

FINAL REPORT

FAR PART 150 NOISE EXPOSURE MAP UPDATE
Portland International Airport

Prepared for
Port of Portland
Portland, Oregon

July 2010

FINAL REPORT

FAR PART 150 NOISE EXPOSURE MAP UPDATE

Portland International Airport

Prepared for
Port of Portland
Portland, Oregon

July 2010

CONTENTS

Chapter		Page
	PREFACE	iii
	SPONSOR’S CERTIFICATION	v
	FAR PART 150 NOISE EXPOSURE MAP CHECKLIST	vi
1	STUDY BACKGROUND AND OBJECTIVES	1
	1.1 Study Background	1
	1.2 Requested FAA Actions	2
	1.3 Airport Environs	2
	1.4 Coordination And Outreach	4
	1.4.1 Citizen Noise Advisory Committee Meetings	4
	1.4.2 Stakeholder Notification And Briefings	4
	1.4.3 Public Review	5
2	NOISE EXPOSURE MAPS.....	6
	2.1 Noise Modeling.....	6
	2.2 Integrated Noise Model Input Data	6
	2.3 Noise Exposure Maps.....	13
	2.3.1 2008 Noise Exposure.....	14
	2.3.2 2017 Noise Exposure.....	14
3	SUMMARY AND FINDINGS.....	17
	3.1 Estimated Noise Exposure.....	17
	3.2 Evaluation of Existing Noise Compatibility Program.....	19
	3.3 Recommendations.....	20
	3.4 Costs, Funding, and Implementation	22
Appendix A – EXISTING NOISE COMPATIBILITY PROGRAM AND RECORD OF APPROVAL		
Appendix B – EVIDENCE OF PUBLIC AND STAKEHOLDER INVOLVEMENT		
Appendix C – FLIGHT TRACK DATA		
Appendix D – SUPPLEMENTAL METRICS		

TABLES

	Page
2-1 Average Daily Aircraft Operations by Type, Time of Day, and Stage Length-2008	7
2-2 Average Daily Aircraft Operations by Type, Time of Day, and Stage Length-2017	9
2-3 Runway Use Summary-2008.....	12
2-4 Runway Use Summary-2017.....	13
3-1 FAR Part 150 Land Use Compatibility Guidelines.....	18
3-2 Estimated Noise Exposure	22

FIGURES

1-1 Airport Environs.....	3
2-1 Noise Exposure – 2008	15
2-2 Noise Exposure – 2017	16
3-1 Residential Units Eligible for Sound Insulation.....	21

PREFACE

This document provides updated Noise Exposure Maps (NEM) pursuant to Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* for Portland International Airport (the Airport). As described in Section 150.21(d)(2) in FAR Part 150: “...any change in the operation of the airport that would significantly reduce noise over existing noncompatible uses that is not reflected in either the existing conditions or forecast noise exposure map on file with the FAA, the airport operator shall, in accordance with this section, promptly prepare and submit a revised noise exposure map.”

Included herein are (1) updated NEMs reflecting existing 2008 and future 2017 conditions, (2) revised estimates of noncompatible land uses, as well as (3) revisions to the number of housing units eligible for mitigation measures included in the Airport’s existing NCP. The last NEMs for the Airport were accepted by the FAA in December 2006, and the Airport’s current Noise Compatibility Program (NCP) was approved by FAA in 2007. The purpose of this update is not to request changes to the FAA-approved NCP, but rather document the change in the existing and projected future noise exposure, and revise the number of housing units eligible for approved mitigation measures per FAR Part 150.

This document includes three chapters and four appendices:

- Chapter 1 presents an overview of the Airport, background and objectives, and coordination/outreach accomplished pursuant to FAR Part 150.
- Chapter 2 describes the noise analysis and includes a summary of the data and forecasts used for noise modeling.
- Chapter 3 documents the existing and future noise exposure to noise sensitive facilities and land uses; provides a review of Recommendations #9 and #11 from the existing NCP; and summarizes implementation strategies.
- Appendix A contains the Airport’s existing NCP.
- Appendix B describes the coordination, consultation, and public involvement process conducted for this Study; and includes copies of written comments received prior to the official comment period immediately preceding and following the public hearing.
- Appendix C documents the flight track use and generalized flight tracks developed for the noise analysis.
- Appendix D documents supplemental analysis completed as part of this Study.

For the convenience of FAA reviewers, the FAA’s official NEM checklists and the NEMs are presented at the end of this section.

SPONSOR'S CERTIFICATION

The Noise Exposure Maps and accompanying documentation for Portland International Airport have been prepared with the best available information and are hereby certified as true and complete to the best of my knowledge and belief.

The 2008 Noise Exposure Map is hereby certified to represent existing conditions at the Airport, and the 2017 Noise Exposure Map is certified as a reasonable representation of forecast conditions seven years after the signature date, below.

It is further certified that adequate opportunity has been afforded interested persons to submit their views, data, and comments concerning the correctness and adequacy of the Noise Exposure Maps and supporting information.

Date of Signature

Name: Steve Schreiber
Title: Director of Aviation,
Port of Portland

FAR PART 150 NOISE EXPOSURE MAP CHECKLIST
FAR Part 150 Noise Exposure Map Update
Portland International Airport

	Yes/ No/ NA	Page No. or Other reference
I. IDENTIFICATION AND SUBMISSION OF MAP DOCUMENT:		
A. Is this submittal appropriately identified as one of the following, submitted under FAR Part 150:		
1. A NEM only	Yes	Preface
2. A NEM and NCP	No	
3. A revision to NEMs which have previously been determined by FAA to be in compliance with Part 150?	Yes	Preface, Page 1
B. Is the airport name and the qualified airport operator identified?	Yes	Cover letter
C. Is there a dated cover letter from the airport operator which indicates the documents are submitted under Part 150 for appropriate FAA determinations?	Yes	Cover letter
II. CONSULTATION: [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	Pages 4 - 5
B. Identification:		
1. Are the consulted parties identified?	Yes	Page 5
2. Do they include all those required by 150.21(b) and A150.105(a)?	Yes	Page 5
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	Cover letter, Pages 4 – 5, Appendix B
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 region?	Yes	Appendix B
III. GENERAL REQUIREMENTS: [150.21]		
A Are there two maps, each clearly labeled on the face with year (existing condition year and 5-year)?	No	2017 represents future conditions at the Airport, <u>9-year</u> Both maps are clearly labeled
B. Map currency:		
1. Does the existing condition map year match the year on the airport operator's submittal letter?	No	2008 is submitted as the existing conditions NEM in 2010
2. Is the 5-year map based on reasonable forecasts and other planning assumptions and is it for the fifth calendar year after the year of submission?	No	Forecast conditions for the <u>seventh</u> calendar year after submission
3. If the answer to 1 and 2 above is no, has the airport operator verified in writing that data in the documentation are representative of existing condition and 5-year forecast conditions as of the date of submission?	Yes	Sponsor's Certification

FAR PART 150 NOISE EXPOSURE MAP CHECKLIST (page 2 of 4)
FAR Part 150 Noise Exposure Map Update
Portland International Airport

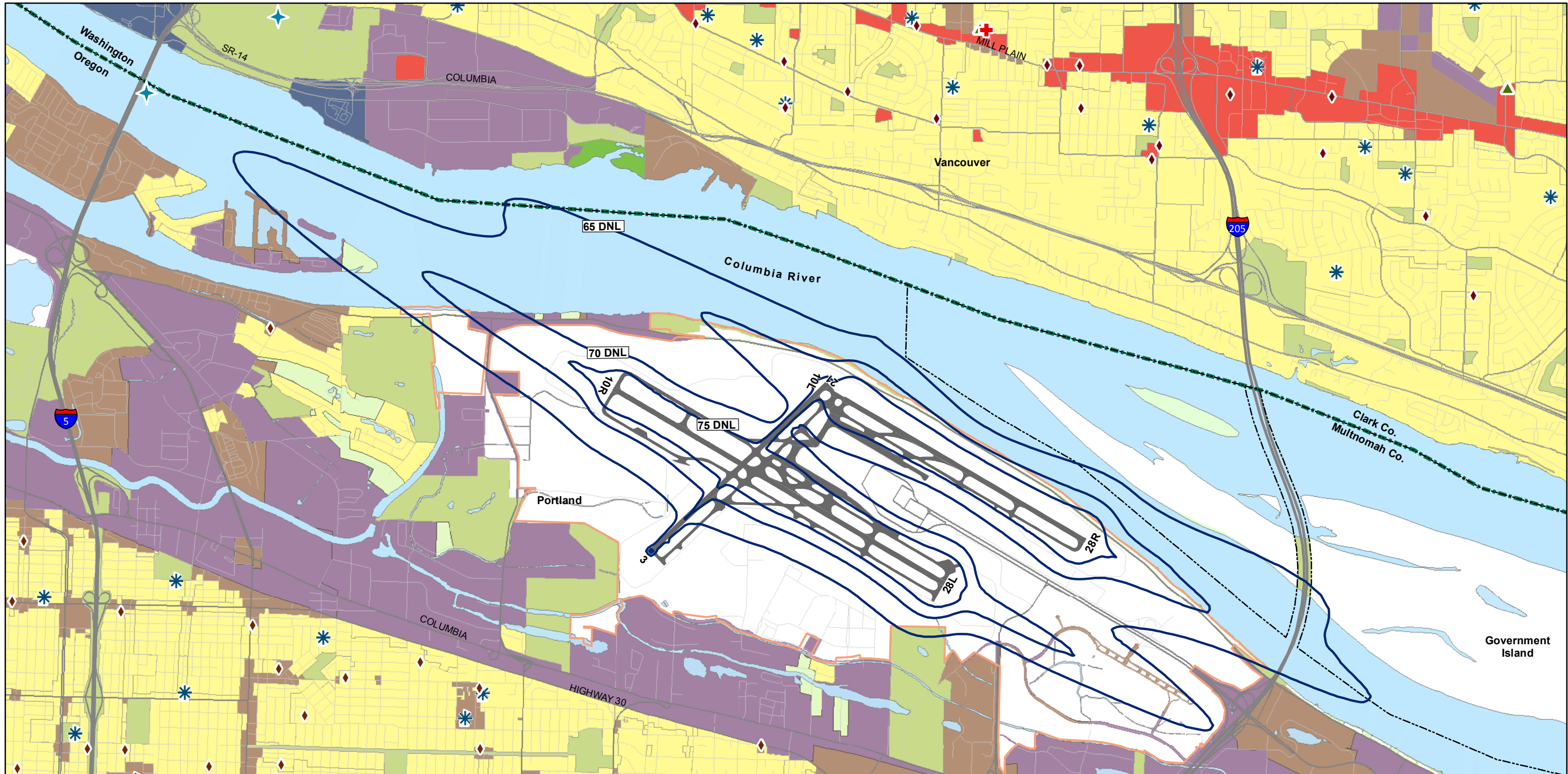
	Yes/ No/ NA	Page No. or Other reference
C. If the NEM and NCP are submitted together:	NA	NA
1. Has the airport operator indicated whether the 5-year map is based on 5-year contours without the program vs. contours if the program is implemented?	NA	NA
2. If the 5-year map is based on program implementation:	NA	NA
a. Are the specific program measures which are reflected on the map identified?	NA	NA
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	NA	NA
3. If the 5-year NEM does not incorporate program implementation, has the airport operator included an additional NEM for FAA determination after the program is approved which shows program implementation conditions and which is intended to replace the 5-year NEM as the new official 5-year map?	NA	NA
IV. MAP SCALE, GRAPHICS, AND DATA REQUIREMENTS: [A150.101, A150.103, A150.105, 150.21(A)]		
A. Are the maps of sufficient scale to be clear and readable, and is the scale indicated on the maps?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
B. Is the quality of the graphics such that required information is clear and readable?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
C. Depiction of the airport and its environs.		
1. Is the following graphically depicted to scale on both the existing condition and 5-year maps:	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
a. Airport boundaries	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
b. Runway configurations with runway end numbers	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
2. Does the depiction of the off-airport data include:		
a. A land use base map depicting streets and other identifiable geographic features	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
b. The area within the DNL 65 (or beyond, at local discretion)	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 (or beyond, at local discretion)	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2

