FAR PART 150 STUDY

Noise Exposure Maps Report

Prepared for:
Hartsfield-Jackson Atlanta
International Airport

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ESA PEQ CDM

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SECTION 1
Introduction

1.1 Study Contents

The City of Atlanta/Department of Aviation (DOA) has prepared a Federal Aviation Regulation Part 150 Study (FAR Part 150 Study) for Hartsfield-Jackson Atlanta International Airport (HJAIA). The Study provided the opportunity for aviation interests, representatives from surrounding communities, and the general public to address noise and land use compatibility issues related to the Airport. Among those participating in the Study were the Federal Aviation Administration (FAA); Environmental Protection Agency (EPA); airlines, cargo carriers and pilots operating at the Airport; State and local elected officials; planning and zoning department representatives; school board officials; general public; and representatives of the DOA.

The Study was prepared in two phases. Phase 1 entailed the preparation of the Noise Exposure Maps (NEM) report that presents computer generated contours of the significant noise exposure areas around the Airport. Phase 2 is the Noise Compatibility Program (NCP) that will result in recommendations to reduce the noise exposure on communities located in the vicinity of the Airport.

HJAIA's FAR Part 150 Study is being published in three volumes:

- Volume I, this Volume, presents the first four sections of the FAR Part 150 Study document (the NEM report) which includes the data necessary to develop the official NEMs and includes the maps themselves;
- Volume II presents Sections 5 through 9 of the FAR Part 150 Study document (the NCP report) that will include the technical analyses of noise mitigation measures and recommendations of the Study; and
- Volume III (the Public Participation Program) provides a discussion of the Study's public participation process. A summary of the process is provided in Section 1.4 of Volume I (this Volume).

When an airport operator conducts a FAR Part 150 Study, the FAA requires that two NEMs be submitted for approval—an NEM that reflects the existing condition at the time the study is submitted and an NEM that reflects conditions forecast to occur five years in the future.

In this volume, the NEMs are being submitted for the existing year, 2007, and a future forecast year of 2012. It is the intent that the 2007 NEM, after review and approval by the FAA, will be used as a basis for establishing the eligibility limits for the use of FAA grant funds for the acquisition and/or sound insulation programs recommended in the Study.

1.2 Background

The DOA and the FAA have performed aircraft noise analyses at HJAIA for over 25 years. An early project in aircraft noise control and abatement was begun in 1978 with the initiation of the Airport Noise Abatement and Land Use Compatibility (ANALUC) Study sponsored by the City of Atlanta and surrounding political jurisdictions. The ANALUC Study, completed in 1980, set the stage for Airport operational controls and local jurisdiction land use compatibility planning. Over the past 25 years, the DOA has maintained a comprehensive noise mitigation program consisting of property acquisition and the insulation of homes. For a history on noise mitigation at HJAIA, refer to **Appendix A, *History of Noise Mitigation***.

As part of the Environmental Impact Statement (EIS) for Runway 10-28, the FAA requested that the DOA prepare a plan to mitigate the effects of runway construction and operation. One mitigation plan component was for the DOA to initiate a new FAR Part 150 Study. The FAA, in its Record of Decision dated September 27, 2001, echoed this commitment to the further evaluation of noise mitigation through the FAR Part 150 process. Thus, the DOA undertook this FAR Part 150 Study.

1.3 FAR Part 150 Study Preparation Timeline

The DOA began the FAR Part 150 Study in 2003. Following initial efforts, a number of changes took place at the Airport that required reevaluation and re-analysis of the NEMs and NCP. This resulted in a delay in the completion of the document. The following provides a brief overview of the timeline of issues and changes that were addressed between the Study's initiation in 2003 and this report. Text and graphics that document the details regarding these changes are provided in the main body of this NEM report.

1.3.1 Initial Noise Exposure Maps

The initial NEMs for the FAR Part 150 Study were developed to reflect year 2003 and 2008 conditions at HJAIA. The 2003 baseline NEM assumed the use of a four-runway system; arrival and departure corridors based on vectored headings established by Atlanta Tower; and operational data including runway use, flight corridors and an aircraft fleet mix obtained from the DOA's Noise and Operations Monitoring System (NOMS). The 2008 NEM assumed a five-runway system and the runway use and flight corridors assumptions from the EIS for Runway 10-28.

To afford an opportunity for the public to review/comment on the 2003/2008 NEMs, the DOA conducted a public workshop on December 15, 2003. Following the workshop, the FAA reviewed and accepted the NEMs. Subsequent to receiving FAA's acceptance of the 2003/2008 NEMs, and prior to completing the NCP, the Study was delayed. These delays were due to the following temporary and permanent changes in operational procedures at the Airport:

Flight Procedure Changes for the Future NEM Condition

After developing the 2003 and 2008 NEMs, the FAA indicated that two of the operational assumptions in the Runway 10-28 EIS needed revision. First, aircraft departing from Runway 10 needed to maintain runway heading until passing the Runway 28 middle marker before turning to

the south. This modification was required in order to maintain consistency with the departure procedure for the other runways. The departure procedure requires pilots to maintain runway heading until passing the reciprocal runway's middle marker.

The second modification involved changing the departure heading for Runway 27R when Runway 28 is being used for departures. The reason for this change is that although a 15 degree divergence was included in the EIS assumptions, there was the potential for convergence of departing aircraft from Runway 27R and Runway 28 (if an aircraft departing from Runway 27R were to turn to the south early and/or a departing aircraft from Runway 28 were to turn to the south late). Therefore, adjustments were made to the departure procedure for Runway 27R to maintain runway heading when the Airport is operated in a three departure runway configuration. This modification also affected the departure heading for Runway 26L, which was rotated further to the north.

Introduction of RNAV

In 2005, the FAA began testing the use of area navigation (RNAV) departure procedures with the intent that the procedures would replace some or all of the vectored departures at the Airport. HJAIA was one of the first large hub airports in the United States to implement RNAV departure procedures at a large scale. The RNAV procedures were under development by the FAA when the flight procedure changes discussed in the previous paragraphs were under evaluation.

EIS Written Reevaluation

The FAA prepared a Written Reevaluation of the Runway 10-28 EIS with respect to the modifications to proposed departure procedures and the establishment of additional departure headings. The FAR Part 150 Study was delayed until the Written Reevaluation was completed and approved by the FAA. In preparing the Written Reevaluation, HJAIA-related operations, fleet mixes and noise contours were developed for the years 2005 and 2010. The conclusion of the Written Reevaluation was that there would be no significant change in noise exposure within the 65 day-night level (DNL) when compared to the No-Action condition. The Written Reevaluation was approved by the FAA in the spring of 2006.

Changes Caused by Delta Air Lines Chapter 11 Status

In late 2005, Delta Air Lines (Delta) filed for Chapter 11 bankruptcy protection. As a result, changes were made within the airline that affected both their operations and fleet mix at HJAIA. Delta initially reduced the number of operations at Atlanta by approximately 10 percent and modified its fleet mix by introducing more commuter jet aircraft.

Opening of Runway 10-28

On May 27, 2006, Runway 10-28 was opened to air traffic and, as a result, the existing condition NEM assumptions changed because the Airport was operating with five runways. In addition, the opening of the fifth runway occurred following the approval of the Runway 10-28 EIS Written Reevaluation document. Therefore, pilots departing from HJAIA followed the revised departure procedures approved in the EIS for a five-runway system.

Reconstruction of Runway 8R-26L

In early September of 2006 (slightly more than three months following the opening of Runway 10-28), Runway 8R-26L was closed for 60 days for reconstruction. During the reconstruction, the runway use changed at the Airport. This resulted in Runway 8L-26R being used for departures and Runway 10-28 having much greater arrival use than was being experienced with a five-runway configuration.

Public Hearing

Following the opening of Runway 10-28 and during the temporary closure of Runway 8R-26L, a public hearing was held (October 9, 2006) to present the updated NEMs and NCP associated with the FAR Part 150 Study. In addition, informal town hall meetings were held in College Park, Forest Park, and East Point (areas primarily affected by the departure procedure and runway use changes). The primary theme by those who commented was for the FAA to revert back, as much as possible, to the corridors that have been in use in the past at the Airport.

Year 2006 Operating Conditions

In 2006, HJAIA was operated using a mix of runway combinations. The year began with the four-runway system operating for the first five months (prior to opening the fifth runway), a five-runway system being used for the next three months, a different four-runway system being used when Runway 8R-26L was closed (between September and November) and then a five-runway system again for the last two months of the year. In other words, during 2006, there was no year-long consistency in the way HJAIA's runway system was utilized. Due to the inconsistencies in runway use procedures in 2006, no updates to the NEMs were made for that year.

1.3.2 Year 2007 and 2012 NEMs

Due to numerous changes that took place at the Airport between 2004 and 2006 and the significant number of comments from the public, the NEMs and associated support data for the FAR Part 150 Study were updated. These updates are incorporated into this document that includes a 2007 NEM and a future 2012 NEM (including updated operations/aircraft fleet mix and operational procedures associated with a five-runway system).

1.4 Public Participation Program

The initial step in the FAR Part 150 Study was to conduct scoping meetings. In the year 2003, a total of 20 meetings were held including meetings with HJAIA's Noise Mitigation Advisory Council (NMAC), the City of Atlanta, Clayton County, the City of College Park, DeKalb County, the City of East Point, the City of Forest Park, Fulton County, and the cities of Hapeville, Jonesboro, Lake City, Morrow, Riverdale, and Union City.

Through late summer of 2006, the NMAC served as the principal forum for coordinating with these political jurisdictions. During this time, two committees of the NMAC, the Operations Committee and the Land Use Committee, provided their technical input to the DOA.

Two public forums were also held, a public workshop and a public hearing. The public workshop was held on December 15, 2003. The public hearing was held on October 9, 2006. Notifications of the workshop and the hearing were made in local newspapers and other mediums (including notification through the NMAC). Prior to the hearing, copies of the Draft FAR Part 150 Study report were available for review at the DOA's offices and at the following locations:

City of College Park – City Hall
City of Hapeville – City Hall
City of Forest Park – City Hall
City of East Point – City Clerk's Office
Clayton County – Headquarters Library
DeKalb County – Chief Deputy Clerk's Office
Fulton County – South Fulton Service Center
Congressman David Scott's Jonesboro District Office

Volume III of the FAR Part 150 Study documentation provides a more detailed discussion of the public participation process.

SECTION 2
Noise Exposure Map Data Sources and INM

The NEMs were prepared following FAR Part 150 guidelines for methodology, noise metrics, identification of noncompatible land uses, and public information. Data from the Airport's NOMS was used to assist in the development of input data and output verification.

The FAA's Integrated Noise Model (INM) Version 6.2a, released on November 3, 2006, was used to prepare the DNL noise contours for the NEMs. The INM is a computer program that predicts aircraft noise exposure in the airport environs based on airport-specific operational input data. The model calculates cumulative aircraft arrival and departure noise for an annual average day. The INM contains average Sound Exposure Levels (SEL) for commercial, general aviation, and military aircraft operating at various distances and altitudes along arrival and departure flight paths. The INM aircraft profiles and noise calculation algorithms are based on guidance documents published by the Society of Automotive Engineers (SAE). These include the SAE-AIR-1845 report titled "Procedure for the Calculation of Airplane Noise in the Vicinity of Airports", as well as other reports which address atmospheric absorption and noise attenuation.

While INM input data is very detailed and voluminous, the data can be described in categories to develop a better understanding. **Table 2.1** lists the basic categories and how these categories affect contour size and shape.

TABLE 2.1
INM DATA CATEGORIES

Data Category	Effect on Contour Size and Shape
Runway Layout	Arriving jet aircraft line up to land along the runway centerline extended. Departing jet aircraft become airborne and follow the runway centerline extended for at least approximately one-half of a nautical mile when departing from HJAIA.
Annual Aircraft Operations	In general, the number of operations influences overall contour size because more operations with the same fleet mix results in more noise exposure.
Fleet Mix	Because some aircraft are much louder than others, accurately defining aircraft the fleet mix is important.
Runway Usage	Runway usage typically dictates how far out a contour extends because contour length is heavily dependent upon how often a given runway is used.
Flight Tracks	Contour shape is a direct result of flight track geometry used in the INM input file, necessitating the need to accurately model the flight tracks.
Stage Lengths	Aircraft flying a long distance must carry more fuel than required for a shorter trip. Increasing aircraft weight results in lesser climb performance and greater noise measured on the ground.
Time of Day	The DNL assesses a 10 dB penalty to operations occurring between 10:00 p.m. and 7:00 a.m. to account for aircraft noise intrusion during the typical nightly period of human sleep.
Meteorological Data	Aircraft do not climb as well in hot weather, usually resulting in additional noise exposure on the ground when compared to climbing in cooler weather.

The key output from the INM is noise contours using the DNL metric. The DNL index is a 24-hour, time-weighted energy average noise level based on A-weighted decibels. It is a measure of the overall noise experienced during an entire day. The time-weighting refers to the fact that noise occurring during certain sensitive time periods is penalized for occurring at these times. In the DNL scale, noise occurring between 10 p.m. and 7 a.m. is penalized 10 dB. This penalty is included in the INM to account for an individual's greater sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occurs during nighttime hours. The FAA specifies the use of DNL for FAR Part 150 studies and has established compatible land use guidelines based on the DNL metric.

The INM calculates DNL values at grid points surrounding an airport and then connects the DNL values of equal noise exposure to create noise contours. The 65 or greater DNL contours represent the levels that the FAA considers significant. In addition to providing noise contours, by specifying grid coordinates for specific noise sensitive sites surrounding the airport under evaluation, the INM can provide the DNL value for these sites as well.

Further information that is related to noise analysis metrics is provided in **Appendix B, *Noise Analysis***.

SECTION 3

2007 Conditions and Supporting Data

3.1 Runway Layout

The Airport has the following five runways that are oriented in an east-west direction. Each of the runway ends is equipped with an instrument landing system (ILS) and approach lights.

- Runways 8L-26R and 9R-27L are 9,000 feet long, 150 feet wide, and are primarily used for arrivals.
- Runways 8R-26L and 9L-27R are primarily used for departures. Runway 8R-26L is 10,000 feet long and 150 feet wide. Runway 9L-27R is 11,890 feet long and 150 feet wide. These runways are separated by more than 4,400 feet, allowing for simultaneous arrivals and departures in all weather conditions.
- Runway 10-28 opened on May 27, 2006 and is located 4,200 feet south of Runway 9R-27L. The runway is 9,000 feet long and can accommodate both arrivals and departures.

Figure 3-1 illustrates the 2007 airfield at HJAIA.

3.2 Annual Aircraft Operations

An aircraft operation is defined as either one aircraft landing or one aircraft take-off (e.g., an arrival of an aircraft and the departure of the same aircraft equals two operations). The FAR Part 150 Study has identified the level of annual 2007 aircraft operations as 1,026,380 (arrivals and departures) -- an annual average day level of 2,812 operations. The average day operations are summarized in **Table 3.1** by aircraft category. The categories used in this Study were passenger-air carrier, passenger-commuter, cargo-air carrier, cargo-general aviation, and general aviation aircraft.

TABLE 3.1
AVERAGE DAILY OPERATIONS - 2007

Category	Subcategory	Average Daily Operations	Percent of Operations
Passenger	Air Carrier	1,692	60.2
	Commuter	1,036	36.8
Cargo	Air Carrier	44	1.6
	General Aviation	28	1.0
General Aviation		12	0.4
TOTAL		**2,812**	**100.0**

Source: ESA Airports

SOURCE: City of Atlanta, Department of Aviation (April 2005)

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure 3-1

2007 Airport Layout

As shown in **Table 3.1**, approximately 97 percent of the operations at HJAIA were assumed to be commercial passenger operations (air carrier and commuter), approximately 3 percent were related to cargo activity (air carrier and general aviation), with the remaining operations assumed to be general aviation (privately owned) aircraft.

3.3 Fleet Mix

To develop the year 2007 fleet mix, two samples of NOMS data were evaluated. The first sample contained aircraft operational data for select days during the months of November and December of 2006 (after the reconstruction of Runway 8R-26L was complete). The sample consisted of operational data for ten days -- five days when HJAIA operated in east flow and five days when the Airport operated in west flow. The second sample consisted of data for the entire month of January 2007. Although HJAIA's operational level and aircraft fleet mix are generally consistent from day to day, there are minor fluctuations in activity depending on the day of the week and the month of the year. Therefore, a year-end airline schedule was also compared to the NOMS data to determine if any perceptible fleet mix changes should be considered. After the total of 2007 airport operations was derived, each carrier's average daily activity and fleet mix were normalized to obtain an annual average day fleet mix and day/night split.

The 2007 aircraft fleet mix is provided in **Table 3.2.** As shown, INM aircraft McDonnell Douglas MD83's, Boeing 717-200's, and Canadair Regional Jets were identified to be the dominant aircraft operating at HJAIA.

3.4 Runway Usage

Wind direction and speed dictate the runway directional use (or flow). From a safety and operational standpoint, it is preferable for aircraft to arrive and depart into the wind. Wind direction changes may also necessitate the need to switch the flow of runway use. Under certain weather conditions, this change in flow can occur several times in a single day.

Table 3.3 presents the year 2007 runway use. This data was developed using a sample of data from the months of November and December of 2006 and data for the month of January 2007. A comparison of runway use from a directional flow standpoint indicates that the runway use is consistent with historical HJAIA runway use trends. Historically, and on an annual basis, aircraft depart and arrive at HJAIA to/from the west 65 percent of the time and depart and arrive to/from the east 35 percent of the time. **Appendix D** provides the 2007 runway utilization by individual aircraft type.

TABLE 3.2
AIRCRAFT FLEET MIX - 2007

Category/ Sub-Category	Representative Aircraft	INM A/C	Average Daily Arrivals		Average Daily Departures		Average Daily Operations			Annual Operations
			Day	Night	Day	Night	Arrivals	Departures	Total	
Passenger – Air Carrier	Boeing 717-200	717200	176.64	7.36	171.12	12.88	184	184	368	134,320
	Boeing 737-300	737300	18.70	3.30	20.02	1.98	22	22	44	16,060
	Boeing 737-700	737700	67.76	9.24	70.84	6.16	77	77	154	56,210
	Boeing 737-800	737800	64.80	7.20	64.80	7.20	72	72	144	52,560
	Boeing 747-400	747400	1.00	-	1.00	-	1	1	2	730
	Boeing 767-300	767300	57.85	7.15	63.70	1.30	65	65	130	47,450
	Boeing 767-400	767400	22.80	1.20	22.80	1.20	24	24	48	17,520
	Boeing 777-200	777200	7.00	-	5.81	1.19	7	7	14	5,110
	Boeing 757-200	757PW	119.04	8.96	120.32	7.68	128	128	256	93,440
	Airbus A319	A319	10.24	5.76	11.36	4.64	16	16	32	11,680
	Airbus A320	A320	7.83	1.17	9.00	-	9	9	18	6,570
	Airbus A340	A340	2.00	-	2.00	-	2	2	4	1,460
	McDonnell Douglas DC9-50	DC95HW	10.00	-	10.00	-	10	10	20	7,300
	McDonnell Douglas MD-83	MD83	219.84	9.16	219.84	9.16	229	229	458	167,170
Passenger – Commuter	Aerospatiale ATR-72	ATR72	32.30	1.70	31.96	2.04	34	34	68	24,820
	Canadair CRJ-100, CRJ-200, CRJ-700	CLREGJ	293.71	24.29	297.23	20.77	318	318	636	232,140
	Embraer EMB-140	EMB140	79.20	8.80	84.48	3.52	88	88	176	64,240
	Embraer EMB-145	EMB145	45.00	5.00	41.00	9.00	50	50	100	36,500
	Embraer EMB-170	EMB170	26.88	1.12	24.64	3.36	28	28	56	20,440
Cargo – Air Carrier	Boeing 727-200	727EM2	2.00	2.00	1.00	3.00	4	4	8	2,920
	Boeing 747-400	747400	1.00	3.00	1.00	3.00	4	4	8	2,920
	Boeing 757-200	757RR	-	2.00	-	2.00	2	2	4	1,460
	Boeing 767-300	767300	-	1.00	-	1.00	1	1	2	730
	Airbus A300	A300	1.00	1.00	1.00	1.00	2	2	4	1,460
	McDonnell Douglas DC-10-10	DC1010	1.00	2.00	1.00	2.00	3	3	6	2,190

TABLE 3.2 (CONTINUED)
AIRCRAFT FLEET MIX - 2007

Category/ Sub-Category	Representative Aircraft	INM A/C	Daily Arrivals		Daily Departures		Daily Operations			Annual Operations
			Day	Night	Day	Night	Arrivals	Departures	Total	
Cargo – Air Carrier (Cont.)	McDonnell Douglas DC-870	DC870	1.00	2.00	-	3.00	3	3	6	2,190
	McDonnell Douglas MD-11	MD11GE	2.00	1.00	2.00	1.00	3	3	6	2,190
Cargo – General Aviation	Gates Learjet 25	LEAR25	1.00	1.00	1.00	1.00	2	2	4	1,460
	Gates Learjet 35	LEAR35	3.00	9.00	4.00	8.00	12	12	24	8,760
General Aviation	Cessna 500 (Citation)	CNA500	1.00	3.00	2.00	2.00	4	4	8	2,920
	Dassault Falcon 20	FAL20	1.00	1.00	1.00	1.00	2	2	4	1,460
		TOTAL	**1,276.59**	**129.41**	**1285.92**	**120.08**	**1,406**	**1,406**	**2,812**	**1,026,380**

Source: ESA Airports

TABLE 3.3
PERCENT RUNWAY UTILIZATION BY TIME OF DAY - 2007

Runway	Arrivals		Departures		Percent of Total Operations
	Daytime	Nighttime	Daytime	Nighttime	
East Flow					
8L	15	23	-	-	8
8R	-	-	19	20	9
9L	-	-	15	15	7
9R	14	13	-	-	7
10	6	-	-	-	3
Subtotal	*35*	*35*	*35*	*35*	*35*
West Flow					
26L	-	-	34	38	17
26R	28	43	-	-	15
27L	26	22	-	-	13
27R	-	-	28	27	14
28	11	-	3	-	6
Subtotal	*65*	*65*	*65*	*65*	*65*
TOTAL	100%	100%	100%	100%	100%

- Denotes that a runway is not typically used for this type of operation.
Note: Numbers reflect rounding and may not add up to 100 percent
Source: ESA Airports

HJAIA has two sets of runways (a northern set and a southern set) and Runway 10-28. Generally, aircraft departing to destinations north and west of Atlanta use Runway 8R-26L (in the northern set) and those departing to destinations south and east use Runway 9L-27R (in the southern set). Aircraft arriving from the northwest and northeast typically land on Runway 8L-26R (northern set), while those arriving from the southwest and southeast land on Runway 9R-27L (southern set). Depending upon air traffic control workload and/or weather, these general runway use parameters may be altered.

When arrival traffic is of sufficient demand, Atlanta Tower will begin using Runway 10-28 as a third arrival runway. When the demand subsides, the controllers will revert to using two runways to handle arrivals. Likewise, when departure demand necessitates the use of three departure runways, Runway 10-28 will be used to accommodate departures. Based on experience gained in 2006, it is expected that Runway 10-28 will continue to be used for a limited number of departures.

Cargo facilities are located both on the north and south side of the Airport. Air traffic controllers prefer to assign arriving cargo aircraft to the runway closest to the aircraft's cargo ramp. Departing cargo aircraft are usually assigned to the runway based on direction of destination, unless Runway 9L-27R is required due to aircraft weight (aircraft flying longer distances typically require a longer runway for departure). Runway 9L-27R is the Airport's longest runway (11,890 feet) and is usually used by aircraft with long trip lengths, such as those departing to Europe or Asia.

3.5 Flight Tracks

During the day (7 a.m. to 10 p.m.), when HJAIA operates in a westerly flow and the FAA is using all three departure runways (Runways 26L, 27R, and 28), each runway has a single jet departure heading. When the FAA is using two departure runways, Runway 27R has a single departure heading and Runway 26L has two jet departure headings. When the Airport operates in an easterly flow and the FAA is using all three departure runways (Runways 8R, 9L, and 10), each runway again only has a single jet departure heading. However, when only Runways 8R and 9L are in use,

Runway 9L has two jet headings. At night (10 p.m. to 7 a.m.), the only runway with two jet departure headings is Runway 9L. **Table 3.4** lists each of the departure runways and their respective headings.

TABLE 3.4
DEPARTURE HEADINGS - 2007

	Day		
Runway	Departing Two Runways	Departing Three Runways	Night-Departing Two Runways
8R	70	70	70
9L	90, 105	90	90, 105
10	-	105	-
26L	275, 290	290	275
27R	250	270	250
28	-	250	-

Source: Department of Aviation

For the purpose of developing the 2007 noise contours, the distribution of aircraft on the daytime departure headings for Runways 9L and 26L when the FAA is using two departure runways and the distribution of aircraft on the departure headings from Runway 9L at night was based on the actual distribution of aircraft during the month of January 2007.

Examples of two days of NOMS radar data are presented in **Figures 3-2 and 3-3**. Figure 3-2 presents flight track data for east flow operations and Figure 3-3 presents data for west flow operations.

After a departing aircraft becomes airborne, pilots are directed to fly runway heading until reaching a point approximately one-half mile beyond the end of the runway - the location of an electronic navigation point aid called a middle marker. Once reaching the middle marker, pilots turn the aircraft to the assigned heading.

The modeled average tracks and corridors containing dispersed tracks are presented in **Figures 3-4 and 3-5**. Figure 3-4 presents the east flow arrival and departure flight corridors and Figure 3-5 presents the west flow arrival and departure flight corridors. Note that these figures illustrate the tracks used by jets and tracks used by turboprop and general aviation prop aircraft.

Aircraft are unable to exactly follow a departure heading and therefore they disperse on either side of what is referred to as an "average track." For the purpose of developing the 2007 NEM, radar tracks from the DOA's NOMS were used to determine the amount of dispersion that occurs on either side of the average track. The width of each of the simulated flight corridors was based on the actual dispersal of the jets and turboprop/general aviation aircraft arriving and departing HJAIA during the month of January 2007. The corridor widths used in the development of the 2007 NEM represent the width of aircraft splay that contained 95 percent of the actual aircraft activity in the month of January 2007.

3.6 Stage Lengths

An aircraft departure stage length is defined as the distance an aircraft flies from an airport to its next destination. Generally, aircraft traveling to farther destinations are heavier and climb at a

Altitude (ft) AGL

- 10001+
- 5001 - 10000
- 4001 - 5000
- 3001 - 4000
- 2001 - 3000
- 1001 - 2000
- 0 - 1000

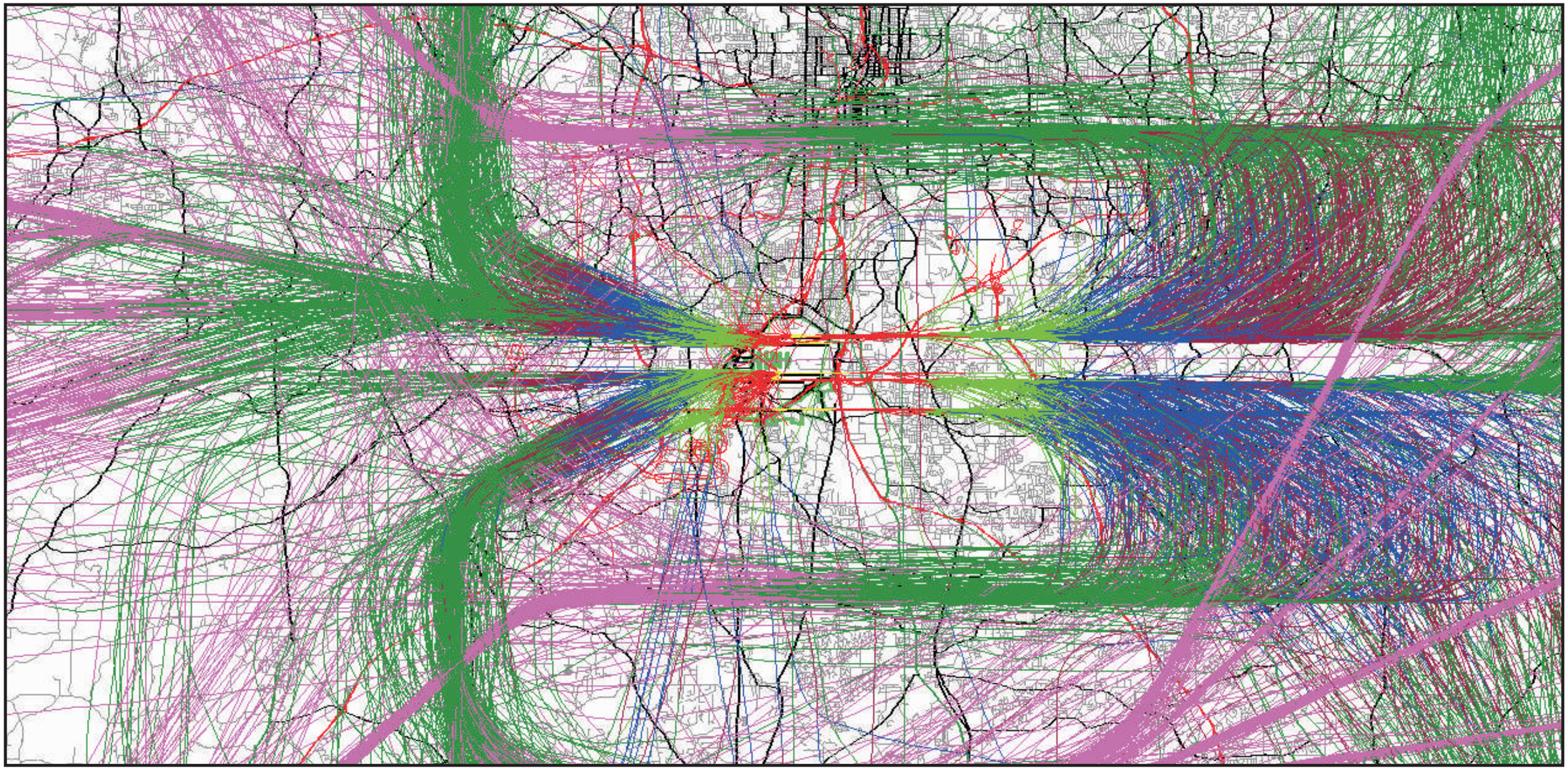
N

0 9,000 Feet

One Day of NOMS Data
January 12, 2007

SOURCE: Department of Aviation, Noise and Operations Monitoring System

Figure 3-2
NOMS Data - East Flow Tracks



Altitude (ft) AGL

- 10001+
- 5001 - 10000
- 4001 - 5000
- 3001 - 4000
- 2001 - 3000
- 1001 - 2000
- 0 - 1000

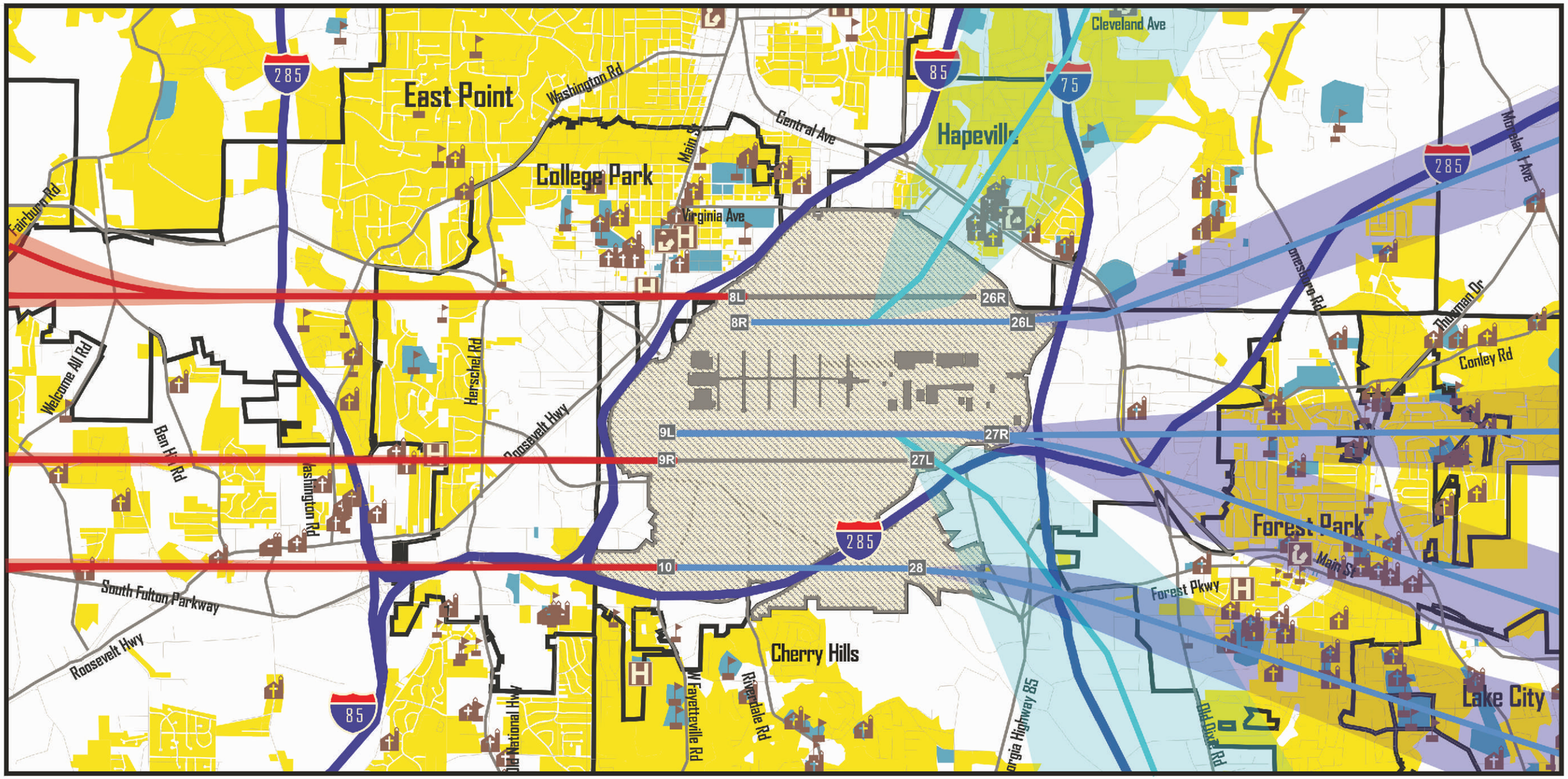
N

0 9,000 Feet

One Day of NOMS Data
January 26, 2007

SOURCE: Department of Aviation, Noise and Operations Monitoring System

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study
Figure 3-3
NOMS Data - West Flow Tracks



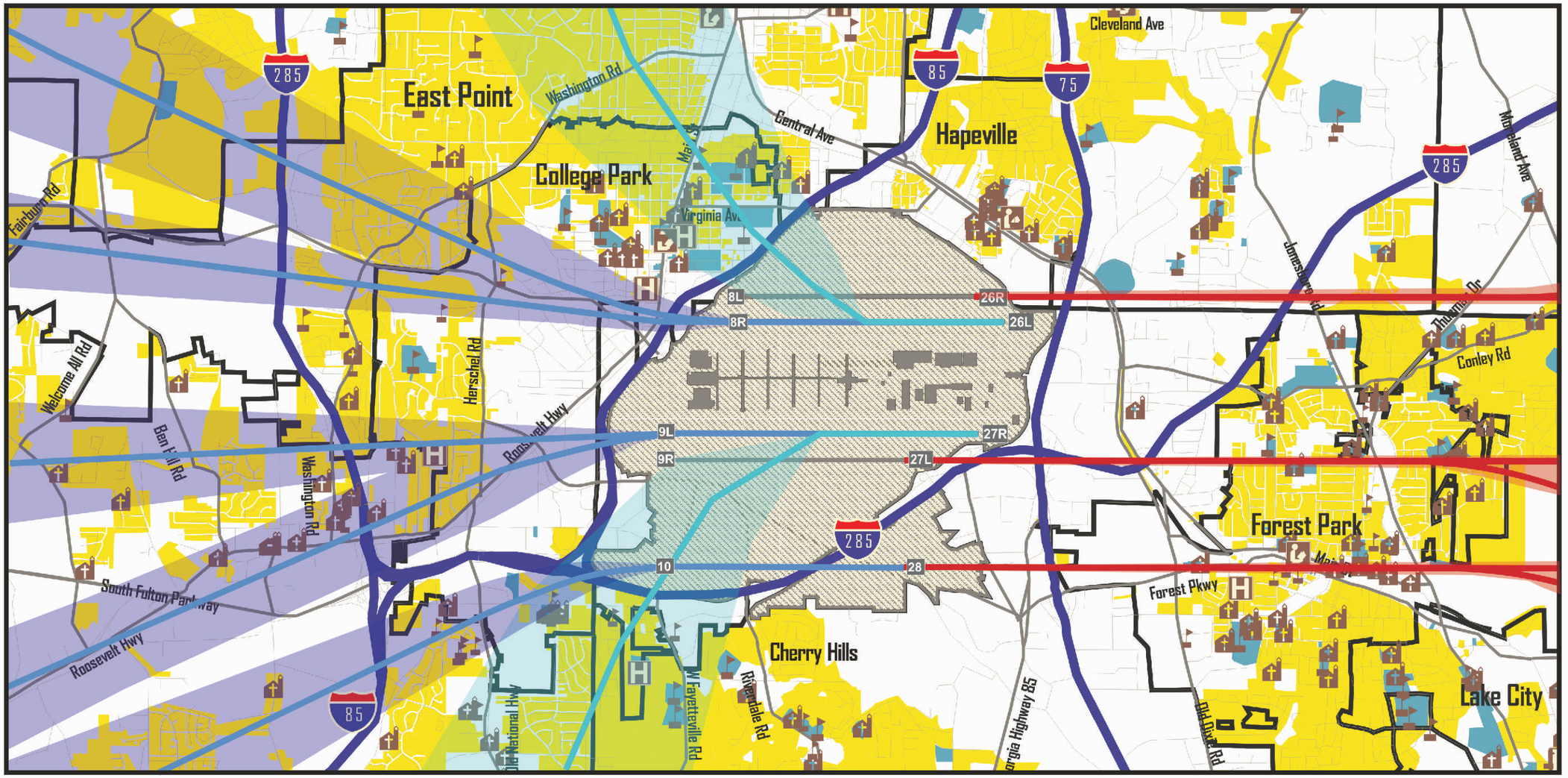
*Land Use in 2005

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure 3-4

2007 East Flow Corridors



*Land Use in 2005

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure 3-5

2007 West Flow Corridors

slower rate due to the need to carry additional fuel when compared to flying to a closer destination. Because the aircraft are lower, under the same weather conditions, noise levels on the ground are increased under the flight path of those aircraft that do travel a farther distance. To account for this variance in aircraft weight, the INM has up to seven departure climb profiles (corresponding to different departure weights) in its database. These profiles represent trip lengths from 500 nautical miles to over 4,500 nautical miles.

Several other factors influence actual aircraft departure profiles. These factors include:

- thrust setting,
- climb rate,
- pilot technique,
- ambient temperature, and
- other meteorological effects (wind, presence of severe weather, etc.).

The year-end 2006 schedules for each airline serving HJAIA were analyzed to determine the fleet mix and number of aircraft in the mix serving each destination. Because the distance to each destination is known, it is possible to develop a departure stage length distribution for each aircraft type. **Table 3.5** presents the average departure stage length distribution for passenger-air carrier and cargo-air carrier aircraft.

TABLE 3.5
DEPARTURE STAGE LENGTH: AIR CARRIER AIRCRAFT - 2007

Subcategory	Departure Stage Length (nautical miles)	Percentage	
		Day	Night
Passenger	up to 500	29	27
	501 to 1000	50	55
	1001 to 1500	4	5
	1501 to 2500	13	2
	2501 to 3500	0	2
	3501 to 4500	2	0
	4501 or greater	2	9
	TOTAL	**100%**	**100%**
Cargo	up to 500	28	22
	501 to 1000	20	19
	1001 to 1500	1	8
	1501 to 2500	49	49
	2501 to 3500	1	0
	3501 to 4500	2	1
	4501 or greater	0	0
	TOTAL	**100%**	**100%**

Source: ESA Airports

3.7 Time of Day

As previously stated, a characteristic of the DNL metric is that any operation occurring after 10:00 p.m. and before 7:00 a.m. (nighttime) is penalized by adding 10 dBA to each operation. The 2007 day/night activity distribution for air carrier operations was developed using actual year-end 2006 Atlanta schedules.

The percentages of nighttime operations, for each category of aircraft, are summarized in **Table 3.6**. As shown, the percentage of cargo operations was higher during nighttime hours (64 and 73 percent of the cargo arrivals and departures, respectively) than were passenger operations (7 and 6 percent of the arrivals and departures, respectively).

TABLE 3.6
NIGHTTIME OPERATIONS - 2007

Category	Subcategory	Average Percentage	
		Arrivals	Departures
Passenger	Air Carrier	7	6
	Commuter	8	7
Cargo	Air Carrier	64	73
	General Aviation	71	64
General Aviation		67	50

Source: ESA Airports

3.8 Meteorological Data

The INM uses temperature and humidity to model the influences of meteorological conditions on aircraft performance and noise propagation. Meteorological data obtained from the National Climatic Data Center (NCDC) for the years 1992 through 2001 were evaluated to obtain long-term averages. Long-term temperature and humidity data were evaluated on an hourly basis and weighted according to the number of operations occurring at HJAIA on an hourly basis. The resultant weighted average temperature was 64.2 degrees Fahrenheit. The average relative humidity was 66 percent.

3.9 2007 Noise Contours

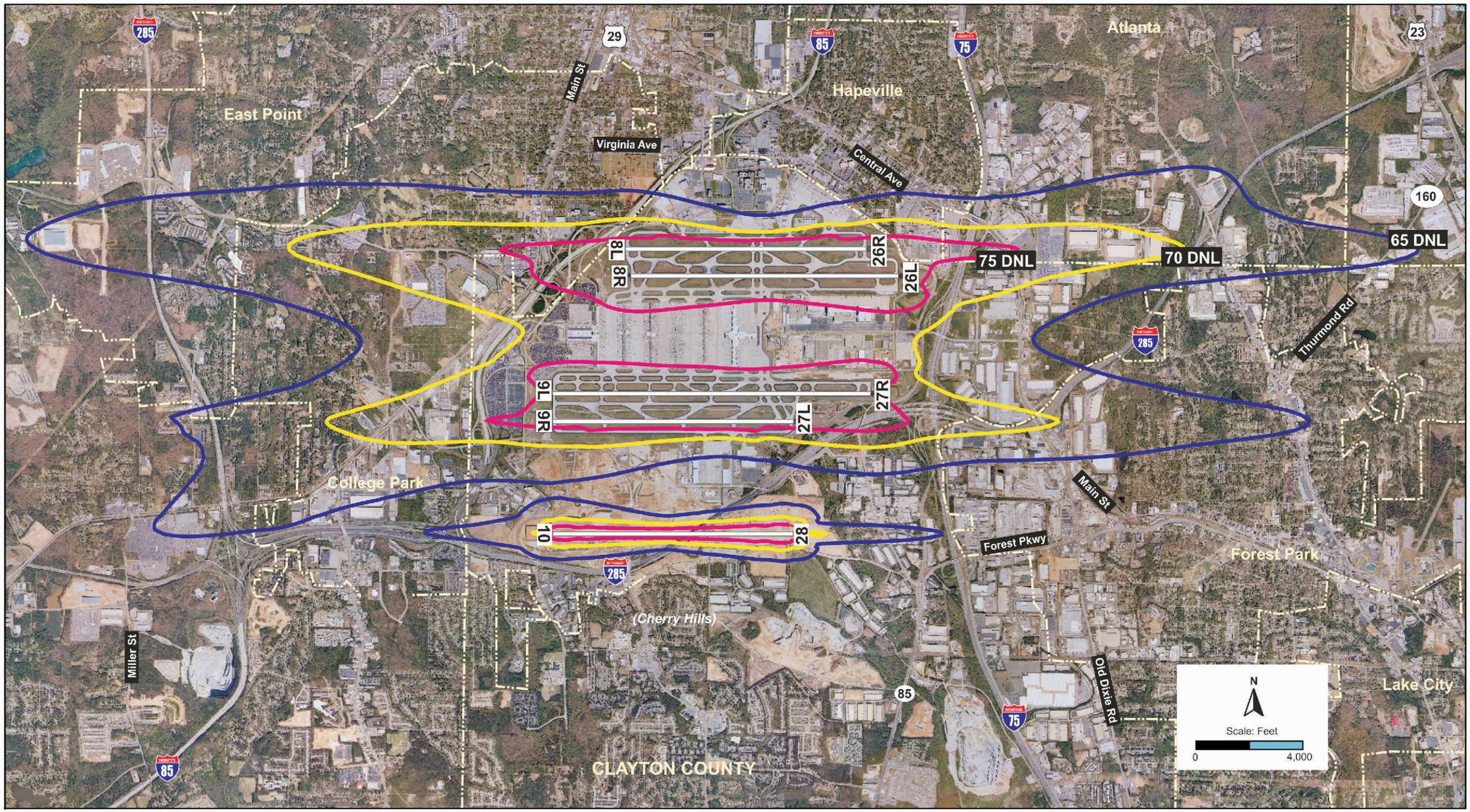
The 2007 noise contours are illustrated on **Figure 3-6.** The 65 DNL contour encompasses 15.37 square miles including Airport property (9.66 square miles excluding Airport property). **Table 3.7** summarizes the area of the noise exposure for each contour interval (65-69 DNL, 70-74 DNL, and 75 and greater DNL). Under FAR Part 150, the 65 DNL contour represents the outer boundary of the area considered to be exposed to significant levels of aircraft noise.

TABLE 3.7
NOISE EXPOSURE CONTOURS: AREA - 2007

	Area (Square Miles)		
DNL Range	On-Airport	Off-Airport	Total
65-69	1.08	7.41	8.49
70-74	2.19	2.00	4.19
75+	2.44	0.25	2.69
Total	*5.71*	*9.66*	*15.37*

Source: Planners for Environmental Quality

As previously discussed, among other factors, contour size and shape is a function of runway usage for arrivals and departures, usage at night, and the types of aircraft assigned to each. As expected, the contours extend farther to the west than the east, reflecting the greater annual use of west flow.



AERIAL SOURCE: GlobeXplorer, January 2004

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure 3-6

2007 Noise Contours

And, the area encompassed by the contours for the northern set of runways is larger than the contour area associated with the southern set of runways, reflecting, in part, the greater nighttime use of the northern runways by cargo operators.

Table 3.8 provides the estimated number of people residing within HJAIA's 2007 65 and greater DNL noise contours (based on year 2000 U.S. Census data). As shown, approximately 12,081 people reside within the 65-69 DNL (84 percent of the total population) and approximately 2,269 people reside within the 70-74 DNL (16 percent of the total population). Notably, these population estimates include persons in residences that were previously acoustically treated through the DOA's noise mitigation program. Based on a field survey and data provided by the DOA, it is estimated that approximately 3,348 persons reside in dwellings within the 65-69 DNL that have already been addressed by the DOA. Within the 70-74 DNL, it is estimated that none of the persons currently reside in dwellings that were previously addressed by the DOA. Of the persons that reside in the 65-69 DNL that were not previously addressed, it is estimated that 158 persons reside in single-family residences and 8,575 persons reside in 48 multi-family dwellings/complexes. Within the 70-74 DNL, it is estimated that 8 people reside in single-family residences and 2,261 persons reside in 7 multi-family dwellings/complexes.

TABLE 3.8
NOISE CONTOURS: ESTIMATED POPULATION - 2007

DNL Range	Total Population[a, b]	Previously Addressed
65-69	12,081	3,348
70-74	2,269	0
75+	0	-
Total	*14,350*	*3,348*

[a] Based on year 2000 U.S. Census data.
[b] Includes people whose residences have previously been acoustically treated.
Source: ESA Aiirports/Planners for Environmental Quality

Table 3.9 provides the area (in square miles) of each political jurisdiction within the 65 and greater DNL noise contour. The distribution of the total population is also provided. As shown, 3.75 square miles, or 39 percent, of the off-Airport contour area lies within the City of College Park while 6,318 persons, or 44 percent, of the affected population resides within this area. Four other political jurisdictions have more than 1,000 persons within the 65 DNL limits including East Point, Atlanta, Forest Park and unincorporated Fulton County.

TABLE 3.9
JURISDICTIONS: AREA AND POPULATION - 2007

Factor	Atlanta	Hapeville	College Park	Union City	Morrow	Riverdale	East Point	Forest Park	Lake City	Fulton	DeKalb	Clayton	Total
Area of Each Jurisdiction Within 65 DNL Contour (sq mi) [a]	1.40	0.23	3.75	0.00	0.00	0.00	0.89	0.44	0.00	0.67	0.09	2.19	9.66
Population by Jurisdiction Within 65 DNL Contour	1,822	263	6,318	0	0	0	3,280	1,210	0	1,131	25	300	14,350

[a] Does not include Airport property.
Source: Planners for Environmental Quality

In addition to residential uses, FAR Part 150 guidelines identify certain other uses as not being compatible with aircraft noise levels above 65 DNL. These noise sensitive uses were grouped into the categories of schools, day care facilities, churches, and retirement facilities. **Table 3.10** provides the INM-predicted aircraft noise levels for the noise sensitive sites within the 65 DNL contour. As shown, there are 24 noise sensitive sites located within the 65-69 DNL noise contour with churches accounting for approximately 70 percent of the sites. There are no non-residential noise sensitive sites located within the 70 and greater DNL noise contour. **Appendix C, *Airport Environs***, contains a detailed description of each political jurisdiction.

TABLE 3.10
NOISE LEVELS AT NOISE SENSITIVE SITES (OTHER THAN RESIDENTIAL) - 2007

Site*	Description	DNL
CH-12	United Mission Ministries	66.8
CH-13	Piney Grove Baptist Church	67.9
CH-18	Forest Park Methodist Church	65.0
CH-20	Christian Mission Holiness Church	66.8
CH-21	From The Heart Church Ministries	65.7
CH-22	Mt. Olive Church of God Holiness	65.1
CH-24	College Park First United Methodist Church	67.3
CH-25	Believers Walking in the Way of Righteousness	65.5
CH-26	Israel, the Church of God	65.5
CH-27	Oliver Grove Baptist Church	66.5
CH-28	God First Baptist Church	67.0
CH-29	Laster Chapel United Methodist Church	66.1
CH-34	Lakemont Missionary Baptist	65.0
CH-35	Iglesia de Cristo Mi-El Ministerio Elim	66.0
CH-36	Iglesia Cristana Penteostes	65.7
CH-37	New Freedom Baptist Church	65.7
DC-1	Kinder Kollege Christian School	69.7
DC-9	The Toddler's Institute Child Care Center	65.7
DC-10	Home Away From Home	65.3
RF-2	Fellowship Senior Day Care Center	68.3
SC-8	Hendrix Drive Elementary	66.9
SC-9	Atlanta Police Academy	69.0
SC-11	Brookview Elementary School	65.4
SC-14	Atlanta Montessori Academy	67.0

*CH – Church; DC - Daycare; RF – Retirement Facility; SC – School; LI - Library
Source: ESA Airports

SECTION 4
Future (2012) Conditions

The purpose of this section is to present the anticipated future noise conditions for HJAIