



.....  
.....  
.....  
.....  
.....  
.....  
.....

**FINAL**

Seattle-Tacoma International Airport

.....  
.....  
.....

**PART 150**  
**NOISE COMPATIBILITY**  
**STUDY UPDATE**

OCTOBER 2013



Port of Seattle®

.....  
.....  
.....  
.....  
.....  
.....  
.....



# **SEATTLE-TACOMA INTERNATIONAL AIRPORT**

## **14 CFR PART 150 NOISE EXPOSURE MAP UPDATE AND NOISE COMPATIBILITY PROGRAM UPDATE**

### **FINAL REPORT**

October 2013

#### **Prepared for:**

Port of Seattle  
17801 International Blvd.  
Seattle, WA 98158



Landrum & Brown, Incorporated  
11279 Cornell Park Drive  
Cincinnati, OH 45242







P.O. Box 68727  
Seattle, WA 98168  
USA

Tele: (206) 787-5388  
Fax: (206) 787-5912

[www.portseattle.org](http://www.portseattle.org)

October 24, 2013

Cayla Morgan  
Environmental Specialist  
FAA Northwest Mountain Region  
Seattle Airports District Office  
1601 Lind Avenue Southwest  
Renton, WA 98057

**Subject: Submission of 14 CFR Part 150 Part Study, Including Noise Exposure Maps and Noise Compatibility Program for Seattle-Tacoma International Airport**

Dear Ms. Morgan:

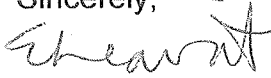
Enclosed please find ten (10) copies of the Seattle-Tacoma International Airport (Sea-Tac Airport) 14 CFR Part 150 Noise Exposure Map (NEM) Update and Noise Compatibility Program (NCP) Update and supporting documentation submitted under 14 CFR Part 150 for appropriate Federal Aviation Administration (FAA) determination. The Port of Seattle (Port) requests acceptance of the Existing (2013) NEM for existing (2013) conditions and the Future (2018) NEM, which includes implementation of the recommended NCP Updates for Sea-Tac Airport presented for FAA approval in this document. These NEMs are revisions to NEMs from the 2002 Part 150 NCP Update that were previously determined by the FAA to be in compliance with 14 CFR Part 150.

The current year (2013) NEM is based on reasonable planning assumptions developed in this Part 150 Study. It was developed based on actual operating activity from calendar year 2009 through May 2012. Based on the latest activity data for the airport, the NEM continues to be a reasonable representation of current (2013) conditions. The future NEM/NCP for 2018, with the implementation of the NCP, is based on reasonable forecasts and planning assumptions that were prepared for this Part 150 Study, and continues to be a reasonable representation of noise conditions expected in (2018).

The measures documented in the NCP are recommended by the Port for FAA approval and are reflected in the Future (2018) NEM. The elements of the NCP have been coordinated with representatives of the agency or user groups having responsibility for implementation. While it is not practical to obtain formal agreements from every agency or group prior to this submission, each group is aware of these actions which fall within their respective jurisdictions.

On behalf of the Port, I would like to express appreciation to the FAA for its support in conducting this Part 150 Study Update. We look forward to an expeditious Federal review and approval of our revised NCP, so that we can begin immediately to implement the recommended measures for the benefit of the airport neighbors.

Sincerely,

A handwritten signature in dark ink, appearing to read "Leavitt", with a stylized flourish at the end.

Elizabeth Leavitt

Director, Aviation Planning and Environmental Programs

# **TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
<b>SPONSOR'S CERTIFICATION</b>	
<b>NOISE EXPOSURE MAPS</b>	
<b>NEM/NCP CHECKLISTS</b>	
<b>GLOSSARY / ACRONYMS</b>	
 <b>CHAPTER ONE – INVENTORY</b>	
1.1 14 CFR Part 150 .....	1-1
1.2 Airport Physical Facilities .....	1-11
1.3 Air Traffic Operations Activity .....	1-12
1.4 Airspace/Air Traffic Control .....	1-17
1.5 Current Noise Compatibility Program .....	1-31
1.6 Noise Complaint History .....	1-47
1.7 Airport Environs .....	1-55
1.8 Land Use Controls Evaluation .....	1-93
 <b>CHAPTER TWO – FORECAST</b>	
2.1 Introduction.....	2-1
2.2 Commercial Passenger .....	2-1
2.3 Air Cargo.....	2-22
2.4 Air Taxi and General Aviation .....	2-30
2.5 Military .....	2-33
2.6 Total Aircraft Operations Summary .....	2-34
 <b>CHAPTER THREE – NOISE ANALYSIS</b>	
3.1 Characteristics of Sound.....	3-1
3.2 Factors Influencing Human Response to Sound .....	3-12
3.3 Health Effects of Noise .....	3-15
3.4 Standard Noise Descriptors.....	3-21
3.5 Federal Laws and Policies and Research Related to Noise.....	3-28
3.6 Baseline Noise Exposure.....	3-37
 <b>CHAPTER FOUR – LAND USE ANALYSIS</b>	
4.1 Federal Laws and Policies Related to Noise/Land Use Compatibility .....	4-1
4.2 Potential Preventative Land Use Controls .....	4-11
4.3 Potential Corrective Land Use Mitigation Tools.....	4-12
4.4 Land Use Assessment Methodology.....	4-15
4.5 Baseline Land Use Compatibility .....	4-18

# **TABLE OF CONTENTS, *Continued***

	<b><u>PAGE</u></b>
<b>CHAPTER FIVE – ALTERNATIVES</b>	
5.1 Abatement Alternatives .....	5-1
5.2 Mitigation Alternatives .....	5-26
5.3 Program Management Alternatives .....	5-41
<b>CHAPTER SIX – NOISE COMPATIBILITY PROGRAM</b>	
6.1 Noise Compatibility Program Recommendations .....	6-1
6.2 Noise Compatibility Program Map .....	6-50
6.3 Noise Compatibility Program Costs .....	6-58
6.4 Noise Compatibility Program Implementation .....	6-63
<b>CHAPTER SEVEN – CONSULTATION</b>	

## **APPENDICES**

APPENDIX A	PUBLIC INVOLVEMENT PLAN
APPENDIX B	TECHNICAL REVIEW COMMITTEE
APPENDIX C	PUBLIC WORKSHOPS
APPENDIX D	HIGHLINE FORUM
APPENDIX E	PUBLIC HEARING
APPENDIX F	SUPPLEMENTAL NOISE ANALYSIS
APPENDIX G	FUTURE (2021) NOISE EXPOSURE MAP/ NOISE COMPATIBILITY PROGRAM
APPENDIX H	NOISE MEDIATION ACTIONS
APPENDIX I	RUNWAY USE AGREEMENT
APPENDIX J	SOUND REDUCTION CODES
APPENDIX K	GROUND RUN-UP ENCLOSURE SITING STUDY
APPENDIX L	NEWSLETTERS
APPENDIX M	HIGHLINE COMMUNITY COLLEGE NOISE REMEDY PLAN
APPENDIX N	FORECAST APPROVAL
APPENDIX O	RESPONSE TO COMMENTS
APPENDIX P	PORT OF SEATTLE COMMISSION APPROVAL

## **TABLES**

	<b><u>PAGE</u></b>
<b>CHAPTER ONE – INVENTORY</b>	
Table 1-1	Summary of Historical Operations, 1999-2011 ..... 1-12
Table 1-2	Summary of Operations by Time of Day ..... 1-15
Table 1-3	Summary of Total Passengers ..... 1-16
Table 1-4	Summary of Total Cargo ..... 1-16
Table 1-5	Published IFR Approach Procedures at Nearby Airports ..... 1-21
Table 1-6	Noise Complaints and Inquiries..... 1-47
Table 1-7	Noise Sensitive Public Facilities ..... 1-61
Table 1-8	Historic Sites ..... 1-65
<b>CHAPTER TWO – FORECAST</b>	
Table 2-1	Domestic Air Service Trends..... 2-3
Table 2-2	International Air Service Trends..... 2-4
Table 2-3	2009 Top Markets – Scheduled Seats ..... 2-5
Table 2-4	Enplanement Forecast Methodology ..... 2-6
Table 2-5	Socio-Economic Variables ..... 2-7
Table 2-6	Domestic O&D Econometric Model Statistics ..... 2-9
Table 2-7	Domestic O&D Enplaned Passenger Forecast ..... 2-9
Table 2-8	International O&D Enplanements Forecast ..... 2-11
Table 2-9	Enplanements Forecast by Air Carrier and Commuter ..... 2-13
Table 2-10	Aircraft Gauge and Load Factor Assumptions ..... 2-15
Table 2-11	Commercial Passenger Operations Forecast ..... 2-18
Table 2-12	Domestic Passenger Operation Fleet Mix ..... 2-19
Table 2-13	International Passenger Operation Fleet Mix..... 2-21
Table 2-14	Air Cargo Tonnage ..... 2-25
Table 2-15	Freight Tonnage by Airline ..... 2-26
Table 2-16	All-Cargo Forecast ..... 2-27
Table 2-17	Total Cargo Tonnage ..... 2-28
Table 2-18	All-Cargo Operation Fleet Mix ..... 2-29
Table 2-19	Historical Air Taxi and GA Operations ..... 2-31
Table 2-20	Air Taxi and GA Operation Fleet Mix ..... 2-32
Table 2-21	Military Operations Forecast ..... 2-33
Table 2-22	Total Aircraft Operations Forecast ..... 2-34
Table 2-23	Aviation Forecasts Versus FAA 2009 TAF..... 2-35
Table 2-24	Average Annual Day ..... 2-39
Table 2-25	Average Annual Day – Day/Night Splits ..... 2-40
Table 2-26	Average Annual Day – Hourly Distributions ..... 2-40



## **TABLES, Continued**

	<b><u>PAGE</u></b>
<b>CHAPTER THREE – NOISE ANALYSIS</b>	
Table 3-1	Temporary Noise Measurement Sites..... 3-39
Table 3-2	Permanent Airport Noise Monitors ..... 3-39
Table 3-3	Temporary Noise Monitoring Program Duration ..... 3-43
Table 3-4	Summary of Noise Monitoring Program Results..... 3-44
Table 3-5	Ambient Noise Levels at Temporary Noise Monitoring Sites ..... 3-46
Table 3-6	Distribution of Average Day Operations by Aircraft Type Existing (2013) Baseline ..... 3-48
Table 3-7	Distribution of Average Day Operations by Aircraft Type Future (2018) Baseline ..... 3-50
Table 3-8	Runway End Utilization – Existing (2013) Baseline ..... 3-53
Table 3-9	Runway End Utilization – Future (2018) Baseline ..... 3-54
Table 3-10	INM Arrival Flight Tracks – Existing (2013) Baseline..... 3-61
Table 3-11	INM Departure Flight Tracks – Existing (2013) Baseline..... 3-71
Table 3-12	INM Arrival Flight Tracks – Future (2018) Baseline..... 3-83
Table 3-13	INM Departure Flight Tracks – Future (2018) Baseline..... 3-93
Table 3-14	Departure Trip Length Distribution Existing (2013) Baseline .....3-104
Table 3-15	Departure Trip Length Distribution Future (2018) Baseline .....3-105
Table 3-16	Ground Run-up Activity – Existing (2013) Baseline .....3-106
Table 3-17	Ground Run-Up Activity – Future (2018) Baseline .....3-107
Table 3-18	Area and Estimated Population within Existing (2013) Baseline Noise Exposure Contour .....3-111
Table 3-19	Comparison of Area and Population within Future (2018) and Existing (2013) Baseline Noise Exposure Contours.....3-117
<b>CHAPTER FOUR – LAND USE ANALYSIS</b>	
Table 4-1	Land Use Compatibility Guidelines – 14 CFR Part 150 ..... 4-2
Table 4-2	Generalized Land Use Classifications ..... 4-15
Table 4-3	Generalized Zoning Classifications ..... 4-21
Table 4-4	Existing (2013) Baseline Land Use Incompatibilities ..... 4-24
Table 4-5	Future (2018) Baseline Land Use Incompatibilities ..... 4-28
Table 4-6	Existing (2013) Baseline Compared to Future (2018) Baseline Land Use Incompatibilities..... 4-31

## **TABLES, Continued**

	<b><u>PAGE</u></b>
<b>CHAPTER FIVE – ALTERNATIVES</b>	
Table 5-1	Abatement Alternatives Screening Analysis Summary ..... 5-13
Table 5-2	Single Event Ground Run-Up Noise Analysis Grid Point Results ..... 5-23
<b>CHAPTER SIX – NOISE COMPATIBILITY PROGRAM</b>	
Table 6-1	Summary of 2013 Noise Compatibility Program Recommendations ..... 6-3
Table 6-2	Future (2018) NEM/NCP Land Use Incompatibilities..... 6-55
Table 6-3	Potentially Eligible Housing Units and Estimated Population Within the Recommended Noise Remedy Boundary ..... 6-59
Table 6-4	Noise Compatibility Program Implementation Costs..... 6-61
<b>APPENDIX F – SUPPLEMENTAL NOISE ANALYSIS</b>	
Table F-1	Noise-Sensitive Facility Grid Point Key ..... F-17
Table F-2	Noise-Sensitive Facility INM Grid Point Analysis Existing (2013) Baseline and Future (2018) Baseline/NCP... F-19
<b>APPENDIX G – FUTURE (2021) NOISE EXPOSURE MAP/NOISE COMPATIBILITY PROGRAM</b>	
Table G-1	Distribution of Average Day Operations by Aircraft Type Future (2021) NEM/NCP ..... G-2
Table G-2	Runway End Utilization – Future (2021) NEM/NCP..... G-4
Table G-3	INM Arrival Flight Tracks – Future (2021) NEM/NCP ..... G-5
Table G-4	INM Departure Flight Tracks – Future (2021) NEM/NCP ..... G-15
Table G-5	Departure Trip Length Distribution Future (2021) NEM/NCP ..... G-26
Table G-6	Ground Run-up Activity – Future (2021) NEM/NCP..... G-27
Table G-7	Area Within Future (2021) NEM/NCP Noise Exposure Contour..... G-31
Table G-8	Future (2021) NEM/NCP Land Use Incompatibilities..... G-33

# EXHIBITS

	<b><u>PAGE</u></b>
<b>Exhibit NEM-1</b>	
<b>Exhibit NEM-2</b>	
<b>CHAPTER ONE – INVENTORY</b>	
Exhibit 1-1	Airport Location Map ..... 1-3
Exhibit 1-2	Noise Compatibility Planning Process..... 1-7
Exhibit 1-3	Existing Airport Layout ..... 1-13
Exhibit 1-4	Airspace Summary..... 1-19
Exhibit 1-5	Standard Instrument Departure and Arrival Routes – North Flow..... 1-23
Exhibit 1-6	Standard Instrument Departure and Arrival Routes – South Flow ..... 1-25
Exhibit 1-7	Existing Noise Remedy Boundary ..... 1-45
Exhibit 1-8	Noise Complaints / Inquiries by Location ..... 1-48
Exhibit 1-9	Noise Complaints / Inquiries – Study Area ..... 1-49
Exhibit 1-10	Noise Complaints / Inquiries by Type ..... 1-51
Exhibit 1-11	Noise Complaints / Inquiries by Time of Day ..... 1-52
Exhibit 1-12	Noise Complaints / Inquiries by Day of the Week..... 1-53
Exhibit 1-13	Noise Complaints / Inquiries by Individual ..... 1-54
Exhibit 1-14	Study Area – Generalized Existing Land Use..... 1-57
Exhibit 1-15	Existing Noise-Sensitive Public Facilities..... 1-59
Exhibit 1-16	Existing Historic Sites..... 1-63
Exhibit 1-17	Generalized Existing Zoning ..... 1-85
<b>CHAPTER TWO – FORECAST</b>	
Exhibit 2-1	Historical Enplaned Passengers..... 2-2
Exhibit 2-2	Enplanements Forecast Summary ..... 2-12
Exhibit 2-3	Historical Revenue Ton Miles ..... 2-23
Exhibit 2-4	2007 Air Cargo Growth by Major Market ..... 2-24
Exhibit 2-5	2009 Air Taxi and GA Operation Fleet Mix ..... 2-31
Exhibit 2-6	Comparison with FAA 2009 TAF – Enplanements..... 2-36
Exhibit 2-7	Comparison with FAA 2009 TAF – Operations ..... 2-36
Exhibit 2-8	Forecasts Comparison – Enplanements..... 2-37
Exhibit 2-9	Forecasts Comparison – Operations ..... 2-38

## **EXHIBITS, *Continued***

	<b><u>PAGE</u></b>
<b>CHAPTER THREE – NOISE ANALYSIS</b>	
Exhibit 3-1	Comparison of Sound ..... 3-3
Exhibit 3-2	Example Addition of Two Decibels Level..... 3-5
Exhibit 3-3	Example of Sound Level Averaging ..... 3-7
Exhibit 3-4	Sound Frequency Weighting Curves ..... 3-9
Exhibit 3-5	Sound Attenuation Graphs ..... 3-13
Exhibit 3-6	Sleep Disturbance Dose-Response Curves..... 3-17
Exhibit 3-7	Noise Effects on Distance Necessary for Speech Communication ..... 3-20
Exhibit 3-8	Measurement of Different Types of Sound..... 3-23
Exhibit 3-9	Relationship Among Sound Metrics..... 3-25
Exhibit 3-10	Schultz Curve..... 3-36
Exhibit 3-11	Noise Monitoring Sites ..... 3-41
Exhibit 3-12	INM Flight Tracks – North Flow ..... 3-57
Exhibit 3-13	INM Flight Tracks – South Flow ..... 3-59
Exhibit 3-14	Existing (2013) Baseline Noise Exposure Contour .....3-109
Exhibit 3-15	Future (2018) Baseline Noise Exposure Contour .....3-113
Exhibit 3-16	Existing (2013) Baseline Compared to Future (2018) Baseline Noise Exposure Contours .....3-115
<b>CHAPTER FOUR – LAND USE ANALYSIS</b>	
Exhibit 4-1	Generalized Existing Zoning ..... 4-19
<b>CHAPTER FIVE – ALTERNATIVES</b>	
Exhibit 5-1	Abatement Alternatives Evaluation Process ..... 5-3
Exhibit 5-2	Proposed Ground Run-Up Enclosure (GRE) Locations..... 5-21
<b>CHAPTER SIX – NOISE COMPATIBILITY PROGRAM</b>	
Exhibit 6-1	Recommended Noise Remedy Boundary ..... 6-51
Exhibit 6-2	Future (2018) NEM/NCP Noise Exposure Contour..... 6-53

## **EXHIBITS, *Continued***

	<b><u>PAGE</u></b>
<b>APPENDIX F – SUPPLEMENTAL NOISE ANALYSIS</b>	
Exhibit F-1	Future (2018) Baseline – Time Above Contour..... F-3
Exhibit F-2	Future (2018) Baseline – Number of Events Above Contour .. F-5
Exhibit F-3	Single Event Noise Contour – 737-800 Arrival to Runway 16C..... F-7
Exhibit F-4	Single Event Noise Contour – 737-800 Departure from Runway 16C..... F-9
Exhibit F-5	Single Event Noise Contour – 737-800 Arrival to Runway 34C..... F-11
Exhibit F-6	Single Event Noise Contour – 737-800 Departure from Runway 34C..... F-13
Exhibit F-7	Noise-Sensitive Public Facilities ..... F-15
<b>APPENDIX G – FUTURE (2021) NOISE EXPOSURE MAP/NOISE COMPATIBILITY PROGRAM</b>	
Exhibit G-1	Future (2021) NEM/NCP Noise Exposure Contour..... G-29



## **SPONSOR'S CERTIFICATION, NOISE EXPOSURE MAPS, AND NEM/NCP CHECKLISTS**

The following pages contain small-scale representations of the official Noise Exposure Maps for Existing (2013) and Future (2018) conditions at Seattle-Tacoma International Airport, as well as Checklists for both the Noise Exposure Maps (NEMs) and Noise Compatibility Program (NCP). The official NEMs, at a scale of one inch equals 2,000 feet, are included at the back of volume one of the printed copy of this document. The Existing (2013) NEM is based on data developed from calendar year 2009 through May 2012 as further explained in this document in Chapter Three, *Noise Analysis*.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **STATEMENT OF CERTIFICATION AND PUBLIC NOTIFICATION**

The Noise Exposure Maps and accompanying documentation for the Noise Exposure Maps for the Seattle-Tacoma International Airport, submitted in accordance with 14 CFR Part 150 with the best available information are hereby certified as true and complete to the best of my knowledge and belief under penalty of 18 U.S.C. 1001. I verify that the data used to develop the Existing (2013) Noise Exposure Map is representative of existing conditions and that the data used to develop the Future (2018) Noise Exposure Map is representative of the five-year forecast condition with implementation of all recommended measures. Interested persons have been afforded adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft Noise Exposure Maps and forecast of operations. The record and description of consultation and opportunity for public comment as provided herein are, to the best of my knowledge true and complete under penalty of 18 U.S.C. 1001.

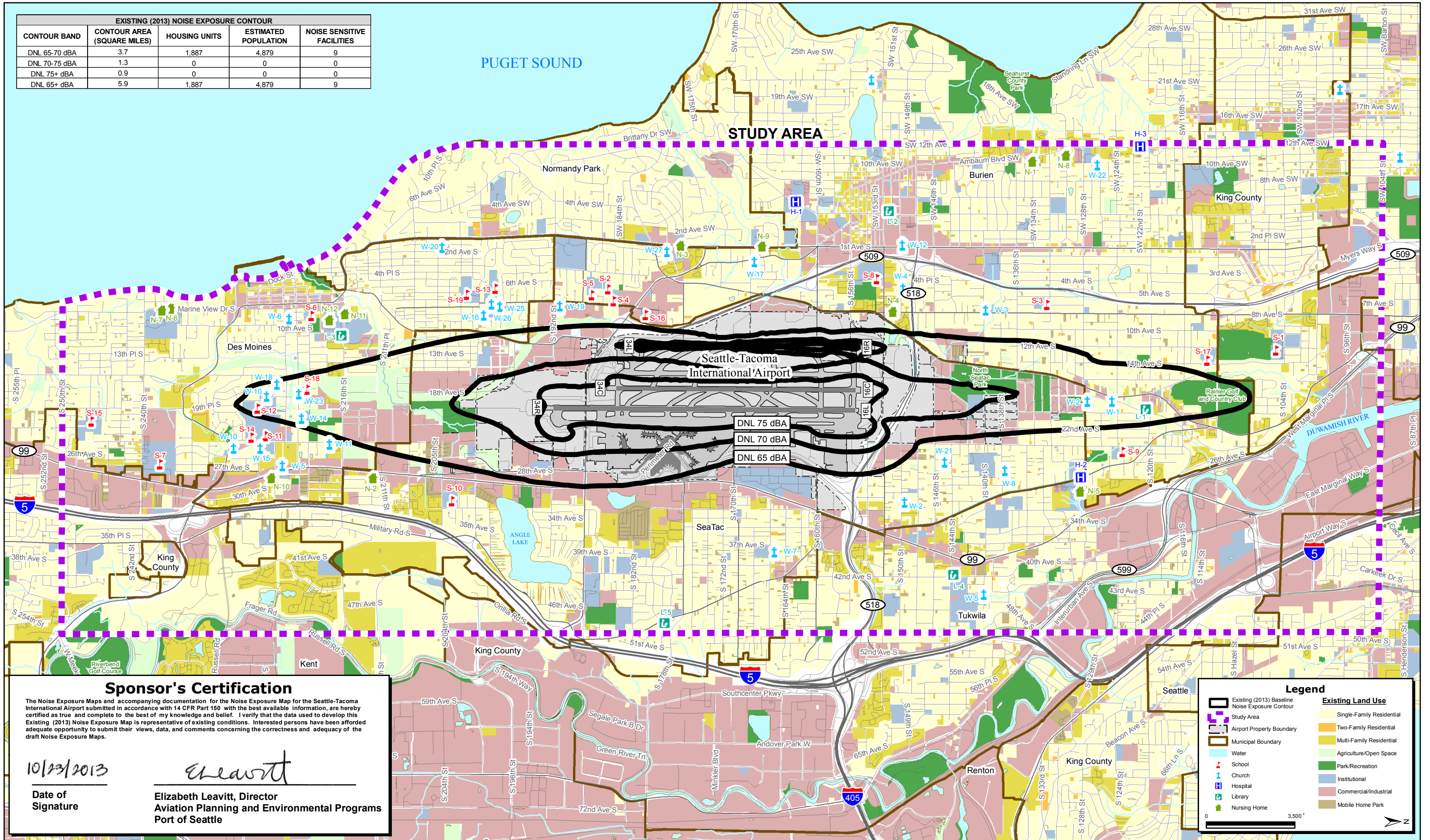


Elizabeth Leavitt,  
Director, Aviation Planning and Environmental Programs  
Port of Seattle

Date 10/23/2014

**THIS PAGE INTENTIONALLY LEFT BLANK**

EXISTING (2013) NOISE EXPOSURE CONTOUR				
CONTOUR BAND	CONTOUR AREA (SQUARE MILES)	HOUSING UNITS	ESTIMATED POPULATION	NOISE SENSITIVE FACILITIES
DNL 65-70 dBA	3.7	1,887	4,879	9
DNL 70-75 dBA	1.3	0	0	0
DNL 75+ dBA	0.9	0	0	0
DNL 65+ dBA	5.9	1,887	4,879	9



### Sponsor's Certification

The Noise Exposure Maps and accompanying documentation for the Noise Exposure Map for the Seattle-Tacoma International Airport submitted in accordance with 14 CFR Part 150 with the best available information, are hereby certified as true and complete to the best of my knowledge and belief. I verify that the data used to develop this Existing (2013) Noise Exposure Map is representative of existing conditions. Interested persons have been afforded adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft Noise Exposure Maps.

10/23/2013

Date of  
Signature

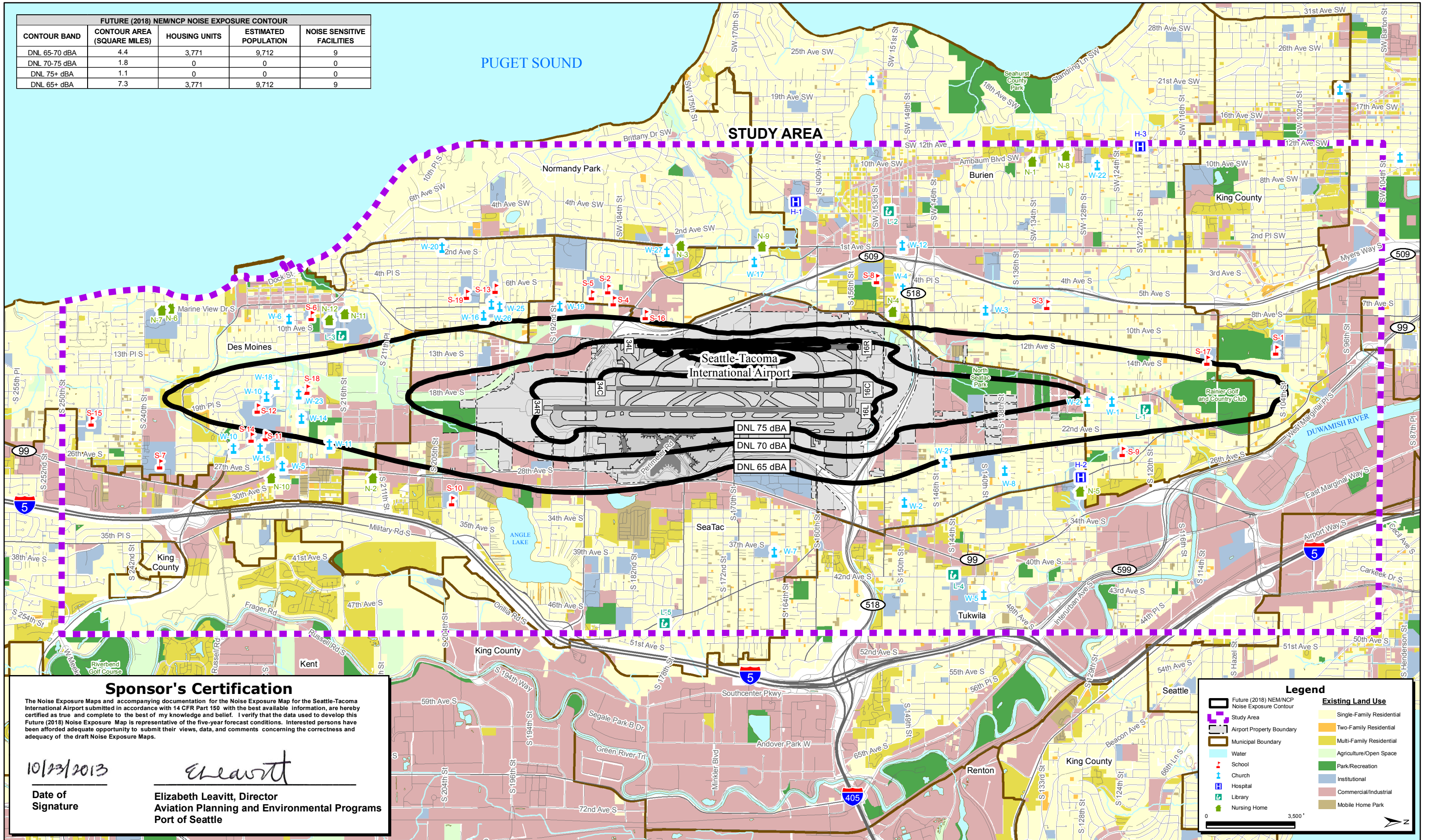
*Elizabeth Leavitt*

Elizabeth Leavitt, Director  
Aviation Planning and Environmental Programs  
Port of Seattle





FUTURE (2018) NEM/NCP NOISE EXPOSURE CONTOUR				
CONTOUR BAND	CONTOUR AREA (SQUARE MILES)	HOUSING UNITS	ESTIMATED POPULATION	NOISE SENSITIVE FACILITIES
DNL 65-70 dBA	4.4	3,771	9,712	9
DNL 70-75 dBA	1.8	0	0	0
DNL 75+ dBA	1.1	0	0	0
DNL 65+ dBA	7.3	3,771	9,712	9





**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE EXPOSURE MAP CHECKLIST -- PART I**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>I. Submitting And Identifying The NEM:</b>		
A. Submission is properly identified:		
1. 14 C.F.R. Part 150 NEM?	No	N/A
2. NEM and NCP together?	Yes	Letter of Transmittal; Chapter 1, Pages 1-1 to 1-11
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?	Yes	Letter of Transmittal; Chapter 1, Pages 1-2
B. Airport and Airport Operator's name are identified?	Yes	Letter of Transmittal; Chapter 1, Page 1-1
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?	Yes	Letter of Transmittal
<b>II. Consultation:</b> [150.21(b), A150.105(a)]		
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	Yes	Chapter 7 and Appendices A, B, C, E, and O
B. Identification of consulted parties:		
1. Are the consulted parties identified?	Yes	Chapter 7 and Appendices A, B, C, E, and O
2. Do they include all those required by 150.21(b) and A150.105(a)?	Yes	Chapter 7 and Appendices A, B, C, E, and O
3. Agencies in 2., above, correspond to those indicated on the NEM?	Yes	NEM-1, NEM-2, & Chapter 7 and Appendices A, B, C, and E
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	Yes	Sponsor's Certification & Chapter 7 and Appendices A, B, C, E, and O
D. Does the document indicate whether written comments were received during consultation and, if there were comments, that they are on file with the FAA regional airports division manager?	Yes	Appendices E and O

**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE EXPOSURE MAP CHECKLIST -- PART I**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>III. General Requirements: [150.21]</b>		
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	Yes	Exhibits NEM-1 & NEM-2 and Large-Scale NEM exhibits (located in the back pocket)
B. Map currency:		
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?	Yes	Letter of Transmittal; Exhibit NEM-1;
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	Yes	Letter of Transmittal; Chapter 3, Page 3-5; Future (2018) NEM/NCP Noise Exposure Map (located in the back pocket); Appendix C, Page C-16
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?	N/A	N/A
C. If the NEM and NCP are submitted together:		
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?	Yes	Letter of Transmittal, Letter of Transmittal & Chapter 3, Section 3.6.2.1, Page 3-50
2. If the forecast year map is based on program implementation:		
a. Are the specific program measures that are reflected on the map identified?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	Yes	Chapter 6, Pages 6-13 through 6-48
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))	N/A	N/A



**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE EXPOSURE MAP CHECKLIST -- PART I**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>IV. Map Scale, Graphics, And Data Requirements:</b> [A150.101, A150.103, A150.105, 150.21(a)]		
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps?	Yes	Large-Scale NEM exhibits located in the back pocket
B. Is the quality of the graphics such that required information is clear and readable?	Yes	Large-Scale NEM exhibits (located in the back pocket)
C. Depiction of the airport and its environs:		
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?		
a. Airport boundaries	Yes	Large-Scale NEM exhibits (located in the back pocket)
b. Runway configurations with runway end numbers	Yes	Large-Scale NEM exhibits (located in the back pocket)
2. Does the depiction of the off-airport data include?		
a. A land use base map depicting streets and other identifiable geographic features	Yes	Large-Scale NEM exhibits (located in the back pocket)
b. The area within the DNL 65 dB (or beyond, at local discretion)	Yes	Large-Scale NEM exhibits (located in the back pocket)
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB (or beyond, at local discretion)	Yes	Large-Scale NEM exhibits (located in the back pocket); Chapter 1, Section 1.7.5
D. 1. Continuous contours for at least the DNL 65, 70, and 75 dB?	Yes	Large-Scale NEM exhibits (located in the back pocket)
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?	No	N/A
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	Yes	Letter of Transmittal & Chapter 3, Section 3.6.2.1, Page 3-50

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>IV. Map Scale, Graphics, And Data Requirements:</b> [A150.101, A150.103, A150.105, 150.21(a)] <b>continued</b>		
E. Flight tracks for the existing condition and forecast year timeframes, which are numbered to correspond to narrative	Yes	Chapter 3, Section 3.6.2.1, Exhibits 3-12 to 3-13; Supplemental exhibits at 1" = 2,000' scale
F. Locations of any noise monitoring sites	Yes	Chapter 3, Section 3.6.1.2, Large-Scale NEM exhibits (located in the back pocket)
G. Noncompatible land use identification:		
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	Yes	Large-Scale NEM exhibits (located in the back pocket)
2. Are noise sensitive public buildings and historic properties identified?	Yes	Large-Scale NEM exhibits (located in the back pocket); Chapter 1, Section 1.7.4
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	Yes	Large-Scale NEM exhibits (located in the back pocket)
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	Yes	Chapter 4, Section 4.5.1, Pages 4-23 to 4-26 and Section 4.5.2, Pages 4-27 to 4-31
<b>V. Narrative Support Of Map Data:</b> [150.21(a), A150.1, A150.101, A150.103]		
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	Yes	Chapter 3, Section 3.6.2.1, Pages 3-44 to 3-105
2. Are the underlying technical data and planning assumptions reasonable?	Yes	Sponsor's Certification; Letter of Transmittal; & Chapter 3, Section 3.6.2.1
B. Calculation of Noise Contours:		
1. Is the methodology indicated?	Yes	Chapter 3, Section 3.6.2.1, Pages 3-44 to 3-45
a. Is it FAA approved?	Yes	Chapter 3, Section 3.6.2.1, Pages 3-44 to 3-45
b. Was the same model used for both maps	Yes	Chapter 3, Section 3.6.2.1, Page 3-45
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?	N/A	N/A

**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE EXPOSURE MAP CHECKLIST -- PART I**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>V. Narrative Support Of Map Data:</b> [150.21(a), A150.1, A150.101, A150.103], <b>continued</b>		
2. Correct use of noise models:		
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?	No	N/A
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	N/A	N/A
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	Yes	Chapter 3, Section 3.6.1.2
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons?	N/A	N/A
C. Noncompatible Land Use Information:		
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	Yes	Chapter 4, Section 4.5.1 and 4.5.2
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	Yes	Chapter 4, Section 4.1 & Table 4-1
a. If a local variation to table 1 was used:		
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?	N/A	N/A
(2) Does the narrative include the airport operator's complete substitution for table 1?	N/A	N/A
3. Does the narrative include information on self-generated or ambient noise where compatible or noncompatible land use identifications consider non-airport and non-aircraft noise sources?	N/A	N/A

**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE EXPOSURE MAP CHECKLIST -- PART I**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>V. Narrative Support Of Map Data:</b> [150.21(a), A150.1, A150.101, A150.103], <b>continued</b>		
4. Where normally noncompatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?	N/A	N/A
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect land use compatibility in the future?	Yes	Chapter 3, Section 3.6.2.1, Page 3-45 and Section 3.6.2.2, Pages 3-110 to 3-115
<b>VI. Map Certifications:</b> [150.21(b), 150.21(e)]		
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?	Yes	Sponsor's Certification
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?	Yes	Sponsor's Certification

**14 CFR PART 150 NOISE COMPATIBILITY STUDY  
NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>I. Submitting And Identifying The NCP:</b>		
A. Submission is properly identified:		
1. 14 C.F.R. Part 150 NCP?	Yes	Letter of Transmittal
2. NEM and NCP together?	Yes	Letter of Transmittal; Chapter 1, Pages 1-1 to 1-11
3. Program revision?	Yes	Letter of Transmittal; Chapter 1, Pages 1-2
B. Airport and Airport sponsor's name are identified?	Yes	Letter of Transmittal; Chapter 1, Page 1-1
C. NCP is transmitted by airport sponsor's cover letter?	Yes	Letter of Transmittal
<b>II. Consultation (including public participation): [150.23]</b>		
A. Documentation includes narrative of public participation and consultation process?	Yes	Chapter 7, Pages 7-1 to 7-2 and Appendices A, B, C, E, and O
B. Identification of consulted parties:		
1. All parties in 150.23(c) consulted?	Yes	Appendices A, B, C, and E
2. Public and planning agencies identified?	Yes	Appendix B
3. Agencies in 2., above, correspond to those affected by the NEM noise contours?	Yes	Appendix B; Large-Scale NEM exhibits (located in the back pocket)
C. Satisfies 150.23(d) requirements by:		
1. Documentation shows active and direct participation of parties in B., above?	Yes	Appendices A, B, C, E, and O
2. Active and direct participation of general public and opportunity to submit their views, data, and comments on the formulation and adequacy of the NCP?	Yes	Appendices A, B, C, E, and O
3. Participation was prior to and during development of NCP and prior to submittal to FAA?	Yes	Appendices A, B, C, E, and O
4. Indicates adequate opportunity afforded to all consulted parties to submit views, data, etc.?	Yes	Appendices A, B, C, E, and O
D. Evidence is included there was notice and opportunity for a public hearing on the final NCP?	Yes	Appendix E

**14 CFR PART 150 NOISE COMPATIBILITY STUDY**  
**NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>II. Consultation (including public participation):</b> [150.23] [ <b>CONTINUED</b> ]		
E. Documentation of comments:		
1. Includes summary of public hearing comments, if hearing was held?	Yes	Appendices E and O
2. Includes copy of all written material submitted to operator?	Yes	Appendices E and O
3. Includes operator's responses/disposition of written and verbal comments?	Yes	Appendices E and O
F. Is there written evidence from the appropriate office within the FAA that the sponsor received informal agreement to carry out proposed flight procedures?	N/A	N/A
<b>III. NOISE EXPOSURE MAPS:</b> [150.23, B150.3; 150.35(f)]		
A. Inclusion of NEMs and supporting documentation:		
1. Map documentation either included or incorporated by reference?	Yes	Large-Scale NEM exhibits (located in the back pocket) and Chapter 3, Section 3.6.2, Page 3-44 to 3-105 and Chapter Four, Page 4-15 to 4-18
2. Maps previously found in compliance by FAA?	Yes	Letter of Transmittal
3. FAA's compliance determination still valid?		
(a) Existing condition NEM represents conditions at the airport at the time of submittal of the NCP for FAA approval?	Yes	Letter of Transmittal & Chapter 3, Section 3.6.2.1, Page 3-45 to 3-50
(b) Forecast condition NEM represents conditions at the airport at least 5 years into the future from the date of submittal of the NCP to the FAA for approval?	Yes	Letter of Transmittal & Chapter 3, Section 3.6.2.1, Pages 3-45 to 3-50
(c) Sponsor letter confirming elements (a) and (b), above, if date of submission is either different than the year of submittal of the previously approved NEMs or over 12 months from the date shown on the face of the NEM?	N/A	N/A
(d) If (a) through (c) cannot be validated, the NEMs must be redone and resubmitted as per 150.21.	N/A	N/A
4. Does 180-day period have to wait for map compliance finding?	Yes	N/A

**14 CFR PART 150 NOISE COMPATIBILITY STUDY**  
**NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>III. NOISE EXPOSURE MAPS:</b> [150.23, B150.3; 150.35(f)] [ <b>CONTINUED</b> ]		
B. Revised NEMs submitted with program:		
1. Revised NEMs included with program?	Yes	Large-Scale NEM exhibits (located in the back pocket)
2. Has airport sponsor requested in writing that FAA make a determination on the NEM(s), showing NCP measures in place, when NCP approval is made?	Yes	Letter of Transmittal
C. If program analysis uses noise modeling:		
1. INM, HNM, or FAA-approved equivalent?	Yes	Chapter 3, Section 3.6.2.1, Page 3-44 to 3-45
2. Monitoring in accordance with A150.5?	Yes	Chapter 3, Section 3.6.1.2, Pages 3-36 to 3-44
D. One existing condition and one forecast-year map clearly identified as the official NEMs?	Yes	Large-Scale NEM exhibits (located in the back pocket)
<b>IV. CONSIDERATION OF ALTERNATIVES:</b> [B150.7, 150.23(e)(2)]		
A. At a minimum, were the alternatives below considered, or if they were rejected was the reason for rejection reasonable and based on accurate technical information and local circumstances?		
1. Land acquisition and interests therein, including air rights, easements, and development rights?	Yes	Chapters 5 & 6, Measure M-1 & Measure M-4
2. Barriers, acoustical shielding, public building soundproofing	Yes	Chapter 6, Measure A-18
3. Preferential runway system	Yes	Chapter 6, Measure A-11
4. Voluntary flight procedures	Yes	Chapter 6, Measure A-12
5. Restrictions described in B150.7	Yes	Chapter 5, Table 5-1, Page 5-18
6. Other actions with beneficial impact not listed in the regulation	Yes	Chapter 5, Table 5-1, Pages 5-13 to 5-18
7. Other FAA recommendations (see D, below)	No	N/A
B. Responsible implementing authority identified for each considered alternative?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48

**14 CFR PART 150 NOISE COMPATIBILITY STUDY**  
**NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>IV. CONSIDERATION OF ALTERNATIVES:</b> [B150.7, 150.23(e)(2)] [ <b>CONTINUED</b> ]		
C. Analysis of alternative measures:		
1. Measures clearly described?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
2. Measures adequately analyzed?	Yes	Chapter 5 and Chapter 6, Pages 6-13 through 6-48
3. Adequate reasoning for rejecting alternatives?	Yes	Chapter 5
D. Other actions recommended by the FAA: As the FAA staff person familiar with the local airport circumstances, determine whether other actions should be added?	No	N/A
<b>V. ALTERNATIVES RECOMMENDED FOR IMPLEMENTATION:</b> [150.23(e), B150.7(c); 150.35(b), B150.5]		
A. Document clearly indicates:		
1. Alternatives that are recommended for implementation?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
2. Final recommendations are airport sponsor's, not those of consultant or third party?	Yes	Letter of Transmittal
B. Do all program recommendations:		
1. Relate directly or indirectly to reduction of noise and noncompatible land uses?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
2. Contain description of each measure's relative contribution to overall effectiveness of program?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
3. Noise/land use benefits quantified to extent possible to be quantified?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
4. Does each alternative include actual/anticipated effect on reducing noise exposure within noncompatible area shown on NEM?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
5. Effects based on relevant and reasonable expressed assumptions?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48
6. Does the document have adequate supporting data that the measure contributes to noise/land use compatibility?	Yes	Chapter 6, Table 6-1 and Pages 6-13 through 6-48



**14 CFR PART 150 NOISE COMPATIBILITY STUDY**  
**NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>V. ALTERNATIVES RECOMMENDED FOR IMPLEMENTATION:</b> [150.23(e), B150.7(c); 150.35(b), B150.5] <b>[CONTINUED]</b> C. Analysis appears to support program standards set forth in 150.35(b) and B150.5?	Yes	Chapters 5 and 6
D. When use restrictions are recommended for approval by the FAA: 1. Does (or could) the restriction affect Stage 2 or Stage 3 aircraft operations (regardless of whether they presently operate at the airport)?	N/A	N/A
2. If the answer to D.1 is yes, has the airport sponsor completed the Part 161 process and received FAA Part 161 approval for a restriction affecting Stage 3 aircraft? Is the FAA's approval documented? For restrictions affecting only Stage 2 aircraft, has the airport sponsor successfully completed the Stage 2 analysis and consultation process required by Part 161 and met the regulatory requirements, and is there evidenced by letter from FAA stating this fact?	N/A	N/A
3. Are non-restrictive alternatives with potentially significant noise/compatible land use benefits thoroughly analyzed so that appropriate comparisons and conclusions among all alternatives can be made?	N/A	N/A
4. Did the FAA regional or ADO reviewer coordinate the use restriction with APP-400 prior to making determination on start of 180-days?	N/A	N/A
E. Do the following also meet Part 150 analytical standards? 1. Recommendations that continue existing practices and that are submitted for FAA re-approval?	N/A	N/A
2. New recommendations or changes proposed at the end of the Part 150 process?	N/A	N/A

**14 CFR PART 150 NOISE COMPATIBILITY STUDY**  
**NOISE COMPATIBILITY PROGRAM CHECKLIST -- PART II**

**FINAL**

AIRPORT NAME: Seattle-Tacoma International Airport

REVIEWER: \_\_\_\_\_

PROGRAM REQUIREMENT	YES/NO/NA	SUPPORTING PAGES
<b>V. ALTERNATIVES RECOMMENDED FOR IMPLEMENTATION:</b> [150.23(e), B150.7(c); 150.35(b), B150.5] [ <b>CONTINUED</b> ] F. Documentation indicates how recommendations may change previously adopted noise compatibility plans, programs, or measures? G. Documentation also: 1. Identifies agencies that are responsible for implementing each recommendation? 2. Indicates whether those agencies have agreed to implement? 3. Indicates essential government actions necessary to implement recommendations? H. Timeframe: 1. Includes agreed-upon schedule to implement alternatives? 2. Indicates period covered by the program? I. Funding/Costs: 1. Includes costs to implement alternatives? 2. Includes anticipated funding sources? <b>VI. PROGRAM REVISION:</b> [150.23(e)(9)] Supporting documentation includes provision for revision?	 Yes  Yes Yes Yes  Yes Yes  Yes Yes  Yes	 Chapter 6, Pages 6-13 through 6-48  Chapter 6, Section 6.1, Pages 6-1 to 6-48; and Table 6-1 Transmittal Letter Chapter 6, Section 6.1, Pages 6-13 to 6-48  Chapter 6, Section 6.1, Pages 6-13 to 6-48 Chapter 6, Section 6.4  Chapter 6, Section 6.3 and Table 6-3, Pages 6-59 to 5-52 Chapter 6, Section 6.3, Pages 6-59 to 5-52  Chapter 6, Measure P-2, Page 6-47

## **GLOSSARY**

**Aeronautical Information Manual (AIM)** – A publication containing basic flight information and air traffic control (ATC) procedures, designed primarily as a pilot's information and instructional manual for use in the National Airspace System (NAS). Sometimes referred to as *Airman's Information Manual*.

**Airport elevation** – 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. AIP is periodically reauthorized by Congress with funding appropriated from the Aviation Trust Fund. Proceeds to the Trust Fund are derived from excise taxes on airline tickets, aviation fuel, etc.

**Airport Layout Plan (ALP)** – A scaled drawing of existing and proposed land and facilities necessary for the operation and development of an airport. The ALP shows boundaries and proposed additions to all areas owned or controlled by the airport operator 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** – Landings (arrivals) and takeoffs (departures) from an airport.

**Airport Traffic Control Tower (ATCT)** – The airport traffic control facility located on an airport that is responsible for traffic separation within the immediate vicinity of the airport and on the surface of the airport.

**Air Route Traffic Control Center (ARTCC or Center)** – A FAA facility established to provide air traffic control service to aircraft operating on Instrument Flight Rules (IFR) flight plans within controlled airspace during the en route portion of flight.

**Air Traffic Control (ATC)** – A service operated to promote the safe, orderly, and expeditious flow of air traffic.

**Airport Traffic Control Tower (ATCT)** – A tower that has been established on an airport to provide for a safe, orderly and expeditious flow of traffic on and in the vicinity of the airport.

**Ambient noise** – The total sum of noise from all sources in a given place and time.

**Approach Light Systems (ALS)** – A series of lights that assists the pilot when aligning aircraft with the extended runway centerline on final approach.

**Attenuation** – Acoustical phenomenon whereby sound energy is reduced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, other natural features, and man-made features (e.g., sound insulation).

**A-weighted sound (dBA)** – A system for measuring sound energy (in decibels) that is designed to represent the response of the human ear to sound. Energy at frequencies more readily detected by the human ear is more heavily weighted in the measurement, while frequencies less well detected are assigned lower weights. A-weighted sound measurements are commonly used in studies where the human response to sound is the object of the analysis.

**Bank** – A cluster of arrivals or departures in a short period of time, characteristic of an airline hub operation.

**Base Leg** – Base Leg – A flight path at right angles to the landing runway. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

**Baseline Condition** – The existing condition or conditions prior to future development or the enactment of additional noise abatement procedures, which serve as a foundation for analysis.

**Commuter aircraft** – Commuters are commercial operators that provide regularly scheduled passenger or cargo service with aircraft seating less than 60 passengers. A typical commuter flight operates over a trip distance of less than 300 miles.

**Connecting passenger** – An airline passenger who transfers from an arriving aircraft to a departing aircraft in order to reach his or her ultimate destination.

**Controlled airspace** – Airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. Controlled airspace is designated as Class A, Class B, Class C, Class D, or Class E. Aircraft operators are subject to certain pilot qualifications, operating rules, and equipment requirements as specified in 14 CFR Part 91, depending upon the class of airspace in which they are operating.

**Crosswind leg** – A flight path at right angles to the approach runway end off of its upwind end.

**Day-night average sound level (DNL)** – A noise metric used to describe the average sound level over a 24-hour period, typically an average day over the course of a year. In computing DNL, an extra weight of 10 decibels is assigned to noise occurring between the hours of 10:00 p.m. and 7:00 a.m. to account for increased annoyance when ambient noise levels are lower and people are trying to sleep. DNL may be determined for individual locations or expressed in noise contours.

**Decibel (dB)** – Sound is measured by its pressure or energy in terms of decibels. The decibel scale is logarithmic. A ten-decibel increase in sound is equal to a tenfold increase in sound energy.

**DGPS antenna** – Differential Global Positioning System is a way to correct the various inaccuracies in the GPS system by placing a reference antenna on a point that has been accurately surveyed. This antenna receives the same GPS signals as an aircraft but corrects the GPS signal for any inaccuracies.

**Displaced Threshold** – A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of pavement behind a displaced threshold may be available for takeoffs in both directions and landings from the opposite direction.

**Distance Measuring Equipment (DME)** – A ground based facility that measures the distance to an aircraft by timing the delay between radio signals.

**Downwind leg** – A flight path parallel to the landing runway in the direction opposite the landing direction.

**Easement** – The legal right of one party to use part of the rights of a piece of real estate belonging to another party. This may include, but is not limited to, the right of passage over, on or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity.

**Enplanements** – The number of passengers boarding an aircraft at an airport. Does not include arriving, connecting, or through passengers.

**Environmental Assessment (EA)** – A concise document that assesses the environmental impacts of a proposed Federal Action. It discusses the need for, and environmental impacts of, the proposed action and alternatives. 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). Public participation and consultation with other Federal, state, and local agencies is a cornerstone of the EA process.

**Environmental Impact Statement (EIS)** – An EIS is a document that provides a discussion of the significant environmental impacts which would occur as a result of a proposed project, and informs decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts. Public participation and consultation with other Federal, state, and local agencies is a cornerstone of the EIS process.

**Equivalent sound level** – see **Leq**.

**Federal Aviation Administration (FAA)** – The FAA is the Federal agency responsible for ensuring the safe and efficient use of the nation’s airspace, for fostering civil aeronautics and air commerce, and for supporting the requirements of national defense. The activities required to carry out these responsibilities include: safety regulations; airspace management and the establishment, operation, and maintenance of a system of air traffic control and navigation facilities; research and development in support of the fostering of a national system of airports, promulgation of standards and specifications for civil airports, and administration of Federal grants-in-aid for developing public airports; various joint and cooperative activities with the Department of Defense; and technical assistance (under State Department auspices) to other countries.

**Final approach** – A flight path that follows the extended runway centerline. It usually extends from the base leg to the runway.

**Finding of No Significant Impact (FONSI)** – If, following the preparation of an environmental assessment, the Federal agency determines a proposed project will not result in any significant environmental impact, a finding of no significant impact (FONSI) is issued by the Federal Agency. A FONSI is a document briefly explaining the reasons why an action will not have a significant effect on the human environment and for which an EIS, therefore, is not necessary.

**Fixed-base operator (FBO)** – A business located on the airport that provides services such as hangar space, fuel, flight training, repair, and maintenance to airport users.

**Flight track utilization** – The use of established routes for arrival and departure by aircraft to and from the runways at an airport.

**FMS/GPS** – Flight Management System/Global Positioning System equipment onboard an aircraft takes advantage of various radio navigation and/or GPS routes to guide the aircraft.

**Glide slope (GS)** – Provides vertical guidance for aircraft during approach and landing. The glide slope consists of the following:

- Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS, or

- Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

**Geographic Information Systems (GIS)** – An information system that is designed for storing, integrating, manipulating, analyzing, and displaying data referenced by spatial or geographic coordinates.

**Global Positioning System (GPS)** – A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude. The accuracy of the system can be further refined by using a ground receiver at a known location to calculate the error in the satellite range data. This is known as differential GPS (DGPS).

**Grid point analysis** – A type of aircraft noise analysis that evaluates the noise levels at individual points rather than through generation of noise contours.

**Ground effect** – Noise attenuation attributed to absorption or reflection of noise by man-made or natural features on the ground surface.

**Ground Run-up Enclosure (GRE)** – an outdoor testing facility designed for in frame testing of jet engines. A GRE is commonly referred to as a hush house.

**Hub** – An airport that services airlines that have hubbing operations.

**Hubbing** – A method of airline scheduling that times the arrival and departure of several aircraft in a close period of time in order to allow the transfer of passengers between different flights of the same airline in order to reach their ultimate destination. Several airlines may conduct hubbing operations at an airport.

**Hush House** – See Ground Run-up Enclosure.

**Infill** – Urban development occurring on vacant lots in substantially developed areas. May also include the redevelopment of areas to a greater density

**Instrument approach** – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

**Instrument Flight Rules (IFR)** – That portion of the Code of Federal Regulations (14 CFR Part 91) specifying the procedures to be used by aircraft during flight in Instrument Meteorological Conditions (IMC). These procedures may also be used under visual conditions and provide for positive control by ATC (see also VFR).

**Instrument Landing System (ILS)** – An electronic system installed at some airports which helps to guide pilots to runways for landing during periods of limited visibility or adverse weather.

**Instrument Meteorological Conditions (IMC)** – Weather conditions expressed in terms of visibility, distance from clouds, and cloud ceilings during which all aircraft are required to operate using instrument flight rules (IFR).

**Integrated Noise Model (INM)** – A computer model developed, updated and maintained by the FAA to predict the noise exposure generated by aircraft operations at an airport.

**Knots** – Airspeed measured as the distance in nautical miles (6,076.1 feet) traveled in one hour. (Approximately equal to 1.15 miles per hour.)

**Land use compatibility** – The ability of land uses surrounding the airport to coexist with airport-related activities with minimum conflict.

**Landing and takeoff (LTO) cycle** – The time that an aircraft is in operation at or near an airport. An LTO cycle begins when an aircraft starts its final approach (arrival) and ends after the aircraft has made its climb-out (departure).

**Ldn** – See **DNL**. Ldn is used in place of DNL in mathematical equations only.

**Leq** – Equivalent Sound Level. The steady A-weighted sound level over any specified period of time (not necessarily 24 hours) that has the same acoustic energy as the fluctuating noise during that period (with no consideration of nighttime weighting). It is a measure of cumulative acoustical energy. Because the time interval may vary, it should be specified by a subscript (such as Leq<sub>8</sub> for an 8-hour exposure to noise) or be clearly understood from the context.

**Local passenger** – A passenger who either enters or exits a metropolitan area on flights serviced by the area's airport. A local passenger is the opposite of a connecting passenger.

**Localizer** – The component of an ILS which provides lateral course guidance to the runway.

**Loudness** – The subjective assessment of the intensity of sound.

**Mean sea level (MSL)** – The average height of the surface of the sea for all stages of the tide; used as a reference for elevations. Also called sea level datum.

**Merge** – Combining noise events that exceed a given threshold level and occur within a selected period of time.

**Missed approach** – A prescribed procedure to be followed by aircraft that cannot complete an attempted landing at an airport.

**Narrow-body aircraft** – A commercial passenger jet having a single aisle and maximum of three seats on each side of the aisle. Common narrow-body aircraft include A320, B717, B727, B737, B757, DC9, MD80, and MD90.

**National Airspace System (NAS)** – The common network of U.S. airspace; air navigation facilities, equipment, services, airports, or landing areas; aeronautical charts, information, and services; rules, regulations, and procedures; technical information, manpower, and materials, all of which are used in aerial navigation.

**National Environmental Policy Act of 1969 (NEPA)** – The original legislation establishing the environmental review process for proposed Federal actions.



**Nautical mile** – A measure of distance equal to one minute of arc on the earth's surface (6,076.1 feet or 1,852 meters).

**NAVAIDs (Navigational Aids)** – Any facility used by an aircraft for navigation.

**Navigational fix** – A geographical position determined by reference to one or more radio navigational aids.

**Noise abatement** – A measure or action that minimizes the amount of impact of noise on the environs of an airport. Noise abatement measures include aircraft operating procedures and use or disuse of certain runways or flight tracks.

**Noise berm** – A manmade earthen structure designed to interrupt the direct transmission of noise from a source to a noise-sensitive area.

**Noise contour map** – A map representing average annual noise levels summarized by lines connecting points of equal noise exposure.

**Noise Compatibility Program (NCP)** – Program developed in accordance with Part 150 guidance that contains provisions for the abatement of aircraft noise through aircraft operating procedures, air traffic control procedures, or airport facility modifications. It also includes provisions for land use compatibility planning and may include actions to mitigate the impact of noise on incompatible land uses and recommendations for amending local land use controls to affect future land uses and development. The program must contain provisions for updating and periodic revision.

**Noise Compatibility Study** – The process, methods, and procedures provided in the Part 150 guidance to develop a Noise Compatibility Program, including the development of noise exposure maps, a noise compatibility program, and public participation.

**Noise Exposure Map (NEM)** – A geographic depiction of an airport, its noise contours for existing conditions and as forecast for five years in the future, and surrounding area developed in accordance with 14 CFR Part 150 guidance. Documentation of the Noise Exposure Maps must include airport operating characteristics for existing conditions and all reasonable and foreseeable airport operating characteristics for the future condition.

**Nondirectional beacon (NDB)** – A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to and from the station. When the radio beacon is installed in conjunction with the ILS marker, it is normally called a compass locator.

**Nonprecision approach** – A standard instrument approach procedure providing runway alignment but no glide slope or descent information.

**Operation** – A takeoff or landing by an aircraft.

**Outer fix** – An air traffic control term for a point in the airspace from which aircraft are normally cleared to the approach fix or final approach course.

**Positive control** – The separation of all air traffic within designated airspace as directed by air traffic controllers.

**Primary Commercial Service Airport** – A commercial airport which enplanes 0.01 percent or more of the total annual U.S. enplanements.

**Primary Runway** – The runway on which the majority of operations take place.

**Profile** – The position of the aircraft during an approach or departure in terms of altitude above the runway and distance from the runway end.

**Propagation** – Sound propagation is the spreading or radiating of sound energy from the noise source. It usually involves a reduction in sound energy with increased distance from the source. Atmospheric conditions, terrain, natural objects, and manmade objects affect sound propagation.

**Public use airport** – An airport open to public use without prior permission, and without restrictions within the physical capabilities of the facility. It may or may not be publicly owned.

**Reliever airport** – An airport which, when certain criteria are met, relieves the aeronautical demand on a nearby busier air carrier airport.

**Retrofitted aircraft** – An aircraft originally certified as Stage 2 and has been modified (hushkitted) to meet Stage 3 requirements per 14 CFR Part 36. This includes both modification of engines or the replacement of engines to meet the Stage 3 standard.

**Run-up** – A routine procedure for testing aircraft systems by running one or more engines at a high power setting. Engine run-ups are normally conducted by airline maintenance personnel checking an engine or other on board systems following maintenance.

**Runway Protection Zone (RPZ)** – An area, trapezoidal in shape and centered about the extended runway centerline, designated to enhance the safety of aircraft operations. It begins 200 feet (60 meters) beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the aircraft, type of operation and visibility minimums. (Formerly known as the clear zone).

**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.

**Runway threshold** – The beginning of that portion of the runway usable for landing.

**Runway use program** – A noise abatement runway selection plan crafted to further noise abatement efforts for communities around airports. A runway selection plan is developed into a runway use program. It typically applies to all turbojet aircraft 12,500 pounds or heavier. Turbojet aircraft less than 12,500 pounds are included only if the airport proprietor determines that the aircraft creates a noise problem. These programs are coordinated with the FAA in accordance with FAA Order 8400.9, *National Safety and Operational Criteria for Runway Use Programs*. Typically runway use programs developed for noise abatement purposes are voluntarily implemented by Air Traffic Controllers when wind, weather, and operating conditions allow.

**Single event** – One noise event. For many kinds of analysis, the sound from single events is expressed using the Sound Exposure Level (SEL) metric.

**Sound** – Sound is the result of 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 after a stone is thrown into a body of water. The result of the movement is fluctuation in the normal atmospheric pressure or sound waves.

**Sound exposure level (SEL)** – A standardized measure of a single sound event, expressed in A-weighted decibels, that takes into account all sound above a specified threshold set at least 10 decibels below the maximum level. All sound energy in the event is integrated over one second.

**Special Use Airspace** – Airspace of defined dimensions identified by an area on the earth's surface wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations, which are not part of those activities.

**Stage 2 aircraft** – Aircraft that meet the noise levels prescribed by 14 CFR Part 36, which is less stringent than those, established for the quieter Stage 3 designation. The Airport Noise and Capacity Act required the phase-out of all Stage 2 aircraft over 75,000 pounds by December 31, 1999, with the potential for case-by-case exceptions through the year 2003.

**Stage 3 aircraft** – Aircraft that meet the most stringent noise levels set in 14 CFR Part 36.

**Standard instrument departure procedure (SID)** – A planned IFR air traffic control departure procedure published for pilot use in graphic and textual form. SIDs provide transition from the terminal to the en route air traffic control structure.

**Standard terminal arrival route (STAR)** – A planned IFR air traffic control arrival procedure published for pilot use in graphic and textual form. STARs provide transition from the en route air traffic control structure to an outer fix or an instrument approach fix in the terminal area.

**Statute mile** – A measure of distance equal to 5,280 feet.

**TACAN** – Tactical Air Navigation. A navigational system used by the military. TACAN provides both azimuth and distance information to a receiver on board an aircraft.

**Terminal Radar Approach Control (TRACON)** – An FAA Air Traffic Control Facility which uses radar and two-way communication to provide separation of air traffic within a specified geographic area in the vicinity of one or more airports.

**Terminal Radar Service Area (TRSA)** – Airspace surrounding certain airports where ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft.

**Through passenger** – An airline passenger who arrives at an airport and departs without deplaning the aircraft.

**Time Above (TA)** – The amount of time that sound exceeds a given decibel level during a 24-hour period (e.g., time in minutes that the sound level is above 75 dBA which would be expressed as TA75).

**Traffic pattern** – The traffic flow for aircraft landing and departing at an airport. Typical components of the traffic pattern include: upwind leg, crosswind leg, downwind leg, base leg, and final approach.

**UNICOM** – A nongovernment communication facility, which may provide airport information at certain airports. Aeronautical charts and publications show the locations and frequencies of UNICOMs.

**Upwind Leg** – A flight path parallel to the approach runway in the direction of approach.

**Vector** – Compass heading instructions issued by ATC in providing navigational guidance by radar.

**Very High Frequency Omnidirectional Range (VOR) Station** – A ground-based radio navigation aid transmitting signals in all directions. A VOR provides azimuth guidance to pilots by reception of electronic signals.

**Very High Frequency Omnidirectional Range Station with Tactical Air Navigation (VORTAC)** – A navigational aid providing VOR azimuth and TACAN distance measuring equipment (DME) at one site.

**Visual approach** – An approach conducted on an IFR flight plan, which authorizes the pilot to proceed visually and clear of clouds to the airport.

**Visual approach slope indicator (VASI)** – A visual aid to final approach to the runway threshold, consisting of two wing bars of lights on either side of the runway. Each bar produces a split beam of light – the upper segment is white, the lower is red.

**Visual flight rules (VFR)** – Rules and procedures specified in 14 CFR 91 for aircraft operations under visual conditions. Aircraft operations under VFR are not generally under positive control by ATC. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate a type of flight plan.

**Visual meteorological conditions (VMC)** – Weather conditions expressed in terms of visibility, distance from cloud, and cloud ceiling equal to or greater than those specified in 14 CFR 91.155 for aircraft operations under Visual Flight Rules (VFR).

**Wide-body aircraft** - A commercial jet with a wingspan generally greater than 155 feet and, in passenger configuration, having two aisles with 8 to 11 seats across in a row. Common wide-body aircraft include the A300, A310, A330, A340, B747, B767, B777, DC-10, and MD-11.

**Yearly Day-Night Average Sound Level** – see DNL

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **ACRONYMS**

AAAE	American Association of Airport Executives
AADT	Average Annual Daily Traffic
AC	Advisory Circular
ADT	Airspace Design Tool
AFB	Air Force Base
AFE	Above Field Elevation
AGL	Above Ground Level
AIM	Aeronautical Information Manual
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALPA	Airline Pilots Association
ALS	Approach Light Systems
ALSF-2	Approach Light System with Sequenced Flashing Lights
ANCA	Airport Noise and Capacity Act of 1990
ANMS	Airport Noise Monitoring System
APO	Aviation Policy, Planning, and Environment (FAA Office of)
APU	Auxiliary Power Unit
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Fire Fighting
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASNA	Aviation Safety and Noise Abatement Act of 1979
ASR	Airport Surveillance Radar
AST	Advanced Subsonic Transport
ASV	Annual Service Volume
ATA	Air Transport Association
ATADS	Air Traffic Activity Data System
ATC	Air Traffic Control
ATCA	Air Traffic Control Association
ATCT	Air Traffic Control Tower (or Airport Traffic Control Tower)
ATO	Air Traffic Organization
ATS	Air Traffic Service
BMP	Best Management Practices
BRL	Building Restriction Line
CAEP	Committee on Aviation Environmental Protection
CATX	Categorical Exclusion
CBD	Central Business District
CDA	Continuous Descent Approach
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CNEL	Community Noise Equivalency Level
dB	Decibel
dBA	A-weighted decibel
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level



DOD	Department of Defense
DOT	Department of Transportation
DP	Departure Procedures
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
EPNDB	Effective Perceived Noise Level
FAA	Federal Aviation Administration
FBO	Fixed-Base Operator
FDC	Flight Data Center
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FMS	Flight Management System
FONSI	Finding of No Significant Impact
GA	General Aviation
GIS	Geographic Information Systems
GP	General Planned Development District
GPS	Global Positioning System
GPU	Ground Power Unit
GRE	Ground Run-Up Enclosure
GS	Glide Slope
GSE	Ground Support Equipment
HIRL	High Intensity Runway Lights
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INM	Integrated Noise Model
LAAS	Local Area Augmentation Systems
LAHSO	Land and Hold Short
Lavg	Average Noise Level
LDA	Localizer-Type Directional Aid
LDC	Land Development Code
Ldn	See DNL
Leq	Equivalent Sound Level
Lmax	Maximum Noise Level
LSP	Land Sales Proceeds
LTO	Landing and Takeoff Cycle
LUMM	Land Use Management Measure
MALS	Medium Intensity Approach Light System
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

MIRL	Medium Intensity Runway Lights
MLS	Microwave Landing System
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MSL	Mean Sea Level
NA	Noise Abatement
NADP	Noise Abatement Departure Profiles
NAM	Noise Abatement Measure
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NATCA	National Air Traffic Controllers Association
NAVAIDS	Navigational Aids
NCP	Noise Compatibility Program
NDB	Non-directional Beacon
NEA	Number of Events Above
NEM	Noise Exposure Map
NEPA	National Environmental Policy Act of 1969
NLR	Noise Level Reduction
NM	Nautical Miles
NMS	Noise Monitoring System
NOTAM	Notice to Airmen
NRHP	National Register of Historic Places
NST	Noise Screening Tool
O&D	Origin & Destination (passengers)
OAG	Official Airline Guide
OM	Outer Marker
OPD	Optimized Profile Descent
PAPI	Precision Approach Path Indicator
PCA	Point of Closest Approach
PFC	Passenger Facility Charges
PGL	Program Guidance Letters
PMM	Program Management Measure
PRM	Precision Runway Monitor
QA/QC	Quality Assurance/Quality Control
QAT	Quiet Aircraft Technology
QC	Quota Count
RAILS	Runway Alignment Indicator Lights
RCLS	Runway Centerline Light System
REIL	Runway End Identifier Lights
RJ	Regional Jet
RMS	Remote Monitoring Site
RNAV	Area Navigation
RNP	Required Navigation Performance
ROA	Record of Approval (issued by FAA on a Part 150 Noise Compatibility Program)
ROD	Record of Decision (issued by FAA on an EIS)
RPZ	Runway Protection Zone
RSZ	Runway Safety Zone (within the Pima County AEFZ)
RSA	Runway Safety Areas

SEA	Seattle-Tacoma International Airport or Sea-Tac Airport
SEL	Sound Exposure Level
SENEL	Single Event Noise Exposure Level
SID	Standard Instrument Departure Procedure
SPL	Sound Pressure Level
STAR	Standard Terminal Arrival Route
STARS	Standard Terminal Automation Replacement System
TA	Time Above
TA-65	Time Above 65 dB
TACAN	Tactical Air Navigation
TAF	Terminal Area Forecast (prepared by the FAA)
TARGETS	Terminal Area Route Generation, Evaluation and Traffic Simulation
TDR	Transfer of Development
TEQ	Equivalent Sound Level
TRACON	Terminal Radar Approach Control
TRC	Technical Review Committee
TRSA	Terminal Radar Service Area
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USPAP	Uniform Standards of Professional Appraisal Practice
VA	U.S. Department of Veterans Affairs
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VOR	Very High Frequency Omnidirectional Radial Antenna
VORTAC	Very High Frequency Omnidirectional Range Station with Tactical Air Navigation
WAAS	Wide Area Augmentation Systems