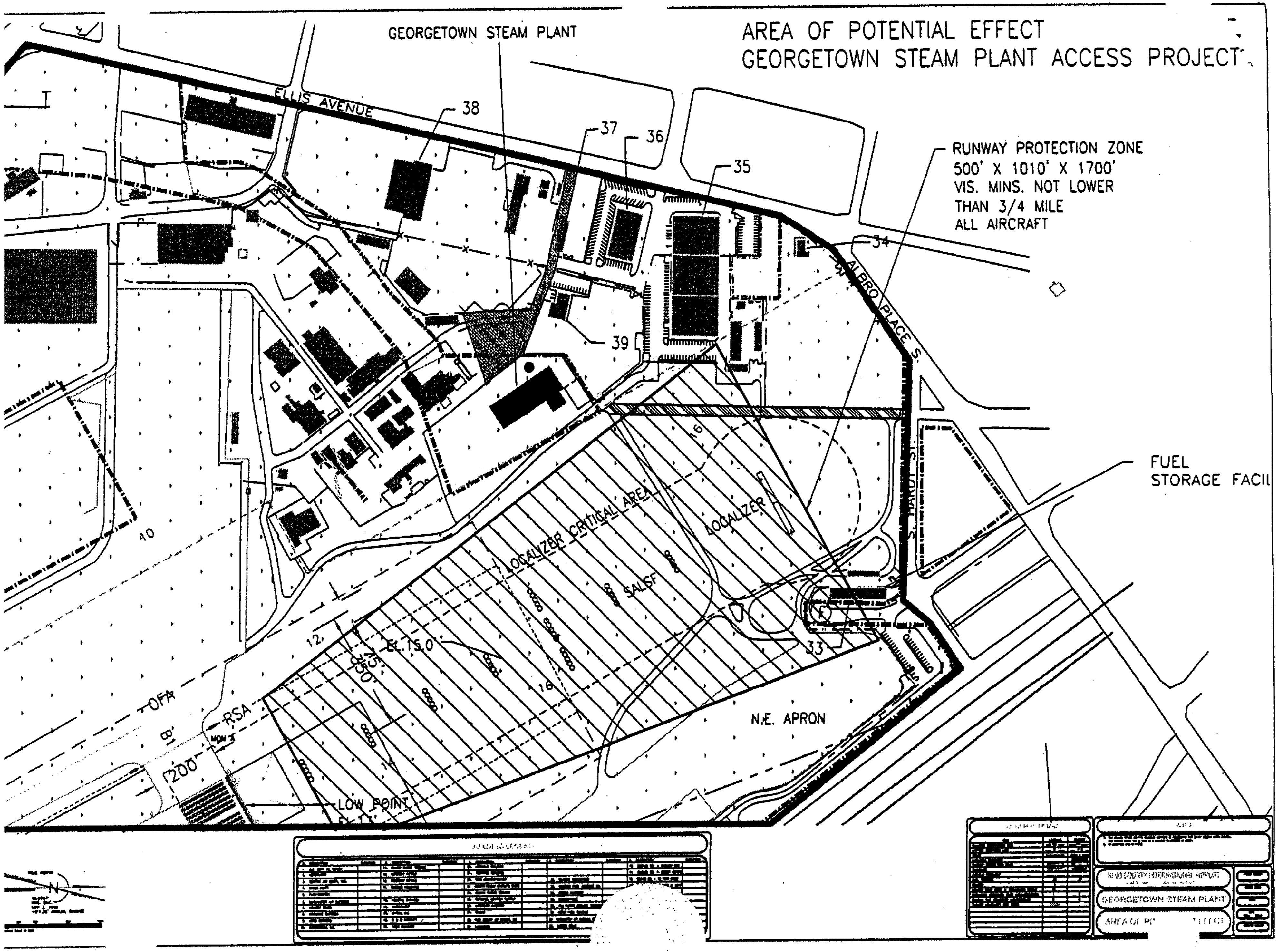
25 points

Table A Change in Time Above a Threshold of A-Weighted Sound (TA)

Site	I	J	Future No Project Time Above 65 dBA	Future No Project Time Above 75 dBA	Future No Project Time Above 85 dBA	Future With Project Time Above 65 dBA	Future With Project Time Above 75 dBA	Future With Project Time Above 85 dBA	Project Change (Future With Project - Future No Project) 65 dBA	Project Change (Future With Project - Future No Project) 75 dBA	Project Change (Future With Project - Future No Project) 85 dBA
29	2	1	47.9	7.3	0.1	48.2	7.4	0.1	0.3	0.1	0.0
30	2	2	44.1	7.3	0.1	44.5	7.5	0.1	0.4	0.2	0.0
31	2	3	39.7	5.2	0.1	40.0	5.5	0.1	0.3	0.3	0.0
32	2	4	39.0	3.1	0.1	39.4	3.4	0.1	0.4	0.3	0.0
33	2	5	32.0	1.0	0.1	32.4	1.1	0.1	0.4	0.1	0.0
34	2	6	27.2	1.0	0.1	27.6	1.0	0.1	0.4	0.0	0.0
35	2	7	20.3	0.9	0.1	20.7	0.9	0.1	0.4	0.0	0.0
36	2	8	19.7	0.9	0.1	20.1	0.9	0.1	0.4	0.0	0.0
37	2	9	17.2	0.9	0.1	17.6	0.9	0.1	0.4	0.0	0.0
38	2	10	14.8	0.8	0.1	15.2	0.9	0.1	0.4	0.1	0.0
39	2	11	12.5	0.8	0.1	12.8	0.9	0.1	0.3	0.1	0.0
40	2	12	12.2	0.8	0.1	12.5	0.8	0.1	0.3	0.0	0.0
41	2	13	11.8	0.6	0.1	12.1	0.7	0.1	0.3	0.1	0.0
42	2	14	11.7	0.6	0.1	11.9	0.6	0.1	0.2	0.0	0.0
57	3	1	65.0	21.0	2.1	65.4	21.1	2.1	0.4	0.1	0.0
58	3	2	61.9	18.9	2.1	62.3	19.1	2.1	0.4	0.2	0.0
59	3	3	57.4	12.6	0.1	57.7	12.8	0.1	0.3	0.2	0.0
60	3	4	47.0	6.4	0.1	47.5	6.7	0.1	0.5	0.3	0.0
61	3	5	43.6	4.1	0.1	44.2	4.5	0.1	0.6	0.4	0.0
62	3	6	36.3	2.0	0.1	36.8	2.2	0.1	0.5	0.2	0.0
63	3	7	27.4	1.8	0.1	27.9	1.9	0.1	0.5	0.1	0.0
64	3	8	24.5	1.7	0.1	25.0	1.8	0.2	0.5	0.1	0.1
65	3	9	22.1	1.7	0.1	22.6	1.7	0.2	0.5	0.0	0.1
66	3	10	19.6	1.6	0.1	20.0	1.7	0.1	0.4	0.1	0.0
67	3	11	17.1	1.6	0.1	17.4	1.6	0.1	0.3	0.0	0.0
68	3	12	16.6	1.5	0.1	16.9	1.5	0.1	0.3	0.0	0.0
69	3	13	16.4	1.3	0.1	16.7	1.4	0.1	0.3	0.1	0.0
70	3	14	16.3	1.0	0.1	16.5	1.1	0.1	0.2	0.1	0.0
85	4	1	92.0	28.0	12.4	92.6	28.2	12.4	0.6	0.2	0.0
86	4	2	84.7	27.7	10.3	85.1	27.9	10.3	0.4	0.2	0.0
87	4	3	75.0	23.4	2.2	75.5	23.7	2.2	0.5	0.3	0.0
88	4	4	65.4	14.8	0.2	66.1	15.2	0.2	0.7	0.4	0.0
89	4	5	52.0	8.3	0.2	52.8	8.7	0.2	0.8	0.4	0.0
90	4	6	48.1	3.8	0.2	48.8	4.2	0.2	0.7	0.4	0.0

Enclosure #5

AREA OF POTENTIAL EFFECT
GEORGETOWN STEAM PLANT ACCESS PROJECT



To: John Current

MUCKLESHOOT CULTURAL PROGRAM

39015 172nd Avenue S.E. • Auburn, Washington 98092-9763

Phone: (253) 939-3311 • FAX: (253) 833-6177

RECEIVED

DEC 18 2000

December 12, 2000

Cayla Morgan
Federal Aviation Administration
Seattle Airports District Offcie
1601 Lind Avenue SW suite 250
Renton WA 98055

Dear Ms. Morgan, RE: Boeing Field runway extension

This letter is in regards to our phone conversation about the Boeing Field runway project. As we discussed, you will be sending me photos of the northern area where the ground disturbing activities will be taking place.

I believe the borehole tests conducted last month were done for noise and/or vibration impacts. As I mentioned, it may be necessary to do an archaeological study that would require a few shovel probes in the northern area that will be added to the runway. I will be able to make comment on the project after I receive the photos and review the information.

For your information, the Wildlife Program and the Fisheries Program are separate departments under the Muckleshoot Indian Tribe. If pertaining to your project, please contact these departments for their input.

If you have any questions, please feel free to contact me at 360-802-2202, x 101. I look forward to working with you.

Sincerely,

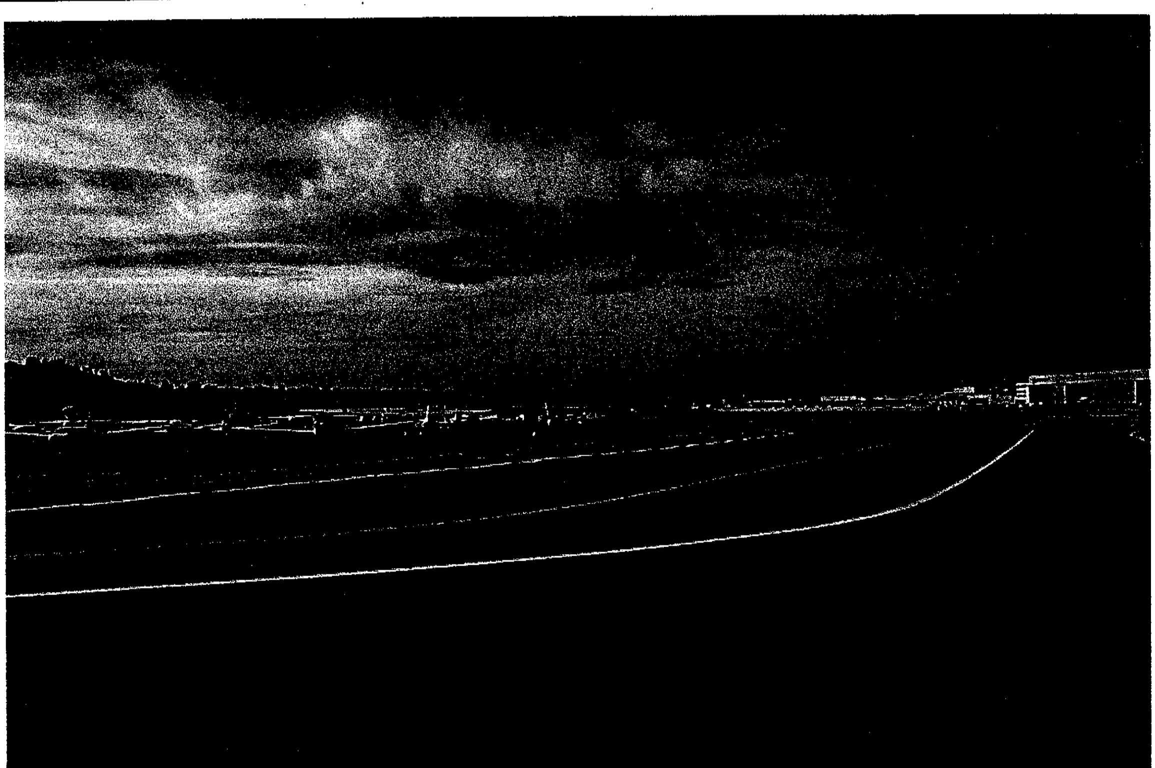
Donna Hogerhuis

Donna Hogerhuis, Cultural Specialist

cc: Melissa Calvert, Wildlife and Cultural Resource Programs Coordinator
Dennis Anderson, Council Member and Cultural Resource Committee Chair

12/22/00 - Left message w/Donna Hogerhuis thanking her for the letter and committing to having photos of the northern area no later than January 3rd. Have also confirmed that photos commitment will work for John Current

Photograph 3: Looking south at the north end of the runway.



Photograph 4: A general aviation area at the northeast end of the runway.

Photo 1: Looking southwest towards the south end of the runway.

Photograph 2: Looking west from the eastern perimeter of the airport.

City of Seattle
Strategic Planning Office

Denna Cline, Director
Paul Schell, Mayor

DEC 7 2000

December 5, 2000

Cayla Morgan
Federal Aviation Administration
Seattle Airports District Office
1601 Lind Avenue S.W., Suite 250
Renton, WA 98055-4056

Re: Area of Potential Effect for King County International Airport Runway Safety Area Project and Access to the Georgetown Steam Plant

Dear Ms. Morgan:

We are writing to provide comments on the proposed Area of Potential Effect (APE) for the King County International Airport (KCIA) Runway Safety Area Project and the APE for reorienting access to the Georgetown Steam Plant, pursuant to Section 106 of the National Historic Preservation Act. We appreciate the information that you provided through your October 16 letter to State Historic Preservation Officer Allyson Brooks. Our comments include requests for additional information that we feel will further inform the designation, as well as general concerns about the limited coverage of the APE for the Runway Safety Area (RSA) Project.

As you are aware, we asked our noise consultant, Robert Brown of Brown-Buntin Associates to review the information provided in the letter. Mr. Brown's conclusion is that the FAA and KCIA have provided the information required for determination of the APE. He has recommended, and we request here, that additional information be provided in the spirit of full disclosure. This information will be useful both in determining the APE and in helping residents of the Georgetown neighborhood better understand the potential impacts of the runway shift. Much or all of the following information should be available without a substantial amount of extra work:

1. A detailed description of the actual points used in the grid analysis for noise modeling. Ideally this would be in the form of a map. This will help confirm that the grid analysis adequately covers the areas of concern for noise impacts.

2. A comparison of noise levels with and without the RSA Project, using the day/night average noise level (DNL), maximum noise level (L_{max}), and Time Above metrics, for conditions expected *at the time of project completion*. The letter only provided this comparison for year 2017 when background operations (those operations not using the restricted area of the runway) will have increased substantially compared to the relatively fixed number of operations projected for the restricted area.

3. 5th A comparison of L_{max} values at the Steam Plant and Georgetown area for aircraft departures from Runway 13R (south flow) with and without the RSA Project. This information focuses on the specific impacts of the RSA project, because it identifies the change in maximum noise levels for operations that will change with the RSA Project. Furthermore, it is important to focus on south flow

NEPA

Not pertinent to 106 County is in process of developing a scope of work and will present in the SEPA EIS departures, because these operations happen approximately two out of three days during the year. The L_{max} sited for north flow only happens one-third of the time. This will answer the question, "what is the change in maximum noise levels for the 220 days a year when the airport is operating in south flow conditions?"

Beyond the data presented or requested, we feel that the APE for the RSA Project should be expanded to include all areas within the 65 DNL contour. Use of the 65 DNL acknowledges that those residents within this area are already impacted by airport noise and any increase in noise has an additional impact. Furthermore, at agency meetings in 1999, KCIA staff and consultants implied that the 65 DNL would be used to determine the APE for Section 106. The EIS consultant scope of services also indicates the same.

- Still, this will be handled in 150

ok

An expanded APE would better cover the potential alternatives for the RSA Project. We recognize that the FAA and KCIA have identified a preferred alternative, but it is not the only alternative that has been considered. One alternative is unrestricted use of the new pavement at the north end of the runway. Under this alternative more flights would depart 880 feet closer to the Georgetown neighborhood, and the noise impacts on the neighborhood would increase. Even if the preferred alternative (restricted use) is selected, we are uncertain of the ultimate success of the proposed program to limit use of the new pavement. If substantially more aircraft are allowed to use the new pavement than projected, the impacts of the preferred alternative will be more like the unrestricted alternative.

Concerning the APE for the Georgetown Steam Plant access, we concur with KCIA staff John Current's suggestion that the whole area shown on the drawing (see attached), and not just the shaded portion, be used to delineate the APE. This was discussed at our meeting with the State Historic Preservation Officer on November 11, 2000 and was acceptable to KCIA and the National Park Service as well.

We appreciate your consideration of our comments. We share your interest in moving forward with the Runway Safety Area project and believe that a thorough analysis will be to the benefit of all interested parties.

Sincerely,

Denna Cline

Denna Cline
Director

cc: Seattle City Councilmembers
King County Councilmember Dwight Pelz
Tom Byers, Deputy Mayor
Allyson Brooks, State Historic Preservation Officer
Cynthia Stewart, Airport Manager, KCIA
Stephanie Warden, King County Office of Regional Policy and Planning
Stephanie Toothman, National Parks Service
Jim Diers, Department of Neighborhoods
Gary Zarker, Seattle City Light

copy to Dennis V

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

RECEIVED
NOV 20 2000

November 14, 2000

Gary Zarker, Superintendent
Seattle City Light
700 Fifth Avenue, Suite 3300
Seattle, Washington 98104
and
Jim Diers, Director
Department of Neighborhoods
700 Third Avenue, Suite 400
Seattle, WA 98104

What about Park Service?

RE: King County International Airport Proposed Runway Shift & Georgetown Steamplant

Dear Mr. Zarker and Mr. Diers:

Thank you for your August 4, 2000 letter concerning the possible impacts of King County International Airport's (KCIA) draft Master Plan and proposed runway shift project on the Georgetown Steam Plant. This letter responds to the issues raised in that letter, and in subsequent conversations with your staff, and provides some additional points of clarification.

I apologize for the delay in responding. I had thought that staff conversations would serve to respond to your concerns. At this time, it is our hope that this response, in conjunction with the Section 106 formal consultation recently initiated by FAA, will result in an agreement concerning mitigation.

The following is a response to each of your questions in the order they appear in your letter. Regarding your comments on the draft study, entitled "Evaluation of Noise Induced Vibration at the Historic Georgetown Steam Plant," our responses are as follows.

1. You indicated that the criterion used is consistent with your understanding of the literature. We appreciate your concurrence.

2. You noted that the analysis was based on the earlier proposal of an 800 foot-shift in the runway and that you recommend we update the analysis to account for the currently proposed 880-foot runway shift. First, it is important to note that although your letter calls

the KCIA proposal an "extension", the Airport runway shift proposal is one that will allow the Airport to retain the runway's current length of 10,000 feet. Therefore, this project is not an "extension"; rather, it is a shift of available length from the south to the north end of the runway.

With regard to the change in the length of the shift, we do not propose to conduct additional vibration analysis at this time. The consultants who conducted the study have indicated that due to the conservative nature of the assumptions used in the study, the relatively small change in footage does not affect the study's findings or warrant additional analysis. The analysis was modeled upon the most extreme standard, that is, using aircraft that would produce the strongest vibration impact. As the study determined, the runway shift will result in only minimal impacts to the Steam Plant.

APE

The study did find that vibration from use of the shifted runway could "result in cracking of some of the [window] units, particularly for glass units held loosely in place by deteriorating stopping materials. Levels of vibration necessary to break the panels, shattering the glass, would likely not be reached with noise levels generated by aircraft using Boeing Field." According to the study, no other significant adverse noise or vibration effects would occur to the Georgetown Steam Plant.

Given the study's findings, it is our hope to fully resolve this matter by replacing the existing windows in the Steam Plant with windows that would meet the structural requirements of the facility. We propose to prepare an additional evaluation as part of the design process to ensure the new windowpanes, and the method of their installation, will meet the appropriate vibration level. In addition, we intend to conduct the replacement in a manner that is consistent with the Steam Plant's historic and architectural values.

3. You commented that noise-induced vibration test and prediction methodologies appear consistent with the objective of determining potential structural damage except for:
   - use of a helicopter to predict glazing response during takeoff
   - questions about possible supersonic aircraft departures at KCIA
   - vibration impacts from northbound departures
   - questions about how often potential vibration impacts might occur.

We appreciate your general agreement with the methodologies. With regard to the exceptions:

- A helicopter flyby was used in the analysis because this aircraft, when contrasted with the other aircraft regularly operating at the Airport, produced the greatest vibration effect on the building. As noted in the paper, a worst-case condition was used, as this represented the peak level vibration. After recent conversations between our vibration consultants and yours it is our understanding that your organization concurs with our methodology and findings.

- As noted in our May 11, 2000 letter, the County has spent the last year working with the FAA to ensure that the airfield would operate as the County desires – that only the aircraft that demonstrate the need for full use of 10,000 feet would use the additional pavement. As a result, we anticipate that the worst case involves only about 322 operations on the runway shift area. The evaluation of the amount of time that the Steam Plant would experience a change in sound level above 65 dbA indicates a likely worst case increase of less than two percent. Without the project, the Steam Plant would experience 135.4 minutes a day above 65 dbA in 2017 (during an average day). With the runway shift, the amount of time could increase 2.4 minutes to 137.8 minutes per average day.
- All of the aircraft predicted to use the runway shift are subsonic aircraft belonging to two primary users: military transport category aircraft equipped with Airborne Warning and Control Systems (AWACS), and the testing of commercial transport aircraft belonging to the Boeing Company.
- The proposed project does not change or alter aircraft takeoff operations in a north flow. In north flow, aircraft would begin their departure run in the same location used today, and the runway available to those aircraft would terminate at the same point the runway terminates at this time. Aircraft landing to the north would use a shorter runway because of the 880-foot threshold displacement at the approach (south) end of Runway 31L. The available runway length for these landings would be 9,180 feet and would terminate at the current north end of the runway. Therefore, none of the north flow operations would have any additional impact on the Steam Plant.

9120

4. You indicated that the draft report does not make any recommendations for minimizing the potential for noise-induced vibration damage to the glazing of the Steam Plant and that acoustical design criteria are needed for the window replacement program that we have proposed.

   As noted above, the report stated "Levels of vibration necessary to break the panels, shattering the glass, would likely not be reached with noise levels generated by aircraft using Boeing Field." However, we have agreed that window replacement standards would be developed in conjunction with your staff and other relevant parties, to assure that all needs are met.

With regard to your comments about the proposed Draft Memorandum of Agreement (draft dated May 9, 2000), I have responded below, although we are not now proposing and forwarding a new draft of the MOA to you. We understand that the MOA will be an outcome of the formal Section 106 process and will be formally initiated by the FAA in that process.

1. You commented that you have not seen delineation of the Area of Potential Effect for the Master Plan, pursuant to the National Historic Preservation Act. However, as noted at our meetings with your staff and other agencies during the fall of 1999, the only locations where the proposed runway shift would produce a 1.5 dnl noise level change (1.5 change

in dnl is considered by the FAA to be the threshold to determine whether or not an effect is "significant") are to properties generally within the airfield and to Boeing Company facilities. The Georgetown Steam Plant would receive less than 1.0 dnl change as a result of the KCIA proposal. A map showing the area of potential noise effect is enclosed for your information. This has been transmitted to the State Historic Preservation Officer (SHPO) by the FAA, and we expect the SHPO to concur with this area of potential effect in the near future.

2. You noted that the proposed MOA does not define the acoustical objectives of the proposed window replacement, and you suggested some objectives. Our proposed MOA was intended to specify what process could be used for reaching agreement about the window replacement.

3. You stated that the MOA does not address jet blast and exhaust from planes turning for takeoff. The project is not expected to create an adverse or unsafe jet blast effect on the Steam Plant. However a full analysis of potential jet blast affects will be included in the draft Environmental Impact Statement document.

4. You noted that a certificate of approval from the Seattle Landmarks Board would be required to implement the proposed window mitigation, and in points numbered 5 and 6, you commented on other parties to the consultation. It is our expectation that the formal consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, which has now formally been initiated by the FAA, would be the method for obtaining the approval and properly establishing the roles, responsibilities and signature procedures for all affected parties.

5. In item 7 of your letter, you requested a scale drawing. That drawing is enclosed.

We look forward to continuing to work with you and your staff and successfully completing the Section 106 consultation. Please do not hesitate to call me at 296-7430 if you have any questions or concerns in the meantime.

Sincerely,

Cynthia Stewart

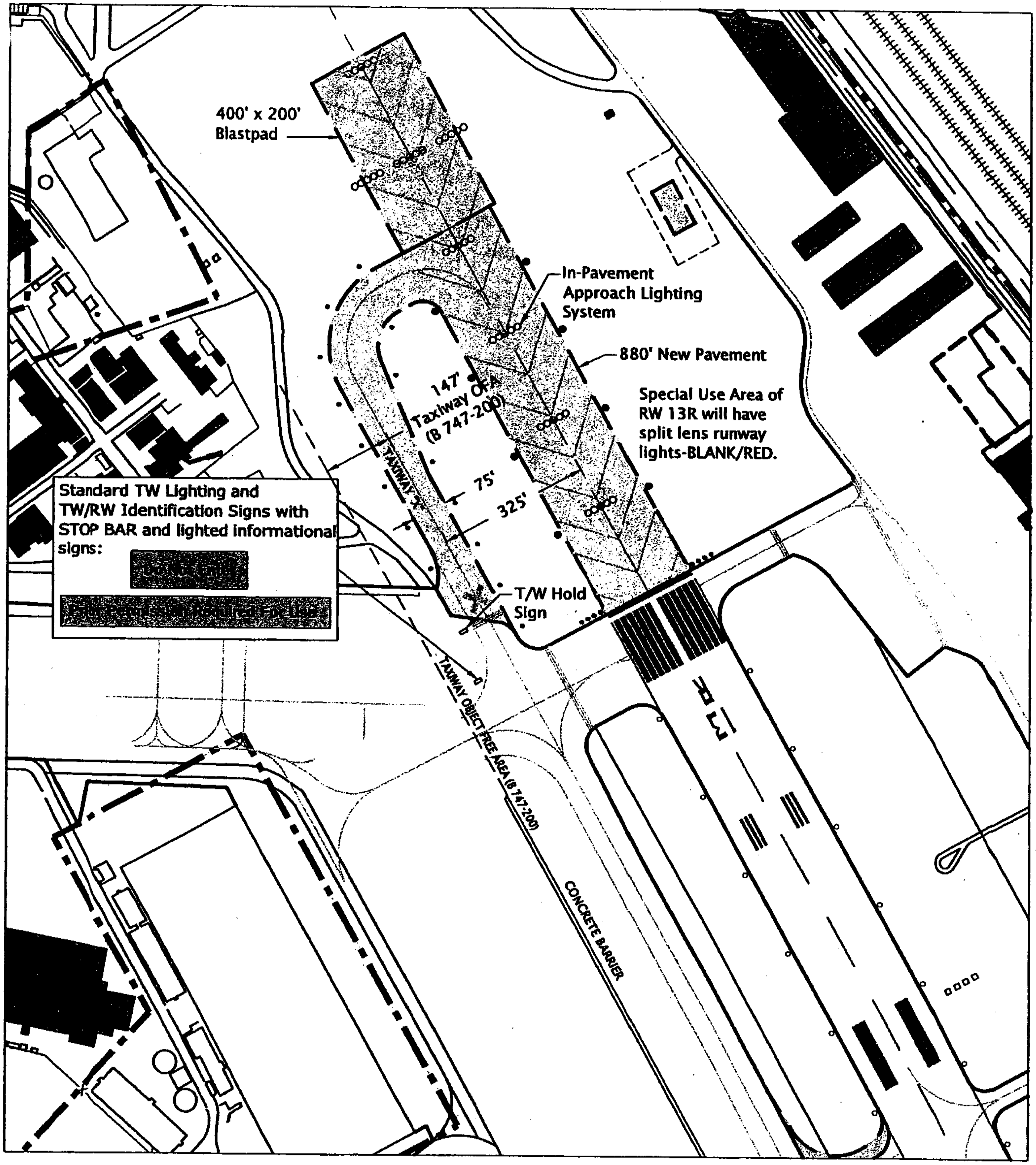
Cynthia Stewart
Airport Manager

Enclosures

1. ALP, 1.5 DNL contour from Runway Shift
2. Scaled Drawing Relating the Steam Plant to the Proposed Runway Project

bcc: Laurie Geissinger, Seattle City Light
Allison Brooks, State Historic Preservation Office
Cayla Morgan, Federal Aviation Administration
Julie Weibusch, Greenbusch Group
Mary Vigilante, Synergy Consultants, Inc.

Barnard Dunkelberg & Company
Tulsa, Oklahoma



True North
Mag. Dec.
N

Future Taxiway 'X'
& Special Use Area of Runway 13R

0 150' 300' 600' 900'
GRAPHIC SCALE IN FEET

King County
INTERNATIONAL AIRPORT/
Boeing Field
MASTER PLAN
Seattle, Washington

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

Idaho, Oregon, Washington

**Airports Division
Northwest Mountain Region
Seattle Airports District Office**
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CMM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Mr. Eric Tweit
Strategic Planning Officer
City of Seattle
600 - 4th Avenue, Suite 300
Seattle, WA 98104

Dear Mr. Tweit:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:07 PM:FILE:BOEING FIELD-ENVIRONMENTAL

U.S. Department
of Transportation
Federal Aviation Administration

Idaho, Oregon, Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Mr. Charlie Sundberg
Preservation Planner/Landmarks and Heritage Program
Office of Cultural Resources
King County
506 Second Avenue, Room 200
Seattle, WA 98104-2307

Dear Mr. Sundberg:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:05 PM:FILE:BOEING FIELD-ENVIRONMENTAL

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

Idaho, Oregon,
Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Ms. Karen Gordon
Urban Conservation Division
Historic Preservation Officer
400 Arctic
700 Third Avenue
Seattle, WA 98104-1848

Dear Ms. Gordon:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:05 PM:FILE:BOEING FIELD-ENVIRONMENTAL

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

Idaho, Oregon,
Washington

**Airports Division
Northwest Mountain Region
Seattle Airports District Office**
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Ms. Laurie Geissinger
Senior Planning & Development Specialist
Environment and Safety Division
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, WA 98104-5031

Dear Ms. Geissinger:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:07 PM:FILE:BOEING FIELD-ENVIRONMENTAL

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

Idaho, Oregon,
Washington

**Airports Division
Northwest Mountain Region
Seattle Airports District Office**
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Mr. ~~Hank Florence~~ Stephanie Toothman
~~Historical Architect~~
U.S. Department of the Interior
National Park Service
909 First Avenue
Seattle, WA 98104-1060

Dear Mr. Florence:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:04 PM:FILE:BOEING FIELD-ENVIRONMENTAL

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

Idaho, Oregon,
Washington

**Airports Division
Northwest Mountain Region
Seattle Airports District Office**
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

Mr. Charlie Sigo
Suguamish Tribal Council
P. O. Box 298
Suquamish, WA 98392

Dear Mr. Sigo:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:05 PM:FILE:BOEING FIELD-ENVIRONMENTAL

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

Idaho, Oregon,
Washington

Airports Division
Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue, S. W., Suite 250
Renton, Washington 98055-4056

CONCURRENCES
ROUTING SYMBOL SEA632
INITIALS/SIGNATURE CM
DATE 11/1/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

November 1, 2000

New Contact

~~Mr. Walter Pacheco~~ → Donna Hogerhuis - Cultural Resources Specialist
Tribal Historic Preservation Office
Muckeshoot Tribal Council
39015 172nd Avenue, S.E.
Auburn, WA 98092

(360) 802-2202 Telephone #101

Dear Mr. Pacheco:

The Federal Aviation Administration (FAA), in accordance with Section 106 of the National Historic Preservation Act of 1966, and implementing regulations 36 CFR Part 800, initiated consultation on the King County International Airport (KCIA) Runway Safety Area with the State Historic Preservation Office (SHPO) in an October 16, 2000, letter, which was faxed to you on October 30, 2000.

As indicated in a recent voice mail, we would like to invite you to a consultation meeting on the Area of Potential Effect for this project, as well as the project to provide an alternative access road to the Steamplant. This meeting is scheduled for November 17, 2000, at 10:00 a.m., in the office of Dr. Allyson Brooks, State Historic Preservation Officer. (Please see enclosed directions).

We hope you can attend. Should you have any questions, please do not hesitate to contact me at (425) 227-2653.

Sincerely,

Cayla D. Morgan
Environmental Specialist
Seattle Airports District Office

Enclosure

SEA632:CDMORGAN:SRD:X2653:11/01/00 04:05 PM:FILE:BOEING FIELD-ENVIRONMENTAL

Date: 10/30/2000 2:03 PM
Sender: Cayla Morgan
To: "Allyson Brooks" <AllysonB@CTED.WA.GOV>
Priority: Normal
Subject: Re:directions

I wanted to give you a further update on this meeting.

I have called each of the following and left a message about the meeting:

Karen Gordon, City of Seattle - neighborhoods
Laurie Geissinger, Seattle City Light
Eric Tweit, City of Seattle, Office of Strategic Planning
Hank Florence, National Park Service
Charlie Sigo, Suquamish Tribe
Charlie Sundberg, King County
Walter Pacheo, Muckleshoot Tribe
John Current, Boeing Field
Cynthia Stewart, Boeing Field

I have also faxed my October 16, 2000 letter to you to each of them.

Hank Florence has confirmed that he will be there.
John Current and Cynthia Stewart will be there.
I believe that Eric Tweit will be there.
4 of us from FAA will be there.

I will send you our tentative agenda when we get it together. That's all for now - cm

______________________ Reply Separator ______________________
Subject: directions
Author: "Allyson Brooks" <AllysonB@CTED.WA.GOV>
Date: 10/30/2000 12:32 PM

** High Priority **

RFC822.TXT

Directions to OAHP.doc

U.S. Department
of Transportation
Federal Aviation
Administration

Seattle Airports District Office
1601 Lind Avenue, S.W., Suite 250
Renton, Washington 98055-4056

File copy
CM
10/16/00

October 16, 2000

This letter was sent to all affected parties and provided at Nov. mtg.

Dr. Allyson Brooks
Washington State Historic Preservation Officer
Office of Archaeology & Historic Preservation
P.O. Box 48343,
Olympia, Washington 98504-8343

Dear Dr. Brooks:

The Federal Aviation Administration (FAA) in accordance with Section 106 of the National Historic Preservation Act of 1966 and implementing regulations 36 CFR Part 800 is initiating consultation on the King County International Airport (KCIA) Runway Safety Area Project. We have also defined the Area of Potential Effect (APE) for this project and the access road project for which we initiated consultation in our January 4, 2000 letter to you. This letter will summarize both projects and the analysis conducted to determine the APE for each. It is our hope that you will concur with our designation of each APE.

1. **Runway Safety Area Project**

A review of all airfield facilities was conducted during the preparation of the draft Airport Master Plan for the purpose of ensuring that these facilities complied with all current FAA standards. At that time, King County found that the Runway Safety Area (RSA) for the south end of the Airport's primary runway (13R/31L) does not meet current dimension/use standards. An RSA is "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway".[1]

Due to a aircraft overruns and incidents at airports with non-standard runway safety areas, FAA has placed an increased emphasis on compliance with design standards for such. All runway ends at this airport, with the exception of the south end of the runway (13R) meet the standards. The RSA for 13R is deficient in length by 880 feet.

The Boeing Company's Commercial Aircraft, Flight Test and Military divisions are located at KCIA. It is at this location that the Boeing Company conducts FAA certification tests and test flights of any new Boeing commercial aircraft models; military Airborne Warning and Control System aircraft (AWACS) are retrofitted with unique avionics and electronics components and electronic testing and maintenance is performed. In addition, the Boeing Company's commercial aircraft line is prepared for delivery. Because the Research and Development Flight Test and Delivery Center are co-located, the company realizes efficiencies from integrating its test pilot and ground support programs. To support these functions, the Boeing Company requires a departure runway length of 10,000 feet.

Two alternatives are available to achieve RSA requirements: a) shorten the runway on the south end to enable that end of the runway to achieve the requisite RSA dimensions and b) shift the runway to the north by 880 feet. The first alternative would shorten the runway to 9,120 feet of departure length when operating to the south. However, as noted, the Boeing Company requires 10,000 feet of departure length at all times, thus shifting the runway to the north by 880 feet is the preferred

---

1/ FAA Advisory Circular 150/5300-13, Airport Design Chapter 3, Runway Design.

alternative. The County proposes to maintain the runway's full departure length of 10,000 feet by effectively shifting the runway by 880 feet to the north. The runway would be displaced 880 feet on the south and 880 feet of additional pavement (plus blast pad) would be added to the north. In addition, the parallel taxiway would be extended on the west side of the runway an additional 880 feet, 325 feet west of the runway.

When operating in a north flow (arrivals from the south, departures to the north), departing flights would take-off at the same location used today, while aircraft landings would occur about 880 feet down the runway. When operating in a south flow (arrivals from the north), aircraft landings would occur at their current location. The attached graphics show where aircraft would land and takeoff with the proposed project. The County would also put in place a "prior permission required" process ensuring that the substantial majority of flights would begin their departure at the current take-off run position. In rare cases, aircraft operators who have demonstrated need and have received County approval would be authorized to begin their takeoff on the new 880 feet of pavement. This would be called a special use area. The County estimates that on a worst-case basis, about 322 operations per year would require the full 10,000-foot runway, or about 1 per day. Without the runway shift, these operations would not occur. See Attachment A.

King County would undertake the runway shift upon completion of the environmental review process. Construction would occur in late 2001 and 2002.

Based on our evaluation of the proposed runway shift, we believe that the primary consequence of the project is a change in noise levels. Other effects that are likely include:

- Increased amount of impervious surface at the airport, which will generate increased quantities of stormwater runoff. The County is currently conducting a biological assessment of the effects of the added stormwater runoff on endangered species. At this time, an adverse effect is not anticipated; and
- Increased air emissions as a result of the short-term construction of the additional taxiway and runway pavement. These added air emissions are estimated to be de-minimis relative to the Clean Air Act thresholds.

The County's EIS consultants have evaluated the noise effects of the shifted runway and parallel taxiway on historic sites. As you may know, the FAA and other Federal governmental agencies, through the Federal Interagency Committee on Aircraft Noise, have adopted the use of the Day –Night Average Sound Level (DNL) as the metric for describing aircraft related noise exposure. Further, the FAA has issued guidance in FAA Order 5050.4A "Airport Environmental Handbook" noting that a significant change in noise exposure occurs to noise sensitive facilities located within 65 DNL if a project results in a 1.5 DNL increase in noise. (FAA Order 5050.4A, Paragraph 47(e)(1)

Using the FAA's Integrated Noise Model (INM), noise exposure data was developed for the area. Attached is a map showing where the project creates a 1.5 DNL change in noise, as well as changes of 0.5, 1.0 and 3.0 DNL. See Attachment B. The 1.5 DNL changed due to the proposed project is located entirely within the airport boundary and does not affect any noise sensitive structures; no off-airport properties would be affected by a 1.5 DNL noise change. The Georgetown Steam Plant is located within the 0.5-1.0 DNL contour band. Based on the INM, the change that would be experienced at the Steam Plant is 0.6 DNL. Without the runway shift, the noise exposure is 69.6 DNL and with the shift, the noise exposure is projected to be 70.2 DNL with the worse case of 322 flights per year using the shifted runway.

We have also evaluated the amount of time that the Steam Plant would experience a change in sound level above 65 dBA. Without the project, the Steam Plant would experience 135.4 minutes a day above 65 dBA in 2017 (during an average day). With the runway shift, the amount of time could increase 2.4 minutes to 137.8 minutes per average day. This increase is less than a 2 percent change.

On an average annual basis, the Steam Plant experiences the greatest noise levels when flights depart to the north, and thus the maximum sound level that the site would experience will not change, as the project will not affect north flow operations. As a result, we do not believe the Steam Plant would experience a significant noise effect.

The following summarizes the noise effects for the Steamplant in the year 2017:

Sound Level Metric	Future Without Project	Future With Project	Change
Day Night Average Level (DNL)	69.6 DNL	70.2 DNL	0.6
Time of exposure above a threshold of 65 dBA (TA 65)	135.4 minutes	137.8 minutes	2.4 minutes
Maximum Sound Level (Lmax)	106.7	106.7	0

While the Georgetown Steam Plant experiences its greatest noise and potential vibration effect when the airport is operating in north flow, which would not be changed by the project, King County undertook a specialized vibration study that examined the effect of the proposed runway shift on vibration at the Steam Plant. The purpose of the study was to evaluate the effect of vibration associated with the project on the Steam Plant. It was discovered that the greatest project effect would occur when the new pavement is being used by heavy aircraft (i.e., AWACS or B747 aircraft). The vibration study found, using conservative criteria, that the potential exists for the old window glass to be jarred from the windowpane and to break.

As a result, King County is proposing to replace all of the windows in the Steam Plant with new windows. Because a conservative criteria was used, and because the results of the vibration test just met that conservative criteria, it is our belief that no further vibration analysis was warranted on other structures, as other non-airport facilities are more than twice the distance from the end of the runway in comparison to the Steam Plant. To facilitate our discussions with Seattle City Light, we have prepared a draft Memorandum of Agreement (MOA) to outline the process for ensuring that the historic integrity of the building is maintained through implementation of the proposed mitigation. At the County's recent agency meeting, this draft MOA was distributed. Several parties felt that this agreement was premature pending your concurrence on an area of potential affect. Attachment C contains the draft MOA.

A grid analysis showing the noise exposure conditions in the Georgetown residential area was also conducted. This analysis shows the change in noise exposure above a designated sound level per a 24-hour day in the future with and without the project. The Georgetown residential area that was analyzed is represented on the map in Attachment D. The range of Time Above exposure at these sites is as follows:

Time Above 65 dBA
0.1 minutes to 1.7 minutes in a 24-hour time period (1440-minutes).
The maximum increase in exposure of 1.7 minutes above 65dBA is .118% of a 24-hour day.

Time Above 75 dBA
0.1 minutes to 0.8 minutes in a 24-hour time period (1440-minutes).
The maximum increase in exposure of .8 minutes above 75dBA is .055% of a 24-hour day.

Time Above 85 dBA
0.0 minutes to 0.4 minutes in a 24-hour time period (1440 minutes)
The maximum increase in exposure of .4 minutes above 85 dBA is .027% of a 24-hour day.

We believe such small increases in noise exposure results in an imperceptible difference. Therefore, we do not believe that the Georgetown residential area should be included in the APE for this project.

As a result of our analysis, we propose that the area of potential effect (APE) be defined based on a significant noise and vibration condition. We propose that the 1.5 DNL contour be used for this purpose and supplemented with the Steam Plant building, where we determined that a vibration effect could occur. Your concurrence on this APE would be appreciated.

2. **Steam Plant Access**

Separate from the Master Plan, King County is proposing to develop an alternative, unrestricted access system to the Georgetown Steam Plant. Presently, during public tours, the Museum operator is required to be escorted by police through the secure portions of the airfield, along an easement or other ownership interests that Seattle City Light previously acquired. Other or regular access occurs to the Steam Plant through a rather circuitous route from Ellis Avenue.

To enable the County to maintain a secure airfield, the County proposes to renegotiate the easement interests that Seattle City Light currently uses along 13th Street on the airfield to exchange it for another easement on which the County would then build a road to the Steam Plant from Ellis Avenue. The new access road would enable unrestricted access to the general public and would be signed appropriately. We are currently working with King County, The Boeing Company, and Seattle City Light to resolve some of the fine points of this plan.

For the access project, the issues that we believe will be addressed in a future SEPA environmental document will focus on access to the Steam Plant, traffic, surface water (additional impervious surface), and construction impacts. As a result, we propose that the APE for the access project be the Steam Plant property and the access alignment, west to Ellis Avenue. The attached figure shows the proposed access alignment. See Attachment E. It is also our understanding that our January 4, 2000 letter to you initiated consultation on the access project. Please let us know if this is not the case.

* *

In conclusion, we believe that the area of potential effect should be limited to the areas defined above:

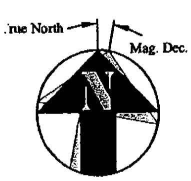
- For the runway shift – the APE reflecting the area within the 1.5 DNL contour and the Steam Plant building;
- For the access project – the APE reflecting the area encompassing the new access road and the Steam Plant property.

We would appreciate your review of and concurrence with these areas. Please do not hesitate to contact me at (425) 227-2653 if you have questions or wish to discuss further.

Sincerely,

Cayla Morgan
Environmental Specialist

Attachments: A – Graphic depiction of Runway Safety Area project
B - 1.5 DNL change map
C - Draft MOA on windows replacement
D – Map of the Georgetown residential area
E – Draft plan showing proposed access



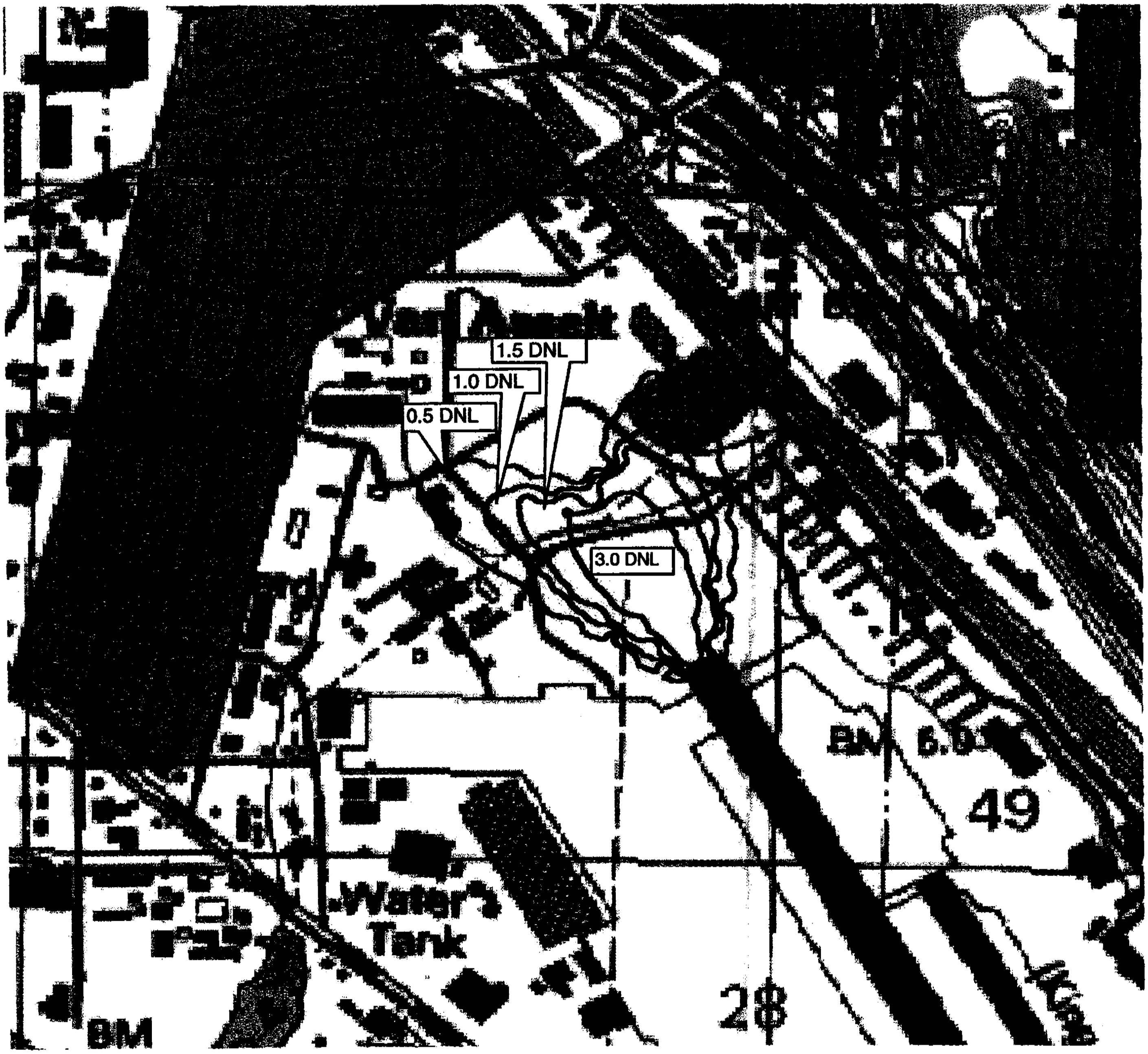
Future Taxiway 'X'
& Special Use Area of Runway 13R

0 150' 300' 600' 900'

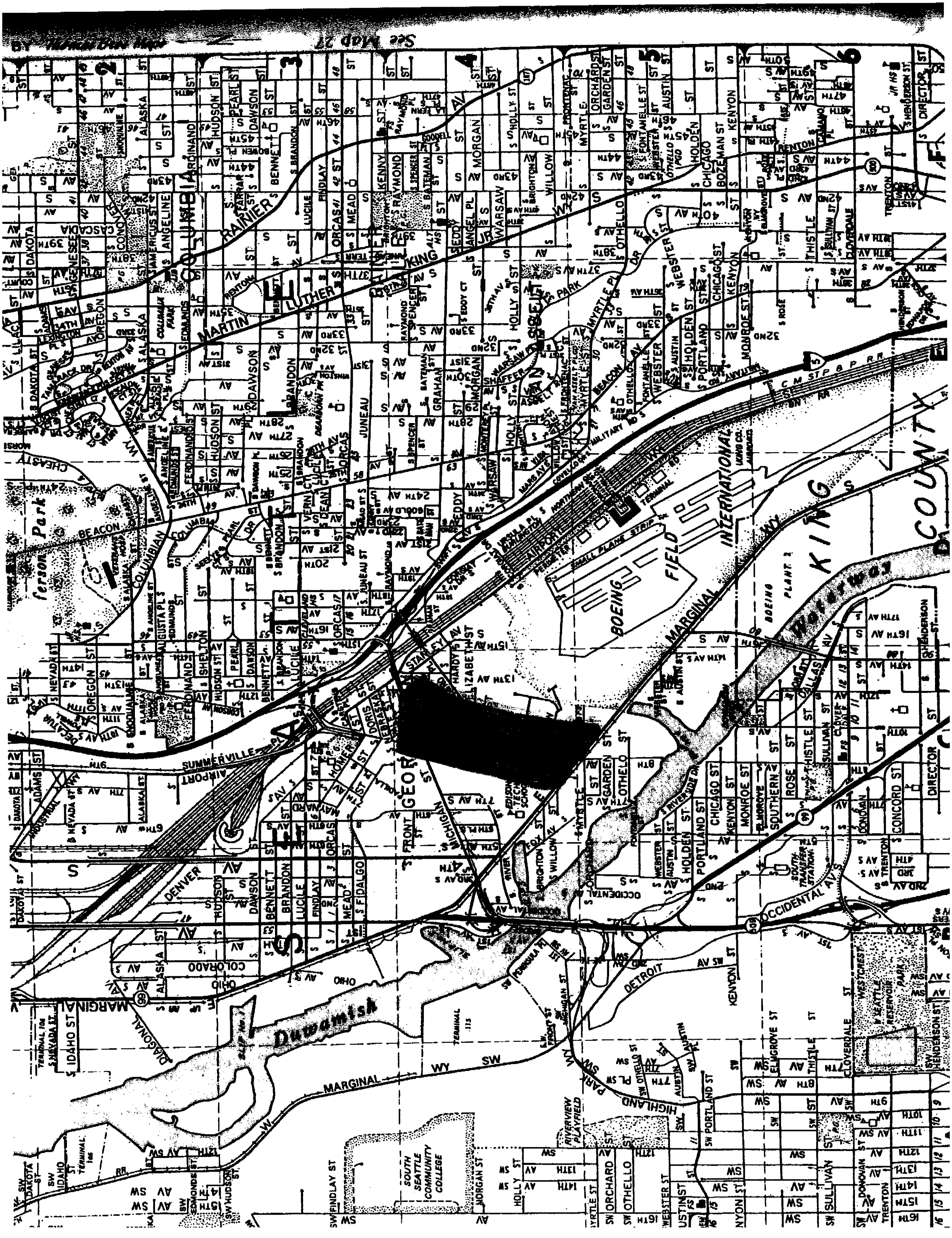
GRAPHIC SCALE IN FEET

King County
INTERNATIONAL AIRPORT/
Boeing Field
MASTER PLAN
Seattle, Washington

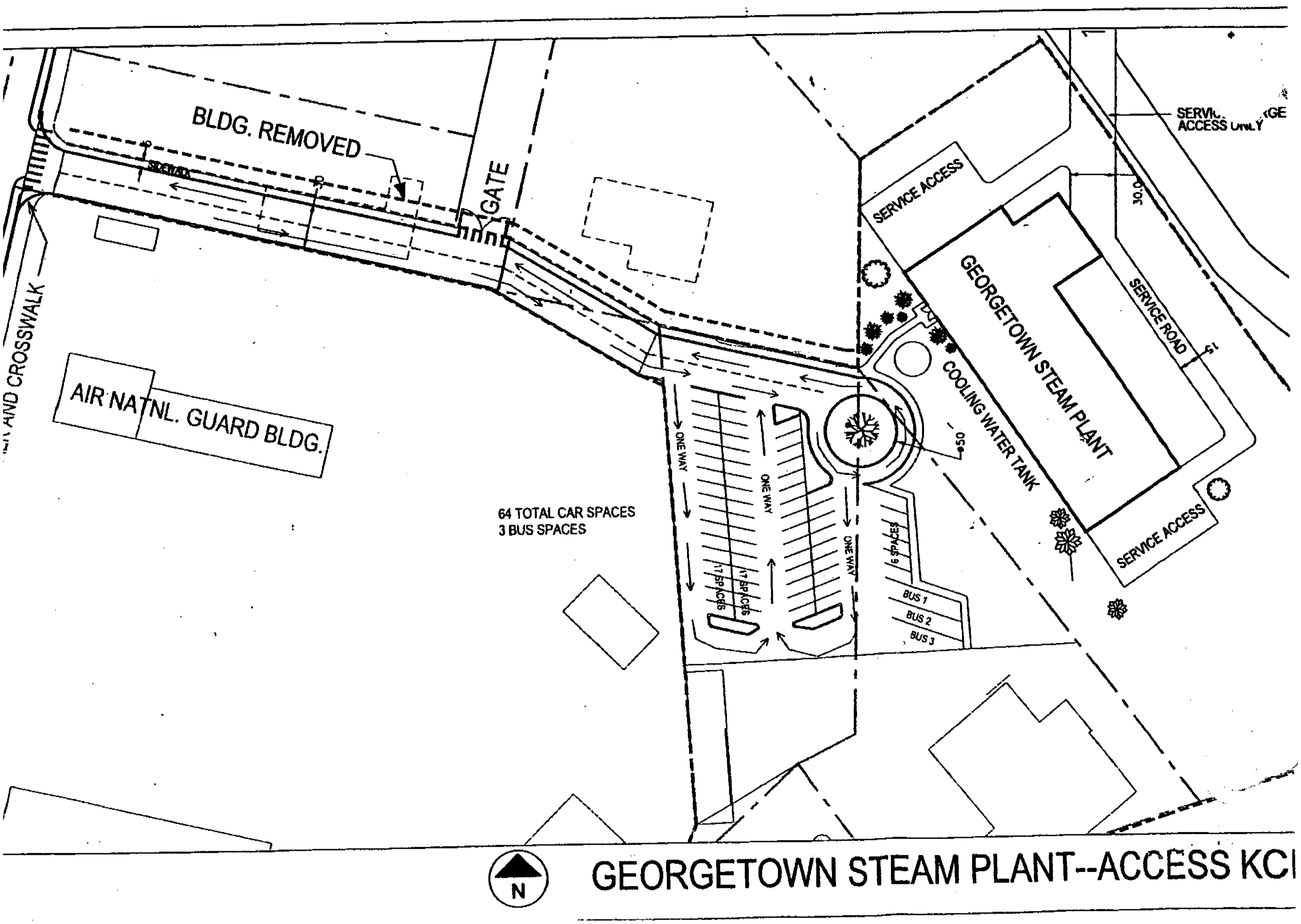
Figure 1
Future Change in DNL Noise Level
ng County International Airport (EA)
.hange in DNL due to the Master Plan 880' foot runway shift (0.5, 1.0, 1.5 and 3.0 DNL)



Prepared August 2000



MARTIN LUTHER KING JR WY
RAINIER AV S
BEACON AV S
KING COUNTY INTERNATIONAL AIRPORT
BOEING FIELD
SMALL PLANE STRIP
TERMINAL
BOEING PLANT 2
MARGINAL WY S
E MARGINAL WY S
Duwamish Waterway
W MARGINAL WY SW
SOUTH SEATTLE COMMUNITY COLLEGE
RIVERVIEW PLAYFIELD
W SEATTLE RESERVOIR PARK
GEORGETOWN
CORSON AV S
AIRPORT WY S
DENVER AV S
SUMMERVILLE
OCCIDENTAL AV S
HIGHLAND PARK WY SW
DIAGONAL AV S
COLUMBIAN WY S
JEFFERSON PARK



GEORGETOWN STEAM PLANT--ACCESS KCI

January 13, 2000

Walter Pacheco
Tribal Historic Preservation Officer
Muckleshoot Tribal Council
39015 172nd Ave., S.E.
Auburn, Washington 98092

Dear Mr. Pacheco:

We are writing this letter to request your comments regarding a proposed access change at the north end of King County International Airport (KCIA). One of the issues that has been discussed in the KCIA Airport Master Plan Update is the fact that the controlled access provided to the Georgetown Steam Plant through an easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. This issue has been examined in KCIA's master plan study. KCIA planning staff has recommended that the controlled access along 13th Street be closed, and as mitigation, have proposed that they provide unhindered access to the Steam Plant property from Ellis Avenue to the west. In a December 27, 1999 meeting with KCIA planning staff, FAA environmental and planning representatives and the State Historic Preservation Officer, it was agreed by all parties that this proposal is a prudent measure that should be pursued.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is consistent with our guidance, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change. However, the consensus of the people involved in the December 27 meeting is that with the proposed mitigation, access

CONCURRENCES		
ROUTING SYMBOL	INITIALS/SIGNATURE	DATE
632	[illegible]	1/13/00
630	[illegible]	1/14/00
600	[illegible]	1/14/00

would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway to achieve the standard Runway Safety Area (RSA) which is also a Section 106 issue. It has been suggested by some that the subject of Steam Plant access should be included in the Section 106 process regarding the RSA; however, the parties in the December 27 meeting also agreed that this project can be treated separately since it responds to our safety and security concerns about public access through the RPZ and is not directly related to the runway shift proposed by the Master Plan. At this point in the airport planning process, KCIA should address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the City of Seattle and King County's Historic Preservation Office, Seattle City Light, the Suquamish Historic Preservation Office, and the National Park Service requesting comment. We look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

J. Wade Bryant
Manager
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

January 13, 2000

Charlie Sigo
Tribal Historic Preservation Officer
Suquamish Tribal Council
P.O. Box 498
Suquamish, Washington 98392

Dear Mr. Sigo:

We are writing this letter to request your comments regarding a proposed access change at the north end of King County International Airport (KCIA). One of the issues that has been discussed in the KCIA Airport Master Plan Update is the fact that the controlled access provided to the Georgetown Steam Plant through an easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. This issue has been examined in KCIA's master plan study. KCIA planning staff has recommended that the controlled access along 13th Street be closed, and as mitigation, have proposed that they provide unhindered access to the Steam Plant property from Ellis Avenue to the west. In a December 27, 1999 meeting with KCIA planning staff, FAA environmental and planning representatives and the State Historic Preservation Officer, it was agreed by all parties that this proposal is a prudent measure that should be pursued.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is consistent with our guidance, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change. However, the consensus of the people involved in the December 27 meeting is that with the proposed mitigation, access

CONCURRENCES	
ROUTING SYMBOL	632
INITIALS/SIGNATURE	CW
DATE	1/13/00
ROUTING SYMBOL	630
INITIALS/SIGNATURE	CM
DATE	1/14/00
ROUTING SYMBOL	600
INITIALS/SIGNATURE	1/14/00
DATE	[illegible]
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	

would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway to achieve the standard Runway Safety Area (RSA) which is also a Section 106 issue. It has been suggested by some that the subject of Steam Plant access should be included in the Section 106 process regarding the RSA; however, the parties in the December 27 meeting also agreed that this project can be treated separately since it responds to our safety and security concerns about public access through the RPZ and is not directly related to the runway shift proposed by the Master Plan. At this point in the airport planning process, KCIA should address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the City of Seattle and King County's Historic Preservation Office, Seattle City Light, the Muckleshoot Historic Preservation Office, and the National Park Service requesting comment. We look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

J. Wade Bryant
Manager
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE GW
DATE 1-11-99
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

January 11, 2000

Laurie Geissinger
Senior Planning & Development Specialist
Environment and Safety Division
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, Washington 98104-5031

Dear Ms. Geissinger:

As we have discussed in previous meetings, the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. As a part of KCIA's master plan study, they have proposed the closure of the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street. As mitigation, KCIA has also proposed that they will provide unhindered access to the Steam Plant property from Ellis Avenue to the west.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is a prudent measure, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change, even though, with the proposed mitigation, access would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway, and it will be pursued regardless of the outcome of the runway proposal selected. It has been suggested by some that the subject of Steam Plant access should be included into the Section 106 process regarding the runway shift; however, this project is responding to our safety and security concerns from currently having the legal public access granted through the RPZ. It is not related to the runway shift proposed by the Master Plan. The proposal to improve safety and security procedures is independent of the runway shift and should be pursued by King County regardless of the need to address the runway safety area requirements. At this point in the airport planning process, KCIA is obligated to address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the Washington State Historic Preservation Officer, City of Seattle and King County's historical preservation offices, the Muckleshoot and Suquamish tribes requesting comment. I look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

Cayla Morgan
Environmental Specialist
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

January 11, 2000

Karen Gordon, Director
Urban Conservation Division
Historic Preservation Officer
400 Artic Building
700 Third Avenue
Seattle, Washington 98104-1848

Dear Ms. Gordon:

As we have discussed in previous meetings, the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. As a part of KCIA's master plan study, they have proposed the closure of the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street. As mitigation, KCIA has also proposed that they will provide unhindered access to the Steam Plant property from Ellis Avenue to the west.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is a prudent measure, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change, even though, with the proposed mitigation, access would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE CM
DATE 1/11/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway, and it will be pursued regardless of the outcome of the runway proposal selected. It has been suggested by some that the subject of Steam Plant access should be included into the Section 106 process regarding the runway shift; however, this project is responding to our safety and security concerns from currently having the legal public access granted through the RPZ. It is not related to the runway shift proposed by the Master Plan. The proposal to improve safety and security procedures is independent of the runway shift and should be pursued by King County regardless of the need to address the runway safety area requirements. At this point in the airport planning process, KCIA is obligated to address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the Washington State Historic Preservation Officer, Seattle City Light and King County's historical preservation offices, the Muckleshoot and Suquamish tribes requesting comment. I look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

Cayla Morgan
Environmental Specialist
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE cw
DATE 1/12/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

January 12, 2000

Charlie Sundberg
Preservation Planner/Landmarks and Heritage Program
Office of Cultural Resources
King County
506 Second Avenue, Room 200
Seattle, Washington 98104-2307

Dear Mr. Sundberg:

As we have discussed in previous meetings, the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. As a part of KCIA's master plan study, they have proposed the closure of the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street. As mitigation, KCIA has also proposed that they will provide unhindered access to the Steam Plant property from Ellis Avenue to the west.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is a prudent measure, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change, even though, with the proposed mitigation, access would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway, and it will be pursued regardless of the outcome of the runway proposal selected. It has been suggested by some that the subject of Steam Plant access should be included into the Section 106 process regarding the runway shift; however, this project is responding to our safety and security concerns from currently having the legal public access granted through the RPZ. It is not related to the runway shift proposed by the Master Plan. The proposal to improve safety and security procedures is independent of the runway shift and should be pursued by King County regardless of the need to address the runway safety area requirements. At this point in the airport planning process, KCIA is obligated to address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the Washington State Historic Preservation Officer, City of Seattle and the National Park Service's Historical Architect, the Muckleshoot and Suquamish tribes requesting comment. I look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

Cayla Morgan
Environmental Specialist
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE CM
DATE 1/12/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

January 12, 2000

Hank Florence
Historical Architect
U.S. Department of the Interior
National Park Service
909 First Avenue
Seattle, Washington 98104-1060

Dear ~~Ms~~. Mr. Florence:

As we have discussed in previous meetings, the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. As a part of KCIA's master plan study, they have proposed the closure of the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street. As mitigation, KCIA has also proposed that they will provide unhindered access to the Steam Plant property from Ellis Avenue to the west.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is a prudent measure, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change, even though, with the proposed mitigation, access would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway, and it will be pursued regardless of the outcome of the runway proposal selected. It has been suggested by some that the subject of Steam Plant access should be included into the Section 106 process regarding the runway shift; however, this project is responding to our safety and security concerns from currently having the legal public access granted through the RPZ. It is not related to the runway shift proposed by the Master Plan. The proposal to improve safety and security procedures is independent of the runway shift and should be pursued by King County regardless of the need to address the runway safety area requirements. At this point in the airport planning process, KCIA is obligated to address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the Washington State Historic Preservation Officer, City of Seattle and King County's historical preservation offices, the Muckleshoot and Suquamish tribes requesting comment. I look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

Cayla Morgan
Environmental Specialist
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

STATE OF WASHINGTON

DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT

Office of Archaeology and Historic Preservation

420 Golf Club Road SE, Suite 201, Lacey • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 407-0752
Fax Number (360) 407-6217

January 13, 2000

JAN 19 2000

Cayla Morgan
Federal Aviation Adminstration
Seattle Airports District Office
1601 Lind Avenue, S.W. Suite 250
Renton, WA 985055-4056

RE:011399-01-FAA
Georgetown Steamplant

Dear Ms. Morgan:

As the State Historic Preservation Officer I have reviewed your undertaking under Section 106 of the National Historic Preservation Act of 1966 (as amended) and implementing regulations, 36CFR800. I am in concurrence that that KCIA's proposal to change access to the Georgetown Steamplant constitutes an adverse effect.

Please notify the Advisory Council on Historic Preservation that there will be an adverse effect to the Georgetown Steamplant. We look forward to working with you on developing a Memorandum of Agreement that mitigates the loss of current access with new public access.

If you have any further questions or concerns please do not hesitate to contact me. I can reached by e-mail at allysonb@cted.wa.gov or at (360) 407-0826. Your concern for protecting the heritage of our state is appreciated.

Sincerely,

Allyson Brooks
State Historic Preservation Officer

cc:Karen Gordon, Seattle Historic Preservation Officer
Laurie Geissinger, Seattle City Light
Jon Current, King County Airport
Charlie Sundberg, King County historic preservation program
Hank Florence, National Park Service

CONCURRENCES
ROUTING SYMBOL 632
INITIALS/SIGNATURE CW
DATE 1/5/00
ROUTING SYMBOL 630
INITIALS/SIGNATURE CW
DATE 1/5/99
ROUTING SYMBOL 600
INITIALS/SIGNATURE [illegible]
DATE 1/5/00
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

January 4, 2000

Allyson Brooks, Ph.D.
State Historic Preservation Officer
Office of Archaeology and Historic Preservation
Department of Community Development
P.O. Box 48343
Olympia, Washington 98504-8343

Dear Dr. Brooks:

As we discussed in a recent meeting, the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street is not compatible with Federal Aviation Administration (FAA) airport design standards and planning policy guidance. This road is located on airport property and transverses an area designated as the Runway Protection Zone (RPZ) for the main runway at King County International Airport (KCIA). FAA Advisory Circular (AC) 150/5300-13, Airport Design and Planning Guidance 98-19, "Roads in the RPZ's" states: "every reasonable consideration should be given to clear the entire RPZ of all objects including roads." The planning guidance further recommends that whenever an airport master plan study is undertaken, an evaluation of this issue, along with other land use issues should be undertaken. As a part of KCIA's master plan study, they have proposed the closure of the controlled access provided to the Georgetown Steam Plant through a legal easement along 13th Street. As mitigation, KCIA has also proposed that they will provide unhindered access to the Steam Plant property from Ellis Avenue to the west.

Since we will need to approve the Airport Layout Plan (ALP) as a part of the master plan study, and because we believe the KCIA proposal to close the road and provide for the associated mitigation is a prudent measure, we have concluded that this constitutes a federal undertaking in accordance with the federal regulation (36 CFR 800) – Protection of Historic Properties.

Our preliminary review of the proposal to end the current access procedure indicates that there will be an effect on the Steam Plant from this change, even though, with the proposed mitigation, access would be improved. However, to ensure that the widest margin of protection is provided to this facility, we have chosen to determine that an adverse effect to the Steam Plant could occur. As a result, we will undertake additional consultation with the potentially affected parties to ensure access is maintained.

This proposal is separate from one of the Airport Master Plan proposals to add 880 feet to the north end of the runway, and it will be pursued regardless of the outcome of the runway proposal selected. It has been suggested by some that the subject of Steam Plant access should be included into the Section 106 process regarding the runway shift; however, this project is responding to our safety and security concerns from currently having the legal public access granted through the RPZ. It is not related to the runway shift proposed by the Master Plan. The proposal to improve safety and security procedures is independent of the runway shift and should be pursued by King County regardless of the need to address the runway safety area requirements. At this point in the airport planning process, KCIA is obligated to address FAA policy as part of the master plan update. The County has informed us that they are prepared to construct the new access and provide signage, at their own expense, so that impacts from this change in access are reduced.

With regard to possible environmental impacts to the Duwamish River or the environs, there will be no new ground disturbance associated with the proposal to change the access. Although some upgrading to the road width and signage will be needed, any new access route would be over existing pavement.

Thank you in advance for your review and response to this notice. Letters have also been sent to the City of Seattle and King County's historical preservation offices, Seattle City Light, the Muckleshoot and Suquamish tribes requesting comment. I look forward to hearing back from you so that the Advisory Council review can occur and a Memorandum of Agreement can be developed regarding this change in access and accompanying mitigation.

Sincerely,

Cayla Morgan
Environmental Specialist
Seattle Airports District Office

Cc: Clare Impett, King County International Airport

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

December 15, 1999

Mr. Dennis Ossenkop
Environmental Protection Specialist
Airports Division
Federal Aviation Administration
1601 Lind Ave. SW
Renton, WA 98055-4056

Mr. Ossenkop:

Per our conversation earlier today, I am submitting a copy of the National Register Nomination for the Georgetown Steam Plant to you for your review. Also included is a program written in 1980 by the American Society of Mechanical Engineers (ASME) for the dedication of the steam plant as a National Historic Mechanical Engineering Landmark, and the drawings prepared in 1979 for the Historic American Engineering Record (HAER) program of the National Park Service.

Perhaps this will assist in clarifying the situation that we are facing as we consider the shift of runway 13R to the North. Thank you.

Sincerely,

John D. Current

John D. Current
Program Planning Manager

the
Sheridan
Consulting
Group

3630 37th Avenue West
Seattle WA 98199
Phone 206 270 8727
Fax 206 281 0093

November 15, 1999

John Current
King County International Airport
7233 Perimeter Road
Seattle WA 98108

Dear Mr. Current:

Enclosed is a copy of the National Register Nomination for the Georgetown Steam Plant. Also included is a program written in 1980 by the American Society of Mechanical Engineers (ASME) for the dedication of the steam plant as a National Historic Mechanical Engineering Landmark, and the drawings prepared in 1979 for the Historic American Engineering Record (HAER) program of the National Park Service.

According to the nomination form, it was first prepared in 1977, by which time the property had already been determined eligible for the National Register. This was a few years after Seattle had passed its own historic preservation ordinance, during a period when the city was actively identifying important historic resources throughout the city and proposing them for landmark designation. The nomination form was later revised, expanded and submitted for National Register consideration in 1984.

The nomination document includes: a detailed description of the building, a description and inventory of equipment, a history of the building and its uses, and a statement explaining the reasons the plant is significant. Three reasons for significance are given:

- The plant contains the last remaining operational example of the Curtis turbine, the world's first large-scale steam turbine and a key factor in the development of General Electric as an important part of the electrical equipment industry;
- The plant was designed and supervised by Frank Gilbreth and is an early example of the reinforced concrete fast-track construction method pioneered by Gilbreth; and,
- The plant played a significant in the development of the electric power industry locally and regionally.

I do not know of any document indicating specifically why the nomination was completed and submitted in 1984, or how the plant came to be designated a National Landmark. However, the ASME ceremony in 1980 indicates that the facility was widely known at that time as historically significant.

I understand that Seattle City Light has a management plan, required by and approved by the National Park Service, that describes how the landmark will be preserved. The plan calls for preserving it as a museum, which necessarily requires access for the public and for equipment maintenance. However, I have not seen the management plan and do not have a copy of it.

Please contact me if you have any further questions.

Mimi Sheridan

Mimi Sheridan, AICP

cc: Mary Vigilante

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

RECEIVED
SEP 17 1999

September 15, 1999

Gary Zarker, Superintendent
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, Washington 98104-5031

Dear Gary:

Thank you for your July 22, 1999 letter. I apologize for the delay in responding. For some reason, the original letter never arrived at this office. We did not receive a copy of Executive Sims' copy, which arrived at his office on August 9, until after I had left for a four-week vacation. Now that I'm back (this is my first week back), I'm happy to reply.

Environmental Impact Statement (EIS) and Section 106 Process

You mentioned concerns about integration of Section 106 consultation and preparation of environmental documents, noting that certain steps in the Section 106 process such as designation of the area of Potential Effect have not yet begun. The consultants did not provide the Airport with the list of sensitive sites that might possibly be affected by the Airport's runway shift proposal until after I had gone on vacation. Now that I have it, we have enclosed it. It may have been distributed at our meeting with agency representatives yesterday, but after I left.

That list identifies sites that are located within the Airport's 65dnl noise contour. The work still not yet completed will determine what the increase in noise (and vibration) is expected to be as a result of the proposed runway shift. Until we have that information, and specifically, what the projected noise and vibration increase at the Steam Plant would be, there is not enough information available to define the area of potential effect.

We continue to hold our monthly agency meetings and keep the State Historic Preservation Officer, your staff, and other relevant agency representatives up to date on our progress. We will tell them tomorrow that the EIS publication date has been delayed due to the consultants not having completed the analysis yet.

Scope of Section 106 Review

Since we talked last, several new developments have occurred, which will affect the Section 106 review. The Airport and its consultants have concluded that the Runway Protection Zone ("RPZ", the restricted use area beyond the 1000 X 500 foot Safety Area) could be reduced to regulatory minimums. It turns out that the current RPZ is actually larger than the FAA's mandatory minimum size. We are therefore considering changing our proposal for the Master Plan to reduce the RPZ to that minimum. This information was presented to the agency representatives, including your staff, yesterday.

This has some benefits to our mutual issues. This change helps remove the need to paint the Steam Plant with a checkerboard. We continue to have concerns about the proximity of the Steam Plant to the runway, because it is the controlling obstruction for approaches from the north, and its existence will continue to mandate higher minimum visibility requirements than if it were not there. But at least it is sufficiently offset from the Runway Protection Zone minimum requirements to no longer feel the checkerboard is needed.

The need for a different access to the Steam Plant still exists, however, for two reasons. First, a portion of the 13th Street access route to the Steam Plant from Albro remains within the reduced RPZ. Second, the Airport needs to improve its security and the requisite fencing needed to assure security along 13th Street is still incompatible with the RPZ requirements.

We will not be able to lease any portion of the Great Western Soils parcel to the City. However, our recent property survey has identified an area adjacent to the Steam Plant parcel on the north that is actually owned by the City, even though it has been assumed to be part of the Great Western Soils parcel. Fortunately, this parcel adjustment is smaller than the other parcel adjustment that was identified – an area east of the Steam Plant that is actually Airport property but has been used by the City and Steam Plant. We should therefore be able to accommodate property boundary corrections without any net debt to the City, and this correction should also provide a portion of the additional space to the north that your staff has requested.

We would like to set up another meeting with you and your staff to review the survey findings and discuss this in greater detail. In the meantime, we again request the additional information previously requested in our meeting with you that portrays the vault on the north side of the Steam Plant that limits the use of Steam Plant land in that area.

We have a fencing proposal to review with you as well at that meeting. The fence would be installed on Airport property and would include a gate sufficiently wide as to present no obstructions to any access from 13th Street during the time we are working out other access arrangements.

EIS Scope

As we have indicated before, the Master Plan EIS will include analysis of impacts of associated changes in taxiways as well as any other construction required to accommodate the proposed runway shift.

We have provided the vibration methodology to City staff, but it is the vibration analysis that, in part, accounts for delays in the consultants' work on the EIS. We have not seen this work yet and therefore cannot provide it yet. Again, you have our assurances that when it is available, we will share it. I am not sure of the details behind all of the other items listed in the last paragraph of page 3 in your letter, but I will check with my staff on those and will be sure that you are satisfied.

Public Assembly at the Steam Plant

Thank you for your assurances about care to generate FOD at the Steam Plant. I agree that the installation of fencing will help this. We appreciate your sensitivity to this crucial matter.

Thank you also for your assurances that you will support us in removing roadblocks to the processes, Section 106, etc. I will certainly forward that assurance to the FAA as well.

I look forward to our next meeting. Thank you again for your letter.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: Paul Schell, Mayor, City of Seattle
Ron Sims, King County Executive
Allyson Brooks, State Historic Preservation Officer
J. Wade Bryant, Manager, Seattle ADO, FAA ✓
Ann Hooker, Historic Preservation Officer, FAA
Stephanie Toothman, Cultural Resource Team Leader, NPS
Druscilla J. Null, Advisory Council on Historic Preservation

Eric Jvveit

City of Seattle

Paul Schell, Mayor

Executive Department - Office of Intergovernmental Relations
Clifford R. Traisman, Director

September 14, 1999

Cynthia Stewart
Airport Manager
King County International Airport
P.O. Box 80245
Seattle, WA 98108

Re: **Noise and Vibration Analysis for Airport Master Plan EIS**

Dear Ms. Stewart:

Thank you for your response to Nancy Ousley's message regarding review of the Draft Environmental Impact Statement (DEIS) for the King County International Airport Master Plan. We appreciate the opportunity to review a preliminary draft. As you revisit your schedule for publication of the DEIS, we would like to request that you include two weeks for review of the preliminary draft by City staff and additional time for response by KCIA and your consultants, if appropriate.

In advance of a preliminary draft and/or the DEIS, I would like to submit our expectations regarding the analysis of noise and vibration impacts of the Master Plan. The City of Seattle hired a consultant to assist us with review of the noise and vibration analysis. Our consultant, Bob Brown, met with airport staff earlier this summer, and more recently he discussed the scope for the noise analysis with the EIS noise consultant. He has made some recommendations regarding the proposed analysis. Our requests are based on Mr. Brown's recommendations, as well as our desire to see a DEIS that sufficiently identifies the impacts of the runway shift. We feel these recommendations are appropriate to provide a quality document that can better stand the test of public and agency review.

We are concerned that the DNL metric may not be sufficient to describe the impacts of the proposed runway shift on the Georgetown neighborhood. It is our understanding that a more detailed analysis of the noise impacts beyond the DNL measure will be prepared using a grid point analysis at 1500-foot increments and the Time Above, L_{max} and SEL metrics. We are in agreement with this approach but are concerned that the 1500-foot grid point intervals may not be of sufficient resolution to adequately assess potential impacts in areas close to the north end of the runway that would be extended. Therefore, we would like to request that more specific grid points be established for detailed analysis using the DNL and the above-described supplementary metrics at the Georgetown Steam Plant and at one or two locations within the Georgetown neighborhood. One critical location in the Georgetown neighborhood is the single family homes along Ellis Avenue. The predicted noise levels with and without the project should be compared to the results of actual noise measurements, if available.

We also strongly encourage KCIA to define criteria for determining significant impacts for the supplementary noise metrics (non-DNL) and for the vibration analysis at the steam plant. We understand that there are no "official" criteria for metrics other than DNL, but that does not preclude the use of these metrics as a measure of impacts. We are aware of cases where a change in single event exposure greater than 3 dB has been used as an indicator of significant impact.

The criteria should be established in advance of the DEIS, and ideally through agreement with KCIA, FAA, the City of Seattle, and other appropriate parties. There are two reasons for establishing criteria in advance. First, the additional information generated in the noise analysis becomes somewhat meaningless if criteria are not applied. Second, by establishing the criteria in advance of the final analysis, it removes the appearance of intentionally setting the criteria in such a way that significant impacts are not identified.

It is also important that the DEIS describe the assumptions to be used for noise modeling with regard to the number and type of aircraft that would be expected to use the full extended length of the runway for takeoffs to the south. The justification for such assumptions should be fully described, as well as potential limitations concerning the assumptions.

Finally, we would like to discuss the implications of current and planned uses at the Georgetown Steam Plant on the DEIS analysis. The steam plant is currently used as a museum and training center and we anticipate continued use as such. Insofar as museum tours, lectures and vocational training are educational activities, we understand that categorization of the steam plant as a noise sensitive use in the DEIS may be appropriate.

Thank you for considering our request. It is not our intent to unnecessarily delay publication of the DEIS. We do share your desire to produce a sound DEIS to aid in the important decisions regarding the Master Plan. If you have any questions about our request regarding the noise and vibration analysis, please contact Eric Tweit at 684-8834.

Sincerely,

Linda Cannon

Linda Cannon
Deputy Director
Office of Intergovernmental Relations

cc Bob Brown, Brown-Buntin Associates
Nancy Ousley, Strategic Planning Office
Lynn Best, Seattle City Light

July 23
630 OK
CAYLA Cool
some requests are not clear by this letter alone. Thx! OK.

City of Seattle
Paul Schell, Mayor

Seattle City Light
Gary Zarker, Superintendent

RECEIVED
JUL 29 1999

July 22, 1999

Cynthia Stewart, Airport Manager
King County International Airport
Department of Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108

Dear Cynthia:

Thank you for your June 22 letter following our meeting about the Georgetown Steam Plant (GTSP) and proposed airport improvements. I also felt the meeting was helpful, and I share your interest in moving the planning process ahead most effectively. The following responds to the proposals outlined in your letter, including the status report on the Environmental Impact Statement and Section 106 process.

Environmental Impact Statement (EIS) and Section 106 Process

Schedule and Coordination

I have continuing concerns about integration of Section 106 consultation and preparation of environmental documents. While the SEPA EIS appears to be well under way, initial steps of Section 106 review have not occurred (such as designation of the Area of Potential Effect) and consultation has not begun. King County (KC) and the Federal Aviation Administration (FAA) wrote to the State Historic Preservation Officer (SHPO) April 14, commenting that Section 106 consultation and coordination will occur prior to issuance of the SEPA Draft EIS. The letter also states FAA's intention to "... initiate both the federal and state environmental review process so that agencies participating in a possible Section 106 determination can be consulted throughout the environmental review."

The SHPO responded asking that KC and FAA consult with her, the Seattle Historic Preservation Officer, and regional office of the National Park Service prior to and at the conclusion of each step. Where does this stand? When do you expect to begin consultation and what is the schedule for publication of the Draft EIS?

700 Fifth Avenue, Suite 3300, Seattle, WA 98104-5031
Tel: (206) 625-3000, TTY/TDD: (206) 684-3225, Fax: (206) 625-3709

Cynthia Stewart
July 22, 1999
Page 2

Scope of Section 106 Review

Your letter asks for comments on three proposals resulting from FAA regulations: 1) rerouting access to the GTSP, 2) painting a checkerboard pattern on the side of the GTSP, and 3) surrounding the steam plant property with a fence. Preliminary comments follow, though for SCL to respond fully, a decision on the applicability of Section 106 on each proposal is needed from the State SHPO. As property owner of the steam plant, SCL will be a consulting party in the Section 106 process. Input from other Section 106 participants is crucial to effective planning and to SCL's decision making.

Your letter indicates KC's consultant is researching Section 106 applicability for the access and painting proposals. Discussion of the fence should be included, as it affects access and maintenance of the steam plant. Aside from Section 106 concerns, my initial comments on each of the proposals follow.

Checkerboard Painting on the Steam Plant

Any alteration to the Georgetown Steam Plant requires a Certificate of Approval from the City of Seattle Landmarks Preservation Board and a permit from SCL. If you wish to pursue the painting, please first contact the City's Landmarks Preservation Board at 684-0380 to begin their application process, and the State Historic Preservation Office to discuss requirements pursuant to Section 106. SCL will act promptly on the permit once the Seattle Landmarks Board and Section 106 reviews are complete.

Access to the Georgetown Steam Plant

*Not in RPZ is it? (outside of A extended?)

SCL and KC staffs have been working to identify alternate access to 13th Avenue South for quite some time. At KC's request, SCL staff outlined parameters to guide identification and review of alternatives. Based on these parameters, SCL expressed cautious support for an alternative off Ellis Avenue South. However, a major caveat was noted by SCL that additional property adjoining the new route would be needed to make it feasible. At this point, it was requested that KC not extend a lease with Great Western Soils beyond the less than two year period remaining (at that time) so as not to foreclose making adjustments to the access proposal.

SCL is potentially interested in a property transaction that would include all or a portion of this property, insofar as it is needed to make the new access work. For clarification, we are not interested in leasing property from KC. Alternative access as proposed does not completely meet criteria provided by SCL staff and may not be feasible. I do see possible solutions though and encourage KC to look more closely at alternatives that involve incorporation of adjoining property.

As promised in connection with the above discussions, SCL has proceeded to obtain an appraisal of the 13th Avenue South easement, a fee owned portion of Greely Street and the remaining SCL Georgetown property. We also plan to acquire assistance from a consultant to evaluate structural concerns with the underground tunnel on the westerly side of the steam plant and will share information on this, as it becomes available.

Fencing

Concern is the potential for (incursions) & fence becoming an obstruction

Based on the preliminary drawing of the fence proposal it appears a new gate will separate the Steam Plant from current access via 13th Avenue South. This will further complicate use of SCL's existing easement, making access to the steam plant more difficult. In addition to access via 13th Avenue South, there is an existing gate along the northerly boundary of the property used for accessing electrical service to the building. Will service vehicles be able to continue to access the north side of the Steam Plant to reach the electrical service? If not, the fencing could require significant changes to the site to accommodate maintenance and upgrading of the electrical service currently underway. We would like an opportunity to discuss this with you based on the results of your survey and the map mentioned in your letter.

EIS Scope and Methodology

Your letter indicates there will be specific project-level analysis of the proposed runway shift in the EIS. We want to make sure the EIS includes analysis of the addition, extension and/or relocation of taxiways and perimeter roads at the north end of the airport, as these improvements could also have significant impacts on the steam plant.

Thank you for your offer to meet with SCL staff to review the proposed methodology for the noise and vibration analysis. We accept. Please also include Eric Tweit of the City's Strategic Planning Office (684-8834) in any meetings. Laurie Geissinger already met once with KC consultants and staff on May 27 to discuss the general approach. There were several follow-up items from this meeting that she is working on with Clare Impett and KC's noise and vibration consultant. We await more information on the metrics proposed for characterizing average and peak noise conditions, a schedule of aircraft operations that will be monitored relative to the steam plant, the consultant's proposal for location of noise and vibration monitoring equipment at and near the steam plant, and summary of the justification of need documentation submitted to FAA.

Public Assembly at the Steam Plant

The viability of continuing preservation and reuse of the steam plant is directly linked to its accessibility and the accommodation of people. Changes to the airport could have significant impacts on usability of the structure and grounds, that in turn affect preservation of the physical structure and equipment. We are clear on the need to look carefully at public use and assembly in light of the proposed runway shift.

Your concerns about litter or foreign objects and debris (FOD) are taken seriously. We will work with you and the Powerplant Museum to ensure public use does not result in litter affecting airport property. As far as I know, this has not been a problem to date though the runway shift could change conditions considerably. I would guess that addition of a perimeter fence would have the benefit of providing some added protection from FOD. Greater use of the west side of the building for certain functions would also help. We are open to your suggestions.

Our agencies are in a relatively unique situation, where juxtaposition of the KC International Airport and the GTSP National Historic Landmark presents a dynamic tension between two highly held public values - that of safety and respect for our heritage. To me, our challenge and responsibility is to use the Section 106 process to the best possible advantage in reaching agreement on to what extent these values are compatible, and to what extent there may be unavoidable conflicts. You have my support in removing any roadblocks to getting the process fully underway. By copy of this letter I extend the same support to those responsible at the FAA.

Thank you for the effort you and your staff are making to work with SCL on the above. Due to the complexity of the issues we are faced with, I do look forward to involvement of experts in the preservation field through Section 106 consultation. Please keep me up to date on this process and contact Laurie Geissinger (386-4585) as needed to continue discussions about access alternatives, EIS methodology, and other questions.

Sincerely,

Gary Zarker
Superintendent

LGG:cdw

Cc: Ron Sims, King County Executive
Paul Schell, Mayor, City of Seattle
Allyson Brooks, State Historic Preservation Officer
J. Wade Bryant, Manager Seattle ADO, FAA
Ann Hooker, Historic Preservation Officer, FAA
Stephanie Toothman, Cultural Resource Team Leader, NPS
Druscilla J. Null, Advisory Council on Historic Preservation

700 Fifth Avenue, Suite 3300, Seattle, WA 98104-5031
Tel: (206) 625-3000, TTY/TDD: (206) 684-3225, Fax: (206) 625-3709

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT
Office of Archaeology and Historic Preservation
420 Golf Club Road SE, Suite 201, Lacey • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 407-0752
Fax Number (360) 407-6217

RECEIVED
APR 21 1999

April 19, 1999

Cynthia Stewart
Manager, King County International Airport
P.O. Box 80254
Seattle, WA 98108

J. Wade Bryant
Manager, Seattle ADO
Federal Aviation Administration
Northwest Region
1601 Lind Ave., SW
Renton, Washington 98055

Re: 041999-01-FS-FAA
King County Airport Master Plan (Georgetown Steam Plant)

Dear Ms. Stewart and Mr. Bryant:

I am in receipt of your letter dated April 14, 1999 concerning the Master Plan for King County International Airport and initiation of the Section 106 process. Your proposal for undertaking the Section 106 process is excellent. To facilitate open communication and coordination between our agencies please consult with our office and the Seattle Historic Preservation Officer on the final definition of the area of potential effect before proceeding with the historic inventory. I would suggest that your consultant meet with our office, the Seattle Historic Preservation Officer and the regional office of the National Park Service prior to, and at the conclusion of, each step. Its is beneficial for us all to ensure that all interested parties have an opportunity to comment on the area of potential effect, results of the inventory and special noise study, the assessment of effects and possible mitigation alternatives should analyses conclude in a finding of adverse effect. Much of the general public involvement process could be coordinated with any public forums held as part of NEPA/SEPA.

If you have any further questions please do not hesitate to contact me at (360) 407-0826 or you may e-mail me at allysonb@cted.wa.gov. Your concern for protecting the heritage of this state is appreciated.

Sincerely,

Allyson Brooks, Ph.D.
State Historic Preservation Officer

cc: Steve Wells, CTED State of Washington
David Hanson, Deputy State Historic Preservation Officer, OAHP
Stephanie Toothman, Cultural Resource Team Leader, NPS, Seattle
Karen Gordon, Seattle Historic Preservation Officer
Druscilla J. Null, Advisory Council on Historic Preservation
Laurie Guissinger, Seattle City Light

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

Federal Aviation Administration
Northwest Region
1601 Lind Ave, SW
Renton, Washington 98055

April 14, 1999

David Hansen
Office of Archaeology & Historic Preservation
Deputy State Historic Preservation Officer
P.O. Box 48343
Olympia, Washington 98504-8343

Dear Mr. Hansen:

In July 1998, King County and the Federal Aviation Administration (FAA) met with a number of agencies concerning the Master Plan for King County International Airport and the potential impact of the plan on the Steam Plan adjacent to the Airport. At that time, several of the agencies expressed concern that the environmental review process had begun, that the Section 106 process was not being initiated per 36 CFR Part 800, and that coordination between interested agencies was inadequate.. The purpose of this letter is to provide you with a status report on where we are in the planning process, how the FAA and King County propose to proceed with the evaluation of the impact of the plan on historic sites, and our notice to you that we are prepared to begin coordination on the Section 106 process. We would appreciate your comments.

Since our meeting, King County has prepared a scope of work and contract for its State Environmental Policy Act (SEPA) EIS consultant. This contract document was finalized in late October, 1998. Based on the July meeting, the scope of the contract and the consultant team was revised to reflect the need for a technical specialist in the area of historic site evaluations and the consultant team was supplemented with a local specialist in this field. In late October we announced the initiation of scoping, and on November 10th, we conducted an agency scoping meeting at the airport during the business day, and an evening scoping meeting for the public. The scoping process closed on November 30th, and all comments have been reviewed.

The FAA has determined the need to pursue an Environmental Assessment (EA) under the guidelines set forth under the National Environmental Policy Act (NEPA), specifically for the proposed runway shift project, or to include any other unforeseen development option not categorically excluded per Order 5050.4A. The EA will be prepared as a separate document using as guidance the FAA Environmental Checklist. The FAA accepts that much of the environmental analysis required under NEPA will be done under the Master Plan's SEPA process. A separate EA document containing the relevant information will be produced by the County to allow FAA to prepare its document and make its environmental determination. FAA has articulated this determination prior to receiving any formal environmental documentation from the County in order to initiate both the federal and state environmental review process so that agencies participating in a possible Section 106 determination can be consulted throughout the environmental review.

To pursue this collaborative approach, we propose to undertake the following evaluation as part of the SEPA EIS process:

1. *Project Definition* – The Airport's Master Plan consultant, working with the EIS consultant, expects that the project will consist of two primary components: 1) bringing the runways at the Airport into compliance with FAA safety standards; and 2) more efficiently using airport land to meet future aviation needs.
2. *Area of Potential Effect and Inventory* – the technical specialist will conduct an inventory of all sites currently listed on or potentially eligible for the National Register of Historic Places in the vicinity of the airport. The City of Seattle's recent survey of historic structures in the Georgetown area will be another important source of information. In addition, an inventory of all sites of state and local significance will also be prepared. To address "constructive use" impacts, the inventory will address all sites within the 65 DNL (Day-Night Average Sound Level) noise contour that will be prepared in the next few months. This area, based on past maps prepared by the County, is expected to extend south from Spokane Street to approximately I-5 at Martin Luther King Blvd, and would constitute the area of potential effect.
3. *Special Noise Study* – Based on comments received at the July meeting, the consultant scope of services was amended to include a specialized noise and vibration evaluation at the Steam Plant. This evaluation will identify the existing impact of aircraft operations in terms of cumulative noise exposure as well as vibration on the plant. Then, using the FAA's Integrated Noise Model (a computer model), the potential impact of the Master Plan will be assessed. First, the change in cumulative noise exposure will be identified at the Steam Plant. This evaluation will also identify the area within the 65 DNL that could experience a 1.5 DNL change in noise (the threshold used by the FAA as a significant change in noise). The area experiencing a 1.5 DNL increase will then be inventoried to determine if any sites that may be eligible for the Register are located in this area. Finally, the change in noise exposure and vibration from the Master Plan at the Steam Plant will be estimated based on actual vibration/noise data coupled with the computer model results. If additional potentially vulnerable sites are determined to be within the DNL increase area, additional noise analysis would be completed.
4. *Coordination* – King County and the FAA recommend that numerous steps of coordination be conducted throughout this effort. Upon conducting the initial inventory, we propose to have interested agencies review the inventory. Once the consultant has prepared the inventory of sites potentially eligible for the national register (within the area that could experience a 1.5 DNL or greater noise increase), this information will be forwarded to the State Historic Preservation Officer (SHPO) for a determination if the sites are eligible. As part of the special noise and vibration evaluation, we anticipate that some agencies will want to participate in identifying specific measurement locations and reviewing the results, and would invite agencies, especially those present at the July meeting, to do so. At this point, we would then anticipate having sufficient information to determine the impact of the project on historic sites. Based on the data that our consultants have prepared, we will seek a determination from the Advisory Council on Historic Preservation (ACHP) and the SHPO concerning the effect of the Master Plan. If at that time, a determination of Adverse Effect is made, we would anticipate developing a memorandum of agreement on how to proceed.

5. *Documentation* –Consultation and coordination will occur prior to the issuance of the SEPA Draft EIS. A preliminary draft section of the EIS will be prepared and submitted to the ACHP and SHPO for their use in determining if the project has an effect. If comments are not received within 30 days following submittal to the agencies, the County and FAA would agree to proceed with overall agency and public review of the Draft EIS, with the applicable sections noting that a determination would be expected to be noted in the Final EIS. Should an adverse effect determination be made, it would be our hope that the Final EIS could contain a Memorandum of Agreement. However, our ability to achieve this documentation approach will be dependent on timely comments and coordination by all parties.

We hope that this approach addresses the concerns expressed at the last meeting, and reflects our emphasis on a collaborative, constructive relationship regarding potential impacts to the Steam Plant or other historic properties. We would appreciate your comments on this approach. In the interim, please do not hesitate to contact either of the signators of this letter: Ms. Cynthia Stewart at 206-296-7430 or Mr. J. Wade Bryant at 425-227-2659.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Manager
King County International Airport

Carol Key

for J. Wade Bryant
Manager, Seattle ADO
Federal Aviation Administration

July 20, 1998

Mr. David Hansen
Acting State Historic Preservation Officer
Dept. of Community, Trade and
Economic Development
State of Washington
PO Box 48343
Olympia, Washington 48343

Mr. Hansen:

I am writing in response to your July 2, 1998 letter concerning proposed changes to the King County Airport (Boeing Field) and their affects upon the Georgetown Steam Plant which is located within the boundaries of the airport. We recognize that the Georgetown Steam Plant is a National Historic Landmark.

Presently the King County Airport is involved in the development of an airport master plan. Through this planning process the airport has developed a preferred development alternative. During the next few months the airport will be conducting a thorough environmental review of this alternative (Environmental Impact Statement under SEPA). It is our understanding that during this review the airport will also assess the potential impacts of their proposal on the Steam Plant and other environmentally sensitive areas in the vicinity of the airport. The Federal Aviation Administration (FAA) will review this information along with the final airport planning documents to ascertain the extent of the environmental impacts of projects proposed by the King County Airport Administration. We will insure that your office has an opportunity to provide input into the process prior to formulating a FAA environmental determination on any proposed development project.

CONCURRENCES
ROUTING SYMBOL: SEA 634
INITIALS/SIGNATURE: JDC
DATE: 7/20/98
ROUTING SYMBOL: SEA-632
INITIALS/SIGNATURE: CW
DATE: 7/20/98
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE
ROUTING SYMBOL
INITIALS/SIGNATURE
DATE

Please be assured, the FAA will consider the impacts of any airport development proposals upon the Georgetown Steam Plant when making our environmental determination. If I may be of further assistance please feel free to contact me.

Sincerely,

John D. Current AICP
Community Planner

Cc: Cynthia Stewart
Clare Impett

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT
Office of Archaeology and Historic Preservation
420 Golf Club Road SE, Suite 201, Lacey • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 407-0752
Fax Number (360) 407-6217

July 2, 1998

Mr. John Current
Federal Aviation Administration
Seattle Airports District Office
1601 Lind Avenue SW
Seattle, Washington 98055-4056

Dear Mr. Current:

I am writing to express my concerns about proposed changes at King County International Airport (Boeing Field) in Seattle. It is my understanding that King County proposes to undertake significant redevelopment at the airport including extension and reconfiguration of runways and taxi-ways. My concern lies with potential impacts to historic properties in the project vicinity, particularly the Georgetown Steam Plant.

As you may be aware, Section 106 of the National Historic Preservation Act and implementing regulations of the Advisory Council on Historic Preservation (36 CFR 800) require federal agencies to take into consideration the effect of their actions on properties listed in, or eligible for listing in, the National Register of Historic Places. This includes properties such as the Steam Plant, designated as a National Historic Landmark. Other properties in the Georgetown neighborhood near the north end of the airport may also be eligible for listing in the National Register.

Clearly, it is to the advantage of all interested parties that compliance with Section 106 take place early in project planning. An important step in complying with Section 106 is consultation with the State Historic Preservation Officer (SHPO). To date, information about the project has not been submitted to the SHPO for review. Yet, I understand that project planning is underway.

Therefore, I recommend that as soon as reasonable, the Federal Aviation Administration (FAA) provide information to the Office of Archaeology and Historic Preservation (OAHP) for review and comment. This information shall include a project description, location of known historic properties within the area of project effect, and an assessment of how historic properties will be affected by this action.

In advance, thank you for your attention to this matter. For your information, I am enclosing a leaflet produced by the Advisory Council on Historic Preservation which summarizes the Section 106 process. Please feel free to contact me at (360) 407-0766 should you have any questions.

Sincerely,

David M. Hansen
Acting State Historic Preservation Officer

DMH:gg
Enclosure

Cc: Hank Florence
Leonard Garfield
Laurie Giesinger
Karen Gordon
Cynthia Stewart

PAGE INTENTIONALLY LEFT BLANK