FAR PART 150 NOISE EXPOSURE MAP CHECKLIST (page 3 of 4)
FAR Part 150 Noise Exposure Map Update
Portland International Airport

	Yes/ No/ NA	Page No. or Other reference
D. 1. Continuous contours for at least the DNL 65, 70, and 75?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
2. Based on current airport and operational data for the existing condition year NEM, and forecast data for the 5-year NEM?	Yes	Pages 6 – 14
E. Flight tracks for the existing condition and 5-year forecast timeframes (these may be on supplemental graphics which must use the same land use base map as the existing condition and 5-year NEM), which are numbered to correspond to accompanying narrative?	Yes	Figures C-1 – C-4, High use tracks Figures C-5 – C-6
F Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map as the official NEMs)	Yes	Figures C-1 – C-4, High use tracks Figures C-5 – C-6
G Noncompatible land use identification:		
1. Are noncompatible land uses within at least the DNL 65 depicted on the maps?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
2. Are noise sensitive public buildings identified?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	Yes	2008 NEM, 2017, NEM, Figure 2-1, Figure 2-2
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	NA	NA
V. NARRATIVE SUPPORT OF MAP DATA: [150.21(A), A150.1, A150.101, A150.103]		
A. 1. Are the technical data, including data sources, on which the NEMs are based adequately described in the narrative?	Yes	Pages 6- 14
2. Are the underlying technical data and planning assumptions reasonable?	Yes	Pages 6- 14
B. Calculation of Noise Contours:		
1. Is the methodology indicated?	Yes	Page 6
a. Is it FAA approved?	Yes	Page 6
b. Was the same model used for both maps?	Yes	Page 6
c. Has AEE approval been obtained for use of a model other than those which have previous blanket FAA approval?	NA	NA
2. Correct use of noise models:		
a. Does the documentation indicate the airport operator has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another?	NA	NA
b. If so, does this have written approval from AEE?	NA	NA
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	NA	NA

FAR PART 150 NOISE EXPOSURE MAP CHECKLIST (page 4 of 4)
FAR Part 150 Noise Exposure Map Update
Portland International Airport

	Yes/ No/ NA	Page No. or Other reference
4. For noise contours below DNL 65, does the supporting documentation include explanation of local reasons? (Narrative explanation is highly desirable but not required by the Rule.)	NA	NA
C. Noncompatible Land Use Information:		
1. Does the narrative 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 5-year maps?	Yes	Figure 2-1, Figure 2-2, Table 3-2
2. Does the documentation indicate whether Table 1 of Part 150 was used by the airport operator?	Yes	Table 3-1
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?	NA	NA
(2) Does the narrative include the airport operator's complete substitution for Table 1?	NA	NA
3. Does the narrative include information on self-generated or ambient noise where compatible/noncompatible land use identifications consider non-airport/aircraft sources?	NA	NA
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?	NA	NA
5. Does the narrative describe how forecasts will affect land use compatibility?	Yes	Section 3.1
VI. MAP CERTIFICATIONS: [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	2008 NEM, 2017 NEM
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete?	Yes	2008 NEM, 2017 NEM



LEGEND

- Airport property boundary
- County boundary
- City boundary
- Noise contour
- Rural / agricultural
- Port owned property
- Water

Existing Generalized Land Use

- Commercial
- Industrial
- Mixed use
- Public
- Residential
- Parks / open space
- Natural resources

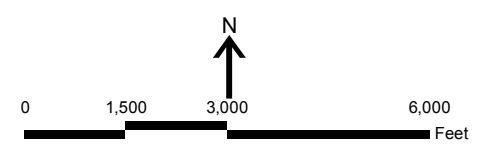
Existing Noise Sensitive Facilities

- Medical facility / nursing facility
- School / university facility
- Library
- Religious facility
- National historic site

Sources: Noise exposure contours - Jacobs Consultancy, November 2009.
 Existing land uses, residential counts, and noise sensitive facilities - Clark and Multnomah counties, November 2009.
 Basemap - Port of Portland, June 2009.

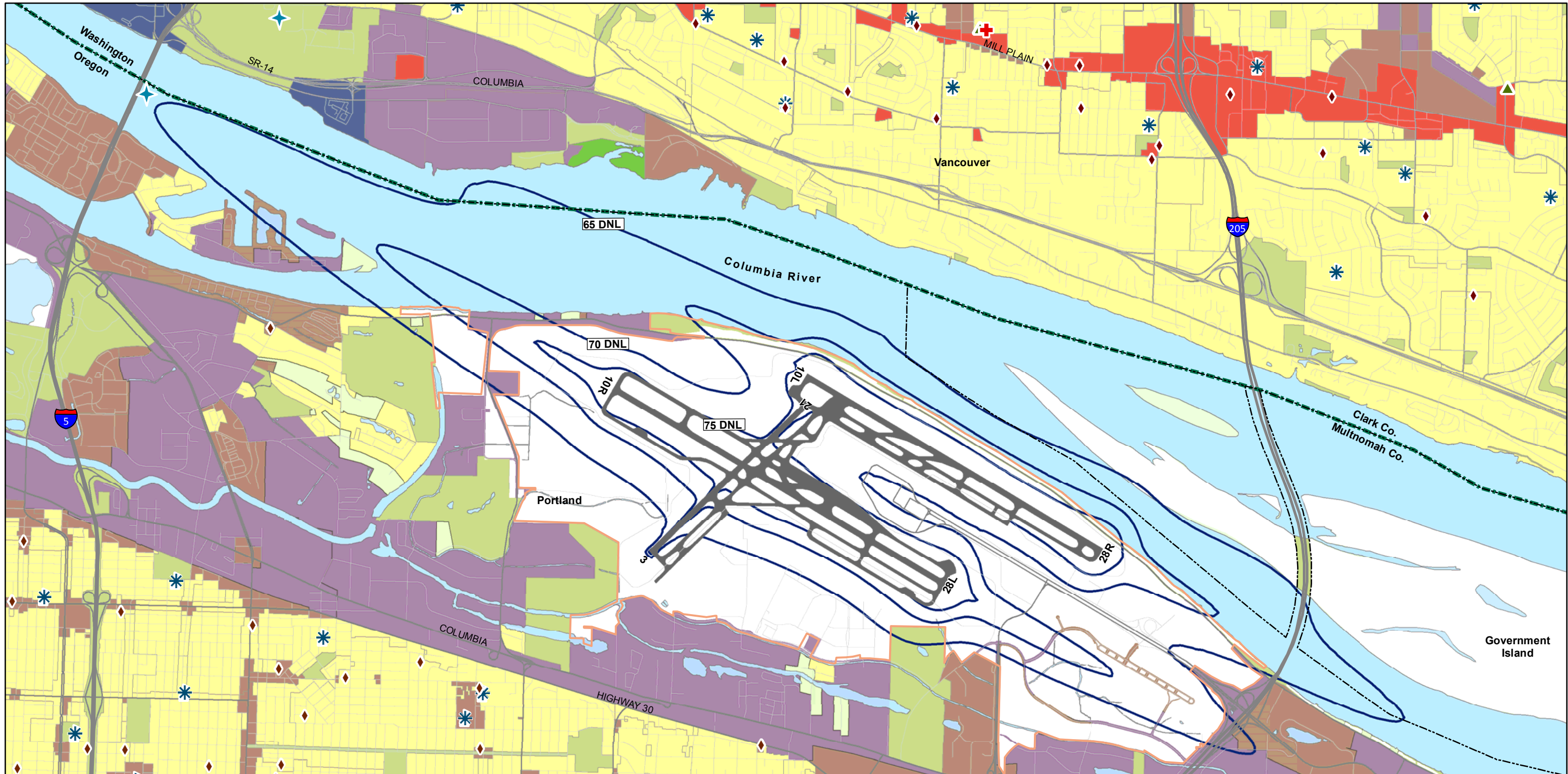
The Noise Exposure Maps and accompanying documentation for Portland International Airport, submitted with the best available information, are hereby certified as true and complete to the best of my knowledge and belief. It is hereby certified that adequate opportunity has been afforded interested persons to submit views, data, and comments on the Noise Exposure Maps and forecasts.

Steve Schreiber, Director of Aviation, Port of Portland Date _____



EXISTING 2008 NOISE EXPOSURE MAP
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010





- LEGEND**
- Airport property boundary
 - - - County boundary
 - - - City boundary
 - [DNL] Noise contour
 - Rural / agricultural
 - Port owned property
 - Water

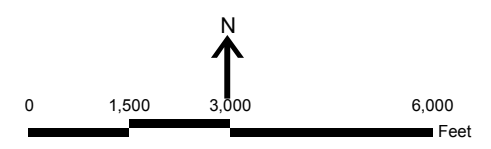
- Existing Generalized Land Use**
- Commercial
 - Industrial
 - Mixed use
 - Public
 - Residential
 - Parks / open space
 - Natural resources

- Existing Noise Sensitive Facilities**
- + Medical facility / nursing facility
 - * School / university facility
 - ▲ Library
 - ◆ Religious facility
 - ★ National historic site

The Noise Exposure Maps and accompanying documentation for Portland International Airport, submitted with the best available information, are hereby certified as true and complete to the best of my knowledge and belief. It is hereby certified that adequate opportunity has been afforded interested persons to submit views, data, and comments on the Noise Exposure Maps and forecasts.

Steve Schreiber, Director of Aviation, Port of Portland Date _____

Sources: Noise exposure contours - Jacobs Consultancy, November 2009.
 Existing land uses, residential counts, and noise sensitive facilities - Clark and Multnomah counties, November 2009.
 Basemap - Port of Portland, June 2009.



FUTURE 2017 NOISE EXPOSURE MAP
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010



Chapter 1

STUDY BACKGROUND AND OBJECTIVES

This chapter provides an overview of the following:

1. Study background
2. Requested FAA actions
3. Airport environs
4. Coordination and outreach

1.1 STUDY BACKGROUND

In 2006, the Port of Portland (the Port) completed the third update of the Airport's NEMs and NCP (the 2006 Part 150 Update). The existing 2006 and future 2011 NEMs reflected aircraft operations and fleet mix based on data compiled at the beginning of that study, which began in 2001. In 2008, the Port completed an Environmental Assessment (EA) as part of the Runway Rehabilitation and Repair Project. The EA included noise exposure contours based on then current 2006 operations.

Compared to the contours from the 2006 Part 150 Update, which were based on 2001 operational data, the 2006 EA contours show reductions in the Day-Night Average Sound Level (DNL) 65 contours as well as noncompatible land uses around the Airport. This change is attributed to the decline in annual aviation operations between 2001 and 2006, as well as fleet mix changes, including fewer operations of older, louder aircraft at the Airport, such as the Fokker F-28, MD-80, and the Military F-15.

FAR Part 150 requires NEMs be updated after a change in operations that results in a "significant" reduction in noise over existing noncompatible uses and results in land becoming compatible per FAR Part 150 specifications. Therefore, this Study is intended to update the currently approved NEMs prepared as part of the 2006 Part 150 Update.

Updated NEMs were prepared for the following scenarios:

- **Existing 2008** – approximating noise exposure conditions for calendar year 2008
- **Future 2017** – approximating noise exposure conditions for 2017 reflecting forecast aircraft operations, fleet mix, and airfield layout, including the planned extension to Runway 10L-28R

In addition to the NEM update, noise exposure estimates have been reevaluated. The revised noise exposure estimates include the number of homes eligible for noise mitigation pursuant to Recommendations #9 and #11 in the current NCP. Recommendation #9 involves the development of a residential sound insulation program for homes within the DNL 65 noise contour; and Recommendation #11 involves the

purchase of noise easements for homeowners within the DNL 65 contour who did not wish to participate in the sound insulation program.

1.2 REQUESTED FAA ACTIONS

FAA acceptance of updated NEMs is requested:

- Updated NEM reflecting existing 2008 conditions, including revisions to the number of housing units associated with changes in noise exposure
- Updated NEM reflecting future 2017 conditions, including revisions to the number of housing units associated with changes in noise exposure

Pending FAA acceptance of the updated NEMs, the findings and conclusions of this Study should be appended to the Airport's existing FAA-approved NCP.

1.3 AIRPORT ENVIRONS

As shown on Figure 1-1, the Airport is located immediately south of the Columbia River, west of Interstate 205 (I-205), north of the Columbia Slough waterway and east of Interstate 5 (I-5). Centrally located within the Portland/Vancouver metropolitan area, the Airport is approximately 5 miles northeast of downtown Portland and 3 miles southeast of downtown Vancouver, Washington. The Airport property, which encompasses approximately 3,400 acres, lies completely within the City of Portland and Multnomah County, Oregon.

The Airport's immediate environs include a variety of commercial uses, including office, hotel, and retail uses on NE Airport Way west and east of I-205. Scattered single-family residential properties are located to the immediate south and west of the Airport. The area to the south of Columbia Boulevard is developed primarily in single-family residential neighborhoods, with nodes of higher-density housing and commercial uses along major thoroughfares.

A number of islands are located within the Columbia River near the Airport. To the northwest, the Hayden/Tomahawk Islands contain a mix of industrial and commercial uses, single- and multi-family residential uses, and some undeveloped areas. North of the Columbia River, the City of Vancouver and unincorporated portions of Clark County, Washington, are primarily developed with commercial and residential uses in the downtown area west of I-5.

To the southeast, between Sandy Boulevard and the Columbia River eastward to Blue Lake Park, lies a mixture of industrial, commercial, and agricultural uses. Farther to the east and south are the cities of Maywood Park, Fairview, Wood Village, Troutdale, and Gresham.

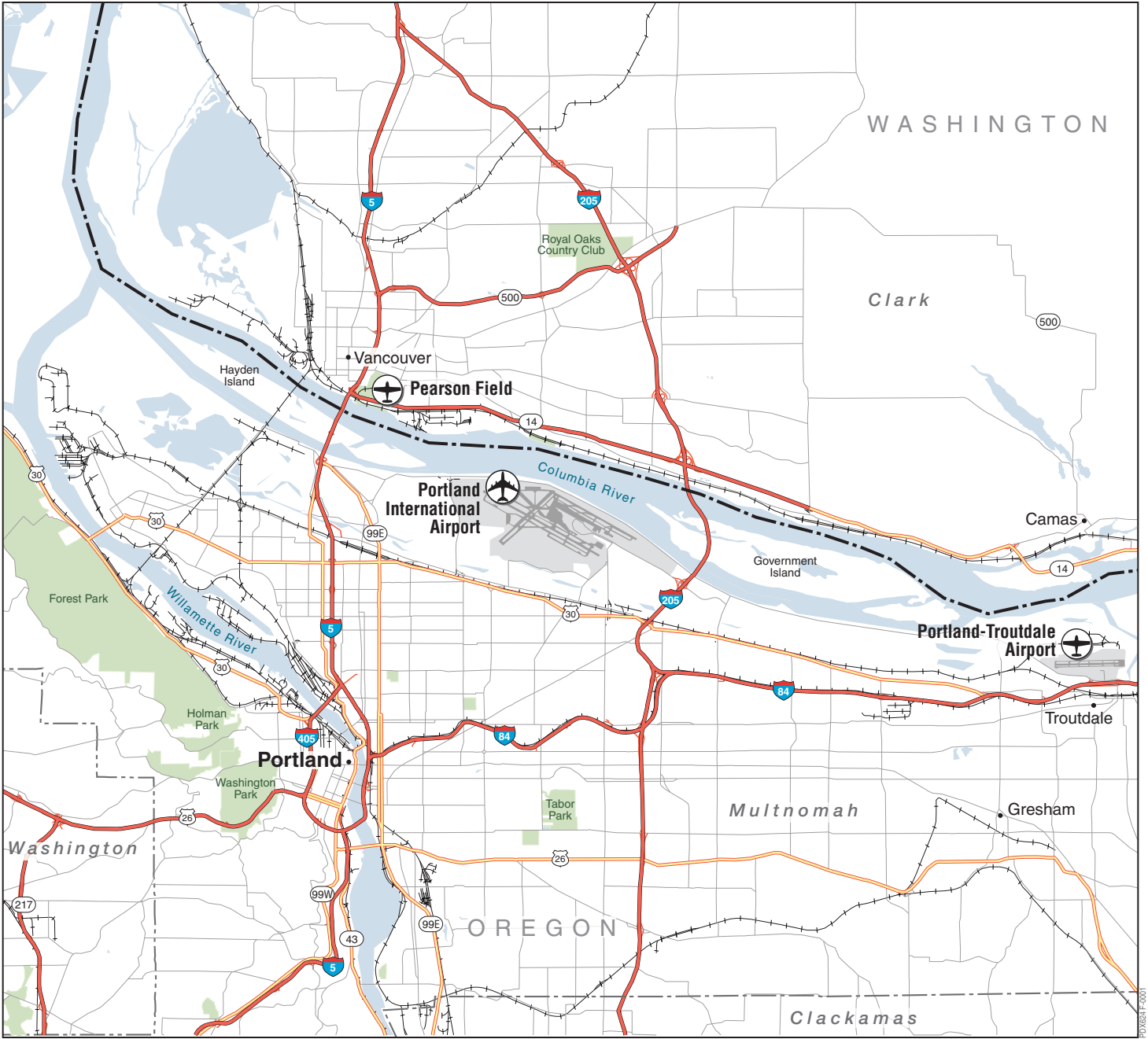


Figure 1-1
AIRPORT ENVIRONS
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010

The Columbia Corridor has a number of riparian areas, generally related to the Columbia Slough, and several golf courses, four of which are adjacent to the Airport on the west and south. A strip of open space containing portions of the 40-mile Loop Trail lies along the northern edge of the Airport between NE Marine Drive and the Columbia River. Other vacant acreage still in interim agricultural uses is located to the immediate south and west of the Airport. Six undeveloped islands are located to the east and northeast of the Airport, including Lemon, Sand, Government, and McGuire islands on the Oregon side, and Ackerman (previously known as Sand) and Lady islands on the Washington side. These islands accommodate dispersed recreation use and can only be accessed via watercraft. Landmarks in the area surrounding the Airport include Fort Vancouver which is a registered National Historic Site. Other landmarks in the area surrounding the Airport include Pearson Airfield, Pearson Air Museum, Officers Row, Vancouver Barracks, and the Vancouver Water Resources Education Center to the north of the Columbia River, which together compose the Vancouver National Historic Reserve established by the U.S. Congress in 1996. Adjacent and north of the Reserve is Clark College, the second largest community college in Washington State, with over 12,000 full-time and part-time students. The Georgia Pacific paper mill, located in downtown Camas, is easily recognized from the air and is used by pilots for visual navigation.

1.4 COORDINATION AND OUTREACH

Appendix B provides additional material documenting the coordination, consultation, and public involvement process for this Study. It includes documentation of correspondence sent to public officials; meeting agendas and handouts; newspaper ads; and comments submitted by members of the public.

The following coordination and outreach was conducted for this Part 150 Update pursuant to FAR Part 150 requirements:

1.4.1 Citizen Noise Advisory Committee Meetings

The Citizen Noise Advisory Committee (CNAC) is the official forum to address the community's aircraft noise concerns. Local jurisdictions and the Port appoint the 15-member committee to represent community concerns. CNAC was organized in.

Two CNAC meetings focused on the results of the noise analysis related to this Part 150 Update were held on November 12, 2009, and January 14, 2010. This afforded both the CNAC and the general public the opportunity to be informed about the project and to provide input and/or comment.

1.4.2 Stakeholder Notification and Briefings

Materials regarding the Part 150 Update were provided to the following stakeholders and stakeholder groups:

- FAA air traffic control and Northwest Region Airports District Office (ADO)
- City of Portland, Oregon

- City of Vancouver, Washington
- Multnomah County, Oregon
- Clark County, Washington
- National Park Service – Fort Vancouver, Washington
- PDX Airlines Affairs Committee (AAC)
- Flightcraft, Inc. (Fixed base operator at the Airport)
- Oregon Air National Guard (ORANG)
- National Business Aviation Association
- Citizen Noise Advisory Committee

In addition to meetings with the above, notices to the public were published in the Columbian and Oregonian newspapers. The Port also provided information and meeting notices via the Port web site, community/stakeholder mailing lists, notices to neighborhood coalitions and neighborhood associations.

1.4.3 Public Review

Copies of the draft documentation were available for public review at the Port of Portland offices in downtown Portland and at the Airport. Electronic and paper copies were made available upon request at public libraries throughout the study area. Finally, draft documentation was also made available for review and download via the Port of Portland's website or as a compact disc upon request.

Prior to submitting the official NEMs to the FAA, the Port provided notice and the opportunity for public comment at the public hearing held on January 14, 2010.

Chapter 2

NOISE EXPOSURE MAPS

This chapter describes the basic noise analysis methodology and operational assumptions used to develop the existing 2008 and future 2017 NEMs prepared for this Noise Exposure Map Update. The future 2017 NEM reflects conditions and operations assuming the extension of Runway 10L-28R to 9,827-feet. In addition to the official NEMs provided at the beginning of this document, noise exposure contours overlaid upon land use maps of the Airport environs are included at the end of this chapter.

2.1 NOISE MODELING

The standard methodology for identifying and analyzing noise conditions at airports involves use of the Integrated Noise Model (INM), an approved FAA model. The original version of the INM was developed by the FAA in the 1970s, and the model has been under continued development and refinement since then. The INM includes sets of algorithms describing sound propagation and attenuation over distance. It also includes an extensive database of noise-thrust-distance relationships for most civil aircraft, and many military aircraft, operating in the U.S.

The INM produces day-night average sound level (DNL) noise contours centered on the Airport. DNL is a noise metric designed to show the cumulative noise level in an area for an average 24-hour period during any given year. Aircraft DNL levels are computed by summing the noise of all aircraft noise events during a 24-hour period, with the addition of an extra 10 dB weight for noise occurring at night between (10:00 p.m. and 7:00 a.m.). The DNL metric was originally developed by the U.S. Environmental Protection Agency for use in community noise evaluations. FAR Part 150 requires that aircraft noise be described using DNL noise contours.

Version 7.0(a) of the INM was used in this Study. Application of the INM requires considerable input data reflecting average day operations, fleet mix, time of operation, stage length, runway use, and flight tracks. INM input data developed for this Update is summarized in the next section.

2.2 INTEGRATED NOISE MODEL INPUT DATA

Input data used to prepare the existing 2008 and future 2017 NEMs are summarized in the following paragraphs. Data from the ongoing Master Plan Update, including historical records and recent forecasts (approved by the FAA in 2008) were used to develop INM fleet mixes, activity levels, stage lengths, and time of operation inputs, which are provided in Tables 2-1 and 2-2. Other operational inputs, including runway use, flight tracks, and flight track use, were developed using information from the Airport's Noise and Operations Management System (ANOMS), in addition to input from FAA Air Traffic Control, the Oregon Air National Guard, and Port Staff.

Table 2-1
AVERAGE DAILY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH-2008
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Group	INM type	Aircraft type	Arrivals		Departures														All operations total			Annual total (a)
			Day	Night	Stage 1 (0-500 nm)		Stage 2 (501 - 1000 nm)		Stage 3 (1001 - 1500 nm)		Stage 4 (1501 - 2500 nm)		Stage 5 (2501 - 3500 nm)		Stage 6 (3501 - 4500 nm)		Stage 7 (4501 - 5500 nm)		Day	Night	Total	
					Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night				
Heavy jet	747400	Boeing747-400/PW4056	--	1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	1.00	--	2.00	2.00	729.93
	757300	Boeing757-300/RB211-535E4B	11.13	2.56	2.58	--	0.86	1.71	0.86	0.85	4.28	2.56	--	--	--	--	--	--	19.70	7.69	27.40	9,999.22
	757PW	Boeing757-200/PW2037	2.92	0.71	--	--	0.08	0.47	1.42	0.24	0.71	0.71	--	--	--	--	--	--	5.13	2.13	7.26	2,648.74
	757RR	Boeing757-200/RB211-535E4	0.66	0.15	--	--	0.08	0.10	0.29	0.05	0.15	0.15	--	--	--	--	--	--	1.18	0.44	1.61	589.00
	767300	Boeing767-300/PW4060	1.37	1.37	0.70	0.09	0.26	--	0.09	0.17	1.42	--	--	--	--	--	--	--	3.84	1.63	5.46	1,993.72
	767CF6	Boeing767-200/CF6-80A	0.77	0.77	0.58	0.07	0.22	--	0.07	0.15	0.45	--	--	--	--	--	--	--	2.09	0.99	3.08	1,124.67
	A300-622R	AirbusA300-622R/PW4158	0.35	0.53	--	0.88	--	--	--	--	--	--	--	--	--	--	--	--	0.35	1.41	1.76	642.72
	A330-301	AirbusA330-301/CF6-80E1A2	0.38	--	--	--	--	--	--	--	--	--	--	--	0.38	--	--	--	0.75	--	0.75	275.53
	A330-343	AirbusA330-343	1.13	--	--	--	--	--	--	--	--	--	--	--	1.13	--	--	--	2.26	--	2.26	826.61
	DC1030	DC10-30/CF6-50C2	1.92	1.28	0.48	0.48	0.32	--	0.16	--	0.80	--	0.16	0.16	0.64	--	--	--	4.48	1.92	6.40	2,337.63
Helicopter	A109	AgustaA-109	0.71	--	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	1.41	--	1.41	515.63
	S70	SikorskyS-70Blackhawk	0.07	--	0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14	--	0.14	51.73
Jet	727EM2	FEDX727-200/JT8D-15	0.16	--	--	--	--	--	0.16	--	--	--	--	--	--	--	--	--	0.32	--	0.32	116.86
	7373B2	Boeing737-300/CFM56-3B-2	24.63	2.40	13.21	1.20	10.21	1.80	--	0.60	--	--	--	--	--	--	--	--	48.04	6.01	54.05	19,728.28
	737400	Boeing737-400/CFM56-3C-1	7.78	0.76	4.17	0.38	3.23	0.57	--	0.19	--	--	--	--	--	--	--	--	15.18	1.90	17.08	6,233.35
	737500	Boeing737-500/CFM56-3C-1	2.65	0.26	1.42	0.13	1.10	0.19	--	0.06	--	--	--	--	--	--	--	--	5.16	0.65	5.81	2,120.60
	737700	Boeing737-700/CFM56-7B24	28.14	7.45	6.62	4.14	16.55	1.65	2.48	--	3.31	0.83	--	--	--	--	--	--	57.09	14.07	71.16	25,973.06
	737800	Boeing737-800/CFM56-7B26	8.25	2.34	0.22	0.14	1.40	0.05	0.08	--	6.09	2.59	--	--	--	--	--	--	16.05	5.12	21.17	7,725.55
	A319-131	AirbusA319-131/V2522-A5	5.99	4.93	0.85	--	3.42	1.71	--	--	2.46	2.46	--	--	--	--	--	--	12.72	9.10	21.83	7,966.23
	A320-211	AirbusA320-211/CFM56-5A1	2.18	1.74	--	--	1.31	0.44	--	--	1.31	0.87	--	--	--	--	--	--	4.80	3.05	7.85	2,864.32
	A320-232	AirbusA320-232/V2527-A5	2.09	1.68	--	--	1.26	0.42	--	--	1.26	0.84	--	--	--	--	--	--	4.61	2.93	7.54	2,751.98
	CIT3	CIT3/TFE731-3-100S	1.67	0.04	1.61	0.10	--	--	--	--	--	--	--	--	--	--	--	--	3.29	0.15	3.43	1,253.71
	CL600	CL600/ALF502L	0.96	0.02	0.93	0.05	--	--	--	--	--	--	--	--	--	--	--	--	1.89	0.07	1.96	715.77
	CL601	CL601/CF34-3A	1.55	0.02	1.52	0.04	--	--	--	--	--	--	--	--	--	--	--	--	3.07	0.06	3.13	1,143.69
	CNA55B	Cessna550CitationBravo	11.51	0.27	11.12	0.65	--	--	--	--	--	--	--	--	--	--	--	--	22.63	0.91	23.54	8,592.94
	CNA750	CitationX/RollsRoyceAllison	0.99	0.03	0.95	0.06	--	--	--	--	--	--	--	--	--	--	--	--	1.94	0.09	2.03	740.38
	DC870	DC8-70/CFM56-2C-5	0.54	0.18	0.43	--	--	--	--	--	0.29	--	--	--	--	--	--	--	1.26	0.18	1.44	525.85
	DC9Q9	DC9-30/JT8D-9QN	1.12	0.16	0.32	--	0.32	--	0.64	--	--	--	--	--	--	--	--	--	2.40	0.16	2.56	934.87
	EMB145	Embraer145ER/AllisonAE3007	2.58	--	--	--	2.58	--	--	--	--	--	--	--	--	--	--	--	5.17	--	5.17	1,886.10
	FAL20	FALCON20/CF700-2D-2	0.66	--	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	1.33	--	1.33	483.70
	GIIB	GulfstreamGIIB/GIII-	0.94	--	0.94	--	--	--	--	--	--	--	--	--	--	--	--	--	1.89	--	1.89	689.63
	GIV	GulfstreamGIV-SP/TAY611-8	1.46	0.03	1.42	0.06	--	--	--	--	--	--	--	--	--	--	--	--	2.88	0.09	2.97	1,085.20
	GV	GulfstreamGV/BR710	37.23	3.45	38.93	1.73	--	--	--	--	--	--	--	--	--	--	--	--	76.17	5.18	81.35	29,692.46
	IA1125	ASTRA1125/TFE731-3A	1.92	0.04	1.86	0.10	--	--	--	--	--	--	--	--	--	--	--	--	3.78	0.14	3.92	1,431.56
	LEAR25	LEAR25/CJ610-8	0.99	0.03	0.95	0.06	--	--	--	--	--	--	--	--	--	--	--	--	1.94	0.09	2.03	740.38
	LEAR35	LEAR36/TFE731-2	4.42	0.09	4.29	0.22	--	--	--	--	--	--	--	--	--	--	--	--	8.71	0.31	9.02	3,294.04
	MD83	MD-83/JT8D-219	5.13	0.85	--	--	--	--	3.42	0.85	1.71	--	--	--	--	--	--	--	10.26	1.71	11.97	4,368.32
	MD9028	MD-90/V2528-D5	0.86	--	--	--	0.85	--	--	--	--	--	--	--	--	--	--	--	1.71	--	1.71	624.05
	Long haul	A340-211	AirbusA340-211/CFM56-5C2	0.98	--	0.22	--	--	--	--	--	--	--	--	--	--	0.75	--	--	1.95	--	1.95

Table 2-1 (page 2 of 2)
AVERAGE DAILY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH-2008
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Group	INM type	Aircraft type	Arrivals		Departures														All operations total			Annual total (a)
			Day	Night	Stage 1 (0-500 nm)		Stage 2 (501 - 1000 nm)		Stage 3 (1001 - 1500 nm)		Stage 4 (1501 - 2500 nm)		Stage 5 (2501 - 3500 nm)		Stage 6 (3501 - 4500 nm)		Stage 7 (4501 - 5500 nm)		Day	Night	Total	
					Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night				
Military jet	C140	LOCKHEEDJETSTARTFE731	0.08	--	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	0.15	--	0.15	55.89
	C17	F117-PW-100NM	0.23	--	0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	0.46	--	0.46	167.67
	EA6B	J52-P-408NM	0.22	--	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	0.44	--	0.44	161.24
	F15E20	MCDONNELLDUGLASEAG	0.88	--	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	1.77	--	1.77	644.96
	F16PW9	GENERALDYNAMICSF	0.66	--	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	1.33	--	1.33	483.72
	F-18	MCDONNELLDUGLAS	0.88	--	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	1.77	--	1.77	644.96
Military prop	C-130E	LOCKHEEDHERCULES	0.31	--	0.31	--	--	--	--	--	--	--	--	--	--	--	--	--	0.61	--	0.61	223.55
	T34	BEECHMENTOR(BE45)	0.22	--	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	0.44	--	0.44	161.24
Prop	BEC58P	BARON58P/TS10-520-L	1.95	1.13	2.22	0.86	--	--	--	--	--	--	--	--	--	--	--	--	4.17	2.00	6.17	2,251.45
	GASEPV	19851-ENGVPPROP	18.06	1.23	17.75	1.56	--	--	--	--	--	--	--	--	--	--	--	--	35.81	2.79	38.60	14,088.99
Small	CNA172	Cessna172R/LycomingI	0.74	0.06	0.74	0.06	--	--	--	--	--	--	--	--	--	--	--	--	1.48	0.12	1.59	581.88
	CNA206	Cessna206H/LycomingI	1.17	0.13	1.17	0.13	--	--	--	--	--	--	--	--	--	--	--	--	2.33	0.26	2.59	946.42
	PA31	PIPERNAVAJOCHIEFTAIN	7.21	2.30	7.20	2.31	--	--	--	--	--	--	--	--	--	--	--	--	14.41	4.61	19.02	6,942.07
Turboprop	1900D	Beech1900D/PT6A67	0.64	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--	--	1.28	--	1.28	467.58
	CNA441	CONQUESTII/TPE331-8	4.53	0.34	4.79	0.08	--	--	--	--	--	--	--	--	--	--	--	--	9.32	0.42	9.74	3,554.87
	DHC6	DASH6/PT6A-27	11.27	2.09	10.63	2.73	--	--	--	--	--	--	--	--	--	--	--	--	21.90	4.82	26.72	9,753.73
	DHC8	DASH8-100/PW121	27.35	1.72	28.21	0.86	--	--	--	--	--	--	--	--	--	--	--	--	55.56	2.58	58.14	21,220.97
	DHC830	DASH8-300/PW123	23.74	1.80	22.20	3.34	--	--	--	--	--	--	--	--	--	--	--	--	45.95	5.14	51.08	18,645.99
	EMB120	Embraer120ER	18.96	0.86	18.95	0.86	--	--	--	--	--	--	--	--	--	--	--	--	37.91	1.72	39.63	14,464.54
	L188	L188C/ALL501-D13	0.44	--	0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	0.88	--	0.88	322.56
Total			298.34	46.79	216.22	23.37	44.03	9.12	9.67	3.17	24.23	11.01	0.16	0.16	2.15	--	0.75	1.00	595.55	94.62	690.18	251,914.53

(a) Representing 366 days in 2008.

Source: Jacobs Consultancy, based on the analysis of archived aircraft operational counts supplied by the Port of Portland, data from the Airport Noise and Operations Management System, and discussions with FAA Airport Traffic Control Tower staff, August 2009.

Table 2-2
AVERAGE DAILY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH-2017
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Group	INM type	Aircraft type	Arrivals		Departures														All operations total			Annual total (a)
			Day	Night	Stage 1 (0 - 500 nm)		Stage 2 (501 - 1000 nm)		Stage 3 (1001 - 1500 nm)		Stage 4 (1501 - 2500 nm)		Stage 5 (2501 - 3500 nm)		Stage 6 (3501 - 4500 nm)		Stage 7 (4501 - 5500 nm)		Day	Night	Total	
					Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night				
Heavy jet	747400	Boeing 747-400/PW4056	--	1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	0.66	--	1.66	1.66	604.95
	757300	Boeing 757-300/RB211-535E4B	6.24	1.82	2.59	--	--	--	0.91	0.91	1.82	1.82	--	--	--	--	--	--	11.57	4.55	16.12	5,883.30
	757PW	Boeing 757-200/PW2037	4.26	0.68	--	--	--	--	2.05	0.68	1.53	0.68	--	--	--	--	--	--	7.83	2.05	9.88	3,607.30
	757RR	Boeing 757-200/RB211-535E4	1.98	0.23	--	--	--	--	0.68	0.23	1.07	0.23	--	--	--	--	--	--	3.74	0.68	4.42	1,612.55
	767300	Boeing 767-300/PW4060	0.71	0.71	--	--	--	--	--	--	1.42	--	--	--	--	--	--	--	2.13	0.71	2.84	1,037.25
	767CF6	Boeing 767-200/CF6-80A	2.17	2.17	--	1.31	--	--	--	2.62	0.40	--	--	--	--	--	--	--	2.57	6.10	8.66	3,162.56
	777200	Boeing 777-200ER/GE90-90B	1.36	0.07	0.14	--	0.14	--	0.14	--	0.07	--	0.07	--	0.87	--	--	--	2.79	0.07	2.86	1,043.63
	A300-622R	Airbus A300-622R/PW4158	0.67	1.01	--	1.68	--	--	--	--	--	--	--	--	--	--	--	--	0.67	2.70	3.37	1,229.98
	A330-301	Airbus A330-301/CF6-80 E1A2	1.74	--	--	--	--	--	--	--	--	--	--	--	1.74	--	--	--	3.47	--	3.47	1,267.07
	A340-211	Airbus A340-211/CFM 56-5C2	1.23	--	0.36	--	--	--	--	--	--	--	--	--	--	--	0.87	--	2.46	--	2.46	896.62
	DC1030	DC10-30/CF6-50C2	3.93	0.56	1.12	--	1.12	--	1.12	--	0.56	--	0.56	--	--	--	--	--	8.43	0.56	8.99	3,280.91
	MD11GE	MD-11/CF6-80C2D1F	0.28	0.28	--	0.19	--	--	--	0.37	--	--	--	--	--	--	--	--	0.28	0.84	1.12	410.00
	Helicopter	A109	Agusta A-109	0.78	--	0.78	--	--	--	--	--	--	--	--	--	--	--	--	--	1.56	--	1.56
S70		Sikorsky S-70 Blackhawk (UH-60A)	0.11	--	0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	0.21	--	0.21	76.72
Jet	7373B2	Boeing 737-300/CFM56-3B-2	10.93	--	8.35	--	1.29	0.64	--	0.64	--	--	--	--	--	--	--	--	20.57	1.29	21.86	7,977.36
	737400	Boeing 737-400/CFM56-3C-1	4.55	--	3.48	--	0.54	0.27	--	0.27	--	--	--	--	--	--	--	--	8.57	0.54	9.11	3,323.90
	737700	Boeing 737-700/CFM56-7B24	48.27	11.84	17.30	6.37	25.49	2.73	2.73	--	3.64	1.82	--	--	--	--	--	--	97.44	22.77	120.21	43,874.87
	737800	Boeing 737-800/CFM56-7B26	29.91	7.35	2.73	--	9.10	1.82	4.55	0.91	12.75	5.38	--	--	--	--	--	--	59.04	15.46	74.50	27,192.87
	A319-131	Airbus A319-131/V2522-A5	6.38	3.64	0.91	--	3.64	1.82	--	--	1.82	1.82	--	--	--	--	--	--	12.75	7.29	20.03	7,312.50
	A320-211	Airbus A320-211/CFM56-5A1	10.99	2.41	0.48	--	4.83	1.45	--	--	5.68	0.97	--	--	--	--	--	--	21.98	4.83	26.81	9,785.41
	A320-232	Airbus A320-232/V2527-A5	8.13	2.14	0.43	--	4.28	1.28	--	--	3.42	0.86	--	--	--	--	--	--	16.26	4.28	20.54	7,498.60
	CIT3	CIT 3/TFE731-3-100S	1.66	0.04	1.60	0.10	--	--	--	--	--	--	--	--	--	--	--	--	3.26	0.14	3.40	1,240.42
	CL600	CL600/ALF502L	1.11	0.02	1.07	0.06	--	--	--	--	--	--	--	--	--	--	--	--	2.18	0.08	2.26	825.36
	CL601	CL601/CF34-3A	1.67	0.02	1.65	0.04	--	--	--	--	--	--	--	--	--	--	--	--	3.32	0.05	3.38	1,232.74
	CNA55B	Cessna 550 Citation Bravo/PW530A	12.12	0.27	11.73	0.66	--	--	--	--	--	--	--	--	--	--	--	--	23.85	0.93	24.78	9,044.59
	CNA750	Citation X/Rolls Royce Allison	0.96	0.02	0.92	0.06	--	--	--	--	--	--	--	--	--	--	--	--	1.88	0.08	1.96	716.90
	FAL20	FALCON 20/CF700-2D-2	1.08	--	1.08	--	--	--	--	--	--	--	--	--	--	--	--	--	2.16	--	2.16	789.06
	GIIB	Gulfstream GIIB/GIII - SPEY 511-8	1.16	--	1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	2.32	--	2.32	845.99
	GIV	Gulfstream GIV-SP/TAY 611-8	1.54	0.02	1.50	0.06	--	--	--	--	--	--	--	--	--	--	--	--	3.04	0.08	3.12	1,139.91
	GV	Gulfstream GV/BR 710	18.32	0.98	17.48	1.81	--	--	--	--	--	--	--	--	--	--	--	--	35.80	2.79	38.59	14,086.88
	IA1125	ASTRA 1125/TFE731-3A	2.22	0.05	2.15	0.11	--	--	--	--	--	--	--	--	--	--	--	--	4.36	0.16	4.52	1,650.75
	LEAR25	LEAR 25/CJ610-8	0.96	0.02	0.92	0.06	--	--	--	--	--	--	--	--	--	--	--	--	1.88	0.08	1.96	716.90
	LEAR35	LEAR 36/TFE731-2	5.04	0.10	4.90	0.24	--	--	--	--	--	--	--	--	--	--	--	--	9.93	0.33	10.27	3,747.33
	MD9028	MD-90/V2528-D5	0.91	--	--	--	0.91	--	--	--	--	--	--	--	--	--	--	--	1.82	--	1.82	664.77

Table 2-2 (page 2 of 2)
AVERAGE DAILY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH-2017
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Group	INM type	Aircraft type	Arrivals		Departures														All operations total			Annual total (a)
			Day	Night	Stage 1 (0 - 500 nm)		Stage 2 (501 - 1000 nm)		Stage 3 (1001 - 1500 nm)		Stage 4 (1501 - 2500 nm)		Stage 5 (2501 - 3500 nm)		Stage 6 (3501 - 4500 nm)		Stage 7 (4501 - 5500 nm)		Day	Night	Total	
					Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night				
Military jet	C140	LOCKHEED JETSTAR TFE731-3 NM	0.11	--	0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	0.23	--	0.23	82.88
	C17	F117-PW-100 NM	0.34	--	0.34	--	--	--	--	--	--	--	--	--	--	--	--	--	0.68	--	0.68	248.64
	EA6B	J52-P-408 NM	0.36	--	0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	0.72	--	0.72	263.02
	F15E20	MCDONNELL DOUGLAS EAGLE F100-PW-220 NM	1.44	--	1.44	--	--	--	--	--	--	--	--	--	--	--	--	--	2.88	--	2.88	1,052.13
	F16PW9	GENERAL DYNAMICS F FALCON F100-PW-229 NM	1.08	--	1.08	--	--	--	--	--	--	--	--	--	--	--	--	--	2.16	--	2.16	789.10
	F-18	MCDONNELL DOUGLAS HORNET F404-GE-400 NM	1.44	--	1.44	--	--	--	--	--	--	--	--	--	--	--	--	--	2.88	--	2.88	1,052.13
	Military prop	C-130E	LOCKHEED HERCULES T56-A15 C130E NM	0.45	--	0.45	--	--	--	--	--	--	--	--	--	--	--	--	0.91	--	0.91	331.53
	T34	BEECH MENTOR (BE45) PT6A-25 NM	0.36	--	0.36	--	--	--	--	--	--	--	--	--	--	--	--	0.72	--	0.72	263.02	
Prop	BEC58P	BARON 58P/TS10-520-L	2.46	1.45	2.78	1.14	--	--	--	--	--	--	--	--	--	--	--	5.24	2.59	7.84	2,859.78	
	GASEPV	1985 1-ENG VP PROP	15.67	5.89	17.89	3.68	--	--	--	--	--	--	--	--	--	--	--	33.56	9.56	43.13	15,741.25	
Small	CNA172	Cessna 172R/Lycoming IO-360-L2A	0.86	0.06	0.86	0.06	--	--	--	--	--	--	--	--	--	--	--	1.71	0.11	1.82	665.93	
	CNA206	Cessna 206H/Lycoming IO-540-AC	1.12	0.12	1.12	0.12	--	--	--	--	--	--	--	--	--	--	--	2.24	0.25	2.48	906.50	
	PA31	PIPER NAVAJO CHIEFTAIN PA-31-350/TIO-5	10.04	3.21	10.03	3.22	--	--	--	--	--	--	--	--	--	--	--	20.07	6.43	26.50	9,670.80	
Turboprop	1900D	Beech 1900D/PT6A67	0.79	0.34	0.19	0.15	0.79	--	--	--	--	--	--	--	--	--	--	1.76	0.49	2.25	820.19	
	CNA441	CONQUEST II/TPE331-8	4.92	0.31	5.13	0.09	--	--	--	--	--	--	--	--	--	--	--	10.05	0.39	10.44	3,810.57	
	DHC6	DASH 6/PT6A-27	12.90	2.85	12.56	3.18	--	--	--	--	--	--	--	--	--	--	--	25.46	6.03	31.49	11,495.56	
	DHC8	DASH 8-100/PW121	1.12	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	2.25	--	2.25	820.26	
	DHC830	DASH 8-300/PW123	75.60	5.86	77.54	3.91	--	--	--	--	--	--	--	--	--	--	--	153.14	9.77	162.90	59,460.16	
	EMB120	Embraer 120 ER/ Pratt & Whitney PW118	<u>16.61</u>	<u>0.98</u>	<u>16.61</u>	<u>0.98</u>	--	--	--	--	--	--	--	--	--	--	--	<u>33.22</u>	<u>1.95</u>	<u>35.17</u>	<u>12,838.40</u>	
Total			341.04	58.52	236.38	29.26	52.13	10.02	12.19	6.64	34.19	13.57	0.63	--	2.60	--	0.87	0.66	680.02	118.67	798.69	291,522.85

(a) Representing 365 days in 2017.

Source: Jacobs Consultancy, based on the Airport's aviation demand forecasts approved by the FAA in 2008, data from the Airport Noise and Operations Management System, and discussions with FAA Airport Traffic Control Tower staff, August 2009..

Detailed summaries of the various INM inputs are provided below:

Airfield Description. Noise modeling inputs for 2008 assume use of all runways at the Airport in their existing layout. Runway 10L-28R and Runway 10R-28L are 8,000 and 11,000 feet long, respectively. Runway 3-21 is 7,001 feet long. The landing threshold of Runway 21 is displaced by 680 feet. All runways are 150 feet wide. Noise modeling inputs for 2017 assume use of Runway 10R-28L in its existing layout. Runway 10L-28R was assumed to include a 1,290-foot extension to the west combined with a 537-foot extension to the east. The arrival threshold for Runways 10L and 28R are displaced 1,340 feet and 585 feet, respectively. Additionally, Runway 3-21 was shortened to 6,001 feet, and the displaced arrival threshold for Runway 21 was removed.

Aircraft Operations and Fleet Mix. Aircraft operations and fleet mix data for 2008 were based on a review of Airport historical records. Average annual day operations are projected to increase from 690 operations in 2008 to approximately 800 operations in 2017. Annual average day operations and fleet mix for 2017 were derived from the FAA-approved forecasts prepared for the 2010 Master Plan Update.

Time-of-Day of Aircraft Activity. Day-night split patterns for 2008 were based on arrival and departure information contained in Airport historical records. Future commercial service day-night split patterns were developed using future flight schedules from the approved Master Plan forecasts. The 2008 day-night split patterns for all aircraft groups was assumed to remain constant through 2017.

Flight Profiles. Aircraft noise characteristics vary depending on the takeoff profiles (or climb rates) of aircraft. Takeoff weight directly affects the departure profiles. Due to the difficulty of obtaining data on aircraft takeoff weight, stage length is often used as a surrogate. Stage length refers to the average distance an aircraft travels nonstop. Departure operations in the INM are divided into nine stage lengths that correspond to approximate nonstop flight distances. Each stage length associates the aircraft operation with a takeoff weight that represents a typical passenger load factor and fuel requirement. The longer the stage length, the shallower the climb profile because of the heavier fuel load carried on the aircraft. Stage lengths for aircraft in 2008 and 2017 were derived from origin-destination information, and verified using profile data from the Port's ANOMS system. All general aviation and military aircraft were assumed to operate to short-haul destinations (less than 500 nautical miles).

Annual Runway Use. Generalized annual runway use for 2008 was developed using radar data from the Port's ANOMS system for the weeks of January 1-7 and August 1-7, 2008, and are representative of aircraft operations in east and west flow. Runway use percentages from 2008 were slightly modified to represent a more even distribution of use between the two parallel runways in 2017. Generalized runway use percentages are presented in Table 2-3 and 2-4.

Table 2-3
RUNWAY USE SUMMARY-2008
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Aircraft group	Arrivals												Total
	Day						Night						
	03	10L	10R	21	28L	28R	03	10L	10R	21	28L	28R	
Heavy	0.0%	10.4%	5.8%	0.0%	4.5%	9.7%	0.0%	28.9%	12.6%	0.0%	18.9%	17.4%	8.4%
Helicopter	4.6	0.2	0.1	4.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Jet	0.0	47.7	57.2	0.0	56.9	48.3	0.0	39.0	65.9	0.0	60.2	55.9	53.1
Long haul	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Military jet	0.0	0.0	1.5	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Military prop	0.0	0.6	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Prop	56.7	4.9	4.7	0.0	1.6	12.6	0.0	13.9	0.8	0.0	0.0	7.9	6.5
Small	22.2	3.2	1.9	36.3	1.9	3.9	0.0	8.2	3.9	0.0	0.0	8.4	3.4
Turboprop	<u>16.5</u>	<u>33.0</u>	<u>28.2</u>	<u>59.4</u>	<u>32.5</u>	<u>25.0</u>	<u>0.0</u>	<u>10.0</u>	<u>16.8</u>	<u>100.0</u>	<u>20.9</u>	<u>10.4</u>	<u>27.2</u>
Total (a)	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%

Aircraft group	Departures												Total
	Day						Night						
	03	10L	10R	21	28L	28R	03	10L	10R	21	28L	28R	
Heavy jet	0.0%	4.5%	11.6%	0.0%	6.8%	6.3%	0.0%	17.8%	27.5%	0.0%	21.6%	20.2%	8.4%
Helicopter	0.0	0.2	0.2	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Jet	0.0	67.5	15.1	0.0	55.1	53.0	0.0	67.5	15.1	0.0	55.1	51.8	53.1
Long haul	0.0	0.0	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Military jet	0.0	0.0	3.7	0.0	1.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Military prop	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Prop	0.0	2.4	18.3	33.9	1.7	11.0	0.0	3.5	9.0	0.0	0.0	8.0	6.5
Small	100.0	0.4	10.0	15.2	2.5	3.2	0.0	1.0	16.0	0.0	0.0	8.2	3.4
Turboprop	<u>0.0</u>	<u>24.8</u>	<u>39.8</u>	<u>50.8</u>	<u>31.4</u>	<u>25.3</u>	<u>0.0</u>	<u>10.2</u>	<u>32.4</u>	<u>100.0</u>	<u>23.4</u>	<u>11.8</u>	<u>27.2</u>
Total (a)	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%

(a) Numbers may not add due to rounding.

Source: Jacobs Consultancy, based on the analysis of data from the Port's Airport Noise and Operations Management System and discussion with FAA Airport Control Tower staff, August 2009.

Flight Tracks. Generalized arrival and departure flight tracks and flight track usage for 2008 and 2017 are provided in Appendix C. Generalized flight tracks for 2008 were developed based on ANOMS radar data for the weeks of January 1-7 and August 1-7 of 2008, and are representative of aircraft operations in east and west flow. Generalized flight tracks for 2017 were assumed to be representative of those identified for 2008.

Airport Elevation, Average Temperature, and Relative Humidity. The INM uses airport elevation, average annual temperature and average annual relative humidity in its computation of aircraft noise propagation. According to the FAA's *Airport/Facility Directory*, the Airport is situated at 30 feet above sea level. An average annual temperature of 54°F and average relative humidity of 70% were used as input to the INM.

Table 2-4
RUNWAY USE SUMMARY-2017
FAR Part 150 Noise Exposure Map Update
Portland International Airport

Aircraft group	Arrivals												Total	
	Day						Night							
	03	10L	10R	21	28L	28R	03	10L	10R	21	28L	28R		
Heavy jet	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Helicopter	4.9	0.2	0.1	3.8	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Jet	0.0	44.2	53.9	0.0	52.9	45.9	0.0	29.9	60.7	0.0	56.1	46.5	49.3	
Military jet	0.0	0.0	2.1	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
Military prop	0.0	0.8	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
Prop	47.9	3.8	3.7	0.0	1.2	10.1	0.0	30.5	2.2	0.0	0.0	19.0	6.4	
Small	27.3	3.6	2.2	37.0	2.2	4.5	0.0	7.9	4.6	0.0	0.0	8.8	3.9	
Turboprop	<u>19.9</u>	<u>36.7</u>	<u>31.8</u>	<u>59.2</u>	<u>36.2</u>	<u>28.5</u>	<u>0.0</u>	<u>10.7</u>	<u>21.6</u>	<u>100.0</u>	<u>27.3</u>	<u>12.1</u>	<u>30.6</u>	
Total (a)	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	
Aircraft group	Departures												Total	
	Day						Night							
	03	10L	10R	21	28L	28R	03	10L	10R	21	28L	28R		
Heavy jet	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Helicopter	0.0	0.2	0.2	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
Jet	0.0	62.8	13.1	0.0	50.1	48.9	0.0	68.5	15.4	0.0	58.7	51.3	49.3	
Military jet	0.0	0.0	4.9	0.0	2.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
Military prop	0.0	0.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
Prop	0.0	2.2	15.8	28.6	1.5	10.1	0.0	5.6	14.3	0.0	0.0	12.3	6.4	
Small	100.0	0.5	11.0	16.4	2.8	3.8	0.0	1.0	17.5	0.0	0.0	8.7	3.9	
Turboprop	<u>0.0</u>	<u>29.5</u>	<u>44.1</u>	<u>55.0</u>	<u>36.3</u>	<u>29.7</u>	<u>0.0</u>	<u>8.5</u>	<u>27.4</u>	<u>100.0</u>	<u>20.5</u>	<u>9.7</u>	<u>30.6</u>	
Total (a)	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	

(a) Numbers may not add due to rounding.

Source Jacobs Consultancy, based on the analysis of data from the Port's Airport Noise and Operations Management System and discussion with FAA Airport Control Tower staff, August 2009.

2.3 NOISE EXPOSURE MAPS

Existing 2008 and future 2017 contours exposure contours are presented on Figures 2-1 and 2-2, respectively. Both figures depict noise contours for the DNL 65, 70, and 75, and are presented over a base map showing existing generalized noncompatible land uses and noise-sensitive facilities. The DNL 65 contour represents the level of significant noise exposure as identified by the FAA.

2.3.1 2008 Noise Exposure

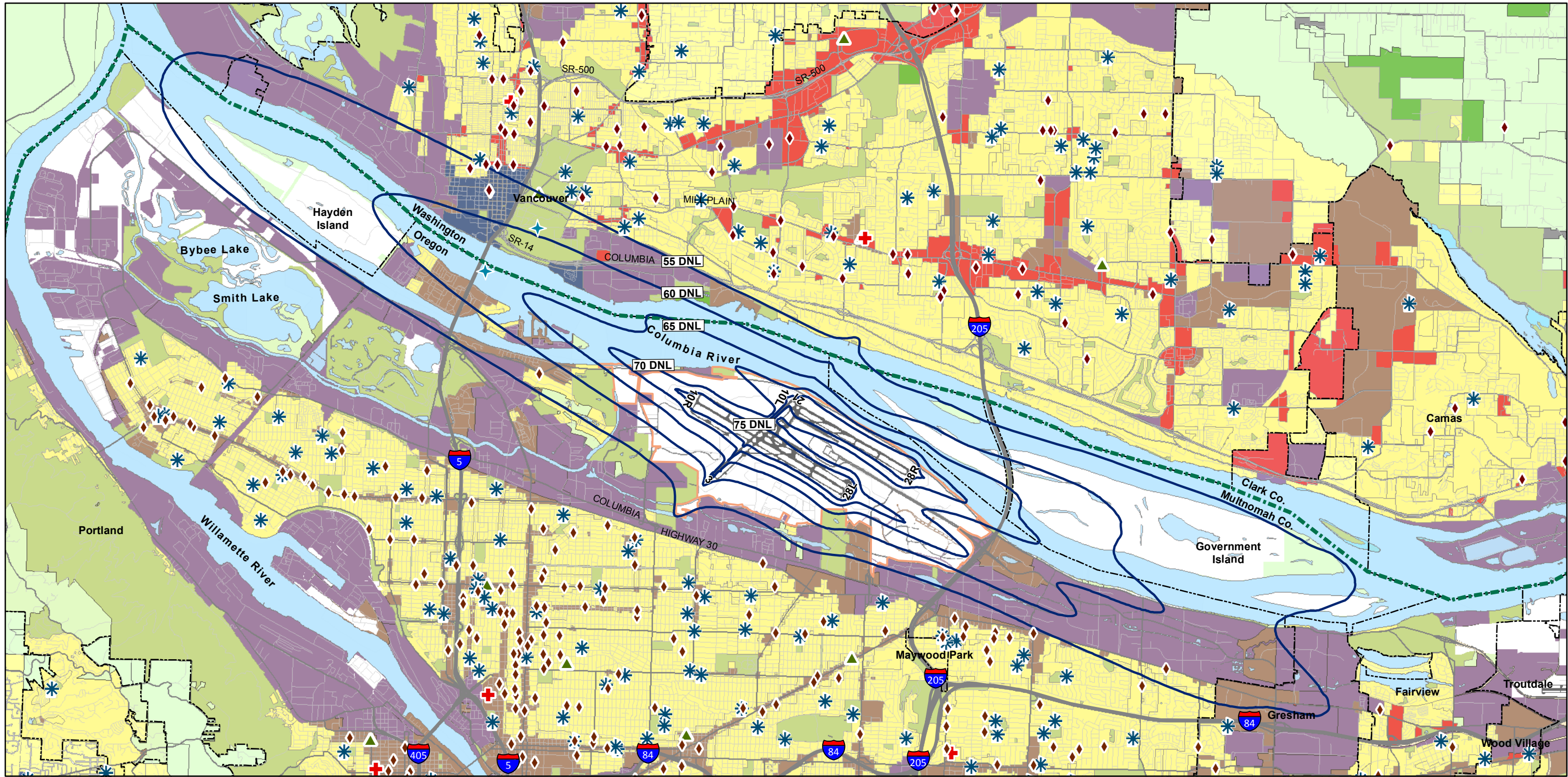
Noise exposure contours for 2008 are presented on Figure 2-1. In general, the contours are consistent with the existing runway use patterns. The wider shape of the contours to the east of the Airport reflects the immediate left turn of jet departures on Runway 10L—the primary departure runway in east flow. In contrast, the noise contours are more concentrated along the extended centerlines of the runway to the west of the Airport, reflecting the higher proportion of arrivals on Runway 10R. In west flow, the Runways 28L and 28R are used nearly equally for arrivals and departures. In 2008, the Airport's mode of operation slightly favored east flow.

On the west side of the Airport the DNL 65 contour associated with Runway 10L-28R extends to the Multnomah County border to the northwest of the Airport; the DNL 65 contour associated with South Runway 10R-28L extends over compatible land uses on the eastern most part of Tomahawk Island. On the east side of the Airport, the DNL 65 contour associated with Runway 10L-28R extends over the Columbia river, just east of I-205, and over Port-owned property on Lemon Island; the DNL 65 contour associated with Runway 10R-28L generally does not extend beyond Airport property, with the exception of a small portion of compatible land to the south of Runway End 28L. The noise contours reflecting operations on Runway 3-21 are minimal.

2.3.2 2017 Noise Exposure

Noise exposure contours for 2017 are presented on Figure 2-2. The contours are generally consistent with the 2008 noise exposure patterns, with the primary exception being the DNL 65 contour on the east side of the Airport, which extends over compatible land uses east of the end of Runway 28L, past I-205. The contours bulge on the northeast side of the Airport, reflecting the assumed continuation jet departures in east flow immediately turning left over the Columbia River. The noise contours west of the Airport remain concentrated along the extended centerline of Runway 10R, reflecting the higher proportion of arrivals on that runway.

On the west side of the Airport the DNL 65 contour associated with Runway 10L-28R is almost identical to the 2008 contours, and extends to the Multnomah County border to the northwest of the Airport; extends over compatible land uses on the eastern most part of Tomahawk Island and a small portion of noncompatible residential land immediately adjacent to Airport property on the west side of the Airport. On the east side of the Airport, the DNL 65 contour associated with Runway 10L-28R extends over the Columbia river, just east of I-205, and over Port-owned property on Lemon Island; the DNL 65 associated with Runway 10R-28L generally does not extend beyond Airport property, with the exception of a small portion of compatible land to the south of the end of Runway 28L and a small portion of compatible land east of Airport property. As with the 2008 NEM, the noise contours reflecting operations on Runway 3-21 are minimal.



- LEGEND**
- Airport property boundary
 - - - County boundary
 - - - - City boundary
 - DNL Noise contour
 - Rural / agricultural
 - Port owned property
 - Water

- Existing Generalized Land Use**
- Commercial
 - Industrial
 - Mixed use
 - Public
 - Residential
 - Parks / open space
 - Natural resources

- Existing Noise Sensitive Facilities**
- + Medical facility / nursing facility
 - * School / university facility
 - ▲ Library
 - ◆ Religious facility
 - + National historic site

ESTIMATED NOISE EXPOSURE - 2008 (690 daily operations)

	65-70 DNL	70-75 DNL	75+ DNL
Acres	2,317	786	598
Residential units	0	0	0
Population	0	0	0
Existing facilities (parks)	7	1	1

Sources: Noise exposure contours - Jacobs Consultancy, November 2009.
 Existing land uses, residential counts, and noise sensitive facilities - Clark and Multnomah counties, November 2009.
 Basemap - Port of Portland, June 2009.

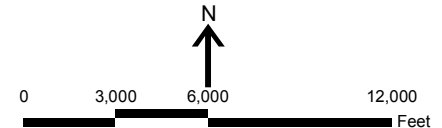
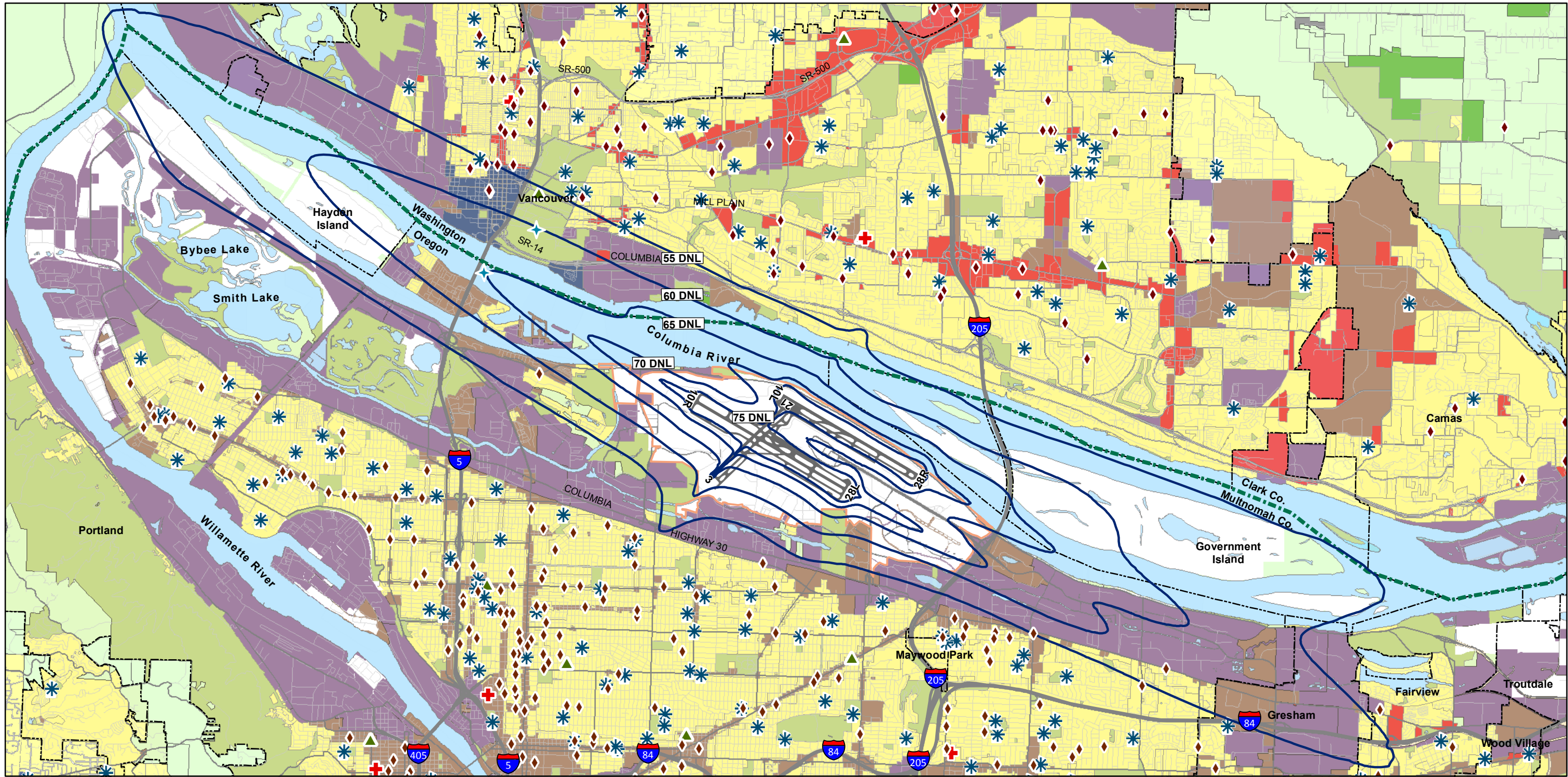


Figure 2-1
NOISE EXPOSURE - 2008
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010



- LEGEND**
- Airport property boundary
 - - - County boundary
 - - - - City boundary
 - DNL Noise contour
 - Rural / agricultural
 - Port owned property
 - Water

- Existing Generalized Land Use**
- Commercial
 - Industrial
 - Mixed use
 - Public
 - Residential
 - Parks / open space
 - Natural resources

- Existing Noise Sensitive Facilities**
- + Medical facility / nursing facility
 - * School / university facility
 - ▲ Library
 - ◆ Religious facility
 - + National historic site

**ESTIMATED NOISE EXPOSURE - 2017
(799 daily operations)**

	65-70 DNL	70-75 DNL	75+ DNL
Acres	2,560	1,018	740
Residential units	6	0	0
Population	24	0	0
Existing facilities (parks)	8	1	1

Sources: Noise exposure contours - Jacobs Consultancy, November 2009.
 Existing land uses, residential counts, and noise sensitive facilities - Clark and Multnomah counties, November 2009.
 Basemap - Port of Portland, June 2009.

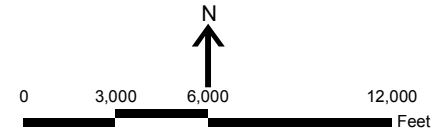


Figure 2-2
NOISE EXPOSURE - 2017
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010

Chapter 3

SUMMARY AND FINDINGS

This chapter presents noise exposure estimates which were assessed using the land use compatibility guidelines in FAR Part 150. Additionally, this chapter provides a narrative describing the evaluation of Recommendations #9 and #11 from the existing NCP.

Federal guidelines for evaluating the compatibility of various land uses exposed to aircraft noise were incorporated into FAR Part 150. Presented in Table 3-1, the list includes types of land uses and identifies their compatibility or incompatibility with varying Day-Night Levels (DNL). Based on FAA's guidelines, noise-sensitive land uses (e.g., residential dwellings, churches, schools, and nursing homes, etc.) are considered compatible with aircraft noise at levels below DNL 65. Hospitals and nursing homes, churches, auditoriums and concert halls, are noise-sensitive uses considered compatible with noise up to DNL 75 provided that measures are taken to ensure outdoor-to-indoor noise level reductions of 25-30 dB. Hence, remedial noise mitigation measures at airports in the United States have generally been restricted to areas exposed to noise of DNL 65 or greater. Although mitigation for areas outside the DNL 65 contour can be proposed in a Part 150 program, they must be based on locally adopted noise compatibility standards that define non-compatibility below the FAR Part 150 standard which must be agreed upon in advance of the study.

3.1 ESTIMATED NOISE EXPOSURE

Estimated noise exposure for the existing 2008 and future 2017 noise contours are presented on Table 3-2, and described in the following paragraphs:

2008 Noise Exposure. Based on residential data provided by Multnomah County, as well as visual confirmation, there are no noncompatible land uses exposed to noise levels of DNL 65 or greater.

2017 Noise Exposure. A total of 6 housing units are estimated to be within the DNL 65 to 70 contours in 2017. A total of five (5) acres of noncompatible land is located within the DNL 65 contour.

Table 3-1
FAR PART 150 LAND USE COMPATIBILITY GUIDELINES

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.

Land Use	Yearly Day-Night Average Sound Level DNL					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N (a)	N (a)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N (a)	N (a)	N (a)	N	N
Public use						
Schools	Y	N (a)	N (a)	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 (b)	Y (c)	Y (d)	Y (d)
Parking	Y	Y	Y (b)	Y (c)	Y (d)	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 (b)	Y (c)	Y (d)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y (b)	Y (c)	Y (d)	N
Communication	Y	Y	25	30	N	N
Manufacturing and production						
Manufacturing, general	Y	Y	Y (b)	Y (c)	Y (d)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y (e)	Y (f)	Y (g)	Y (g)	Y (g)
Livestock farming and breeding	Y	Y (e)	Y (f)	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 (h)	Y (h)	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

Table 3-1 (page 2 of 2)

FAR PART 150 LAND USE COMPATIBILITY GUIDELINES

DNL = Day-night average sound level, in A-weighted decibels.
 Y (Yes) = Land use and related structures compatible without restrictions.
 N (No) = Land use and related structures are not compatible and should be prohibited.
 25, 30, 35 = Land use and related structures generally compatible; measures to achieve a Noise Level Reduction (NLR) of 25, 30, or 35 dB must be incorporated into design and construction of structure.

- (a) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 dB and 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.
- (b) 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.
- (c) 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.
- (d) 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.
- (e) Residential buildings require a NLR of 25 dB.
- (f) Residential buildings require a NLR of 30 dB.
- (g) Residential buildings not permitted.
- (h) Land use compatible provided special sound reinforcement systems are installed.

Source: 14 Code of Federal Regulations Part 150, *Airport Noise Compatibility Planning*, Appendix A, Table 1.

3.2 EVALUATION OF EXISTING NOISE COMPATIBILITY PROGRAM

As identified in Chapter 1, one objective of this Study is to reevaluate Recommendations #9 and #11 from the Airport’s existing NCP to determine if the provisions of those recommendations are still valid. Summaries of the recommendations are provided below:

Recommendation #9 – “Provide sound proofing for owner occupied single family residences and develop a pilot program for multifamily residential structures at or above the 65 DNL contour, using the 2005 Noise Exposure Map. Sound proofing measures may include items such as new windows, solid core doors, and heating and cooling systems to allow windows to be kept closed. In exchange for receiving sound insulation, a homeowner would grant a noise easement to the Port that would be attached to the property and ‘run with the land’.”

Recommendation #11 – “Purchase noise easements from homeowners within the 65 DNL noise contour or above, using the 2005 Noise Exposure Map. This recommendation would apply to homeowners who do not wish to have sound proofing. Experience at other airports has shown that up to 10% of the eligible population may decline sound proofing. This

recommendation provides another voluntary option for homeowners to receive some compensation in return for providing the Port of Portland a noise easement.”

Both recommendations include provisions for providing noise mitigation to residences exposed to DNL 65 or greater. Based on data provided in the existing NCP (attached as Appendix A), 40 single family housing units and 777 multi-family housing units were identified as potentially eligible for noise mitigation in the 2005 NEM.

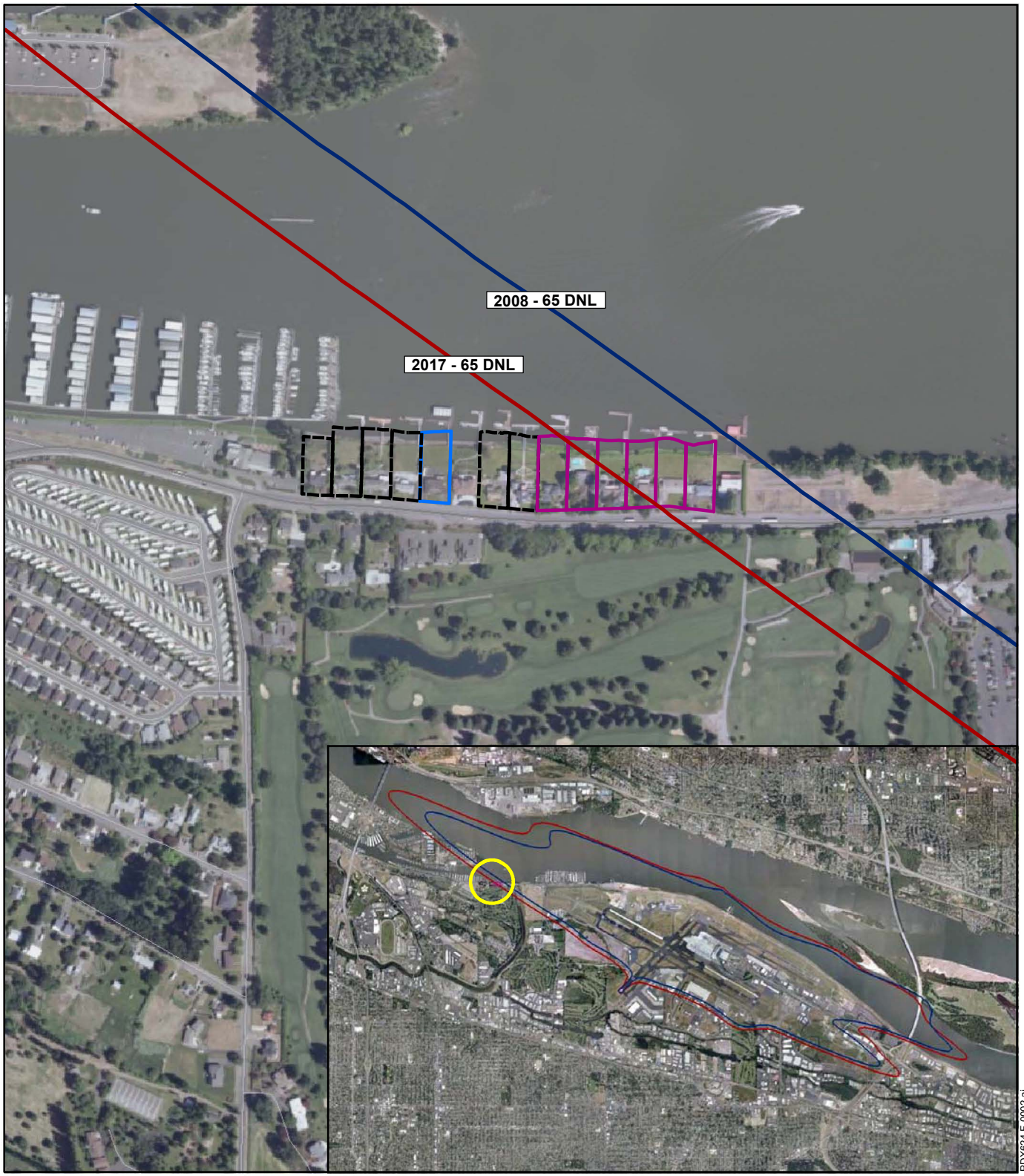
As presented in Table 3-2, no eligible residences are exposed to noise levels of greater than or equal to DNL 65 in 2008. Additionally, only six (6) residences that may be eligible for sound insulation are exposed to noise levels of greater than or equal to DNL 65 in 2017. The locations of these residences are depicted on Figure 3-1.

3.3 RECOMMENDATIONS

The following actions are recommended in this FAR Part 150 NEM Update:

1. Reduce the number of residences eligible for noise mitigation to six (6) single family units.
2. As six (6) residences that may be eligible for sound insulation are exposed to noise levels at or above DNL 65 in the future 2017 NEM, Recommendations #9 and #11 are still valid and should be carried forward as part of the current NCP. However, the language of the recommendations will be revised to reference the “2017 Noise Exposure Map” instead of the “2005 Noise Exposure Map.”
3. Revise the costs, funding, and implementation of Recommendations #9 and #11 as described in Section 3.4.
4. Append this document to the existing NCP following FAA acceptance of the revised NEMs for existing 2008 and future 2017 conditions.

As previously identified, only Recommendations #9 and #11 of the existing NCP would be impacted by this FAR Part 150 NEM Update. Therefore, Recommendations #9 and #11 were the only recommendations from the existing NCP reviewed during this Study. The remaining recommendations from the existing NCP will not be modified, and are carried forward as part of the existing NCP.



PDX624 F-0002.ai

LEGEND

- **DNL** — Noise exposure contour
- Easement owned
- Eligible properties
- Adjacent properties

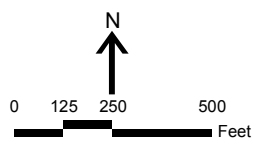


Figure 3-1
RESIDENTIAL UNITS ELIGIBLE FOR SOUND INSULATION
 FAR Part 150 Noise Exposure Map Update
 Portland International Airport
 July 2010

Sources: Noise exposure contours - Jacobs Consultancy, November 2009
 Property boundaries - Port of Portland, December 2009
 Aerial photograph - Port of Portland, June 2009



Table 3-2
ESTIMATED NOISE EXPOSURE
FAR Part 150 Noise Exposure Map Update
Portland International Airport

	2008			2017		
	65-70 DNL	70-75 DNL	+75 DNL	65-70 DNL	70-75 DNL	+75 DNL
Residential units						
Multnomah County						
<i>Single family</i>	--	--	--	6	--	--
<i>Multi-family</i>	--	--	--	--	--	--
<i>Floating home</i>	0	0	--	0	0	--
Clark County						
<i>Single family</i>	--	--	--	--	--	--
<i>Multi-family</i>	--	--	--	--	--	--
<i>Floating home</i>	--	--	--	--	--	--
Total	0	0	--	6	0	--
Population (a)						
Multnomah County	0	0	--	24	0	--
Clark County	--	--	--	--	--	--
Total	0	0	--	24	0	--
Noise sensitive facilities						
Schools	--	--	--	--	--	--
Parks	7	1	1	8	1	1
Medical facilities	--	--	--	--	--	--
Community/public use	--	--	--	--	--	--

(a) Population was estimated assuming 4 persons per household.

Sources: Residence counts, Jacobs Consultancy, based on residential data provided by Multnomah County and Clark County, and onsite inspection conducted by the Port of Portland, December 2009; population estimates, Jacobs Consultancy, December 2009; noise sensitive facility counts, Jacobs Consultancy, based on residential data provided by the Port of Portland, Multnomah County, and Clark County, December 2009.

3.4 COSTS, FUNDING, AND IMPLEMENTATION

As Recommendations #9 and #11 are existing measures, implementation measures outlined in Appendix A remain valid. However, as described in the existing NCP, the Port would be responsible for preparing a Request for Proposals (RFP) for consultant selection, preparing and submitting the FAA grant application, hiring the consultant, developing the priority system and priority manual, and notifying eligible homeowners of options and implementing the program. Additionally, the Port will need to confirm the six residences identified on Figure 3-1 meet FAA requirements for mitigation eligibility.

The cost of providing sound insulation for a single family home was estimated at \$45,000 in the previous Part 150. The cost to purchase noise easements from homeowners was estimated at \$4,000 per residence. Applying the cost per house estimates from the previous Part 150, and assuming all six residences identified on Figure 3-1 are eligible, the minimum cost of implementing these measures is \$24,000 (six easements at \$4,000 apiece). The maximum cost is estimated to be \$270,000 (six homes provided sound insulation at \$45,000 apiece). Once mitigation eligibility is confirmed the FAA may provide help funding such programs, if funds are available.

FAA policy prohibits use of federal funds to sound insulate homes constructed after October 1, 1998, within the DNL 65+ noise contour. This recommendation would allow those homeowners whose homes were built prior to October 1, 1998 on sites at or above the DNL 65 noise contour to receive sound attenuation for their homes.

FAA guidelines recommend measures to achieve an outdoor to indoor noise reduction level (NLR) of at least 25 dB. This recommendation would convert noncompatible land uses to compatible use and would reduce the noise intrusion for those residents who decide to take advantage of this program. The Port of Portland would obtain a noise easement in return for funding the sound attenuation.

Based on eligibility evaluations from previous studies, it was determined that homes in the Pacific Northwest located at or above the DNL 65 contour are often well constructed. As a result, when noise levels were measured, interior noise levels were shown to meet FAA standards despite the high exterior noise levels.

Contingent upon FAA approval of revised residential counts and funding availability, the above recommendations could be implemented as early as 2011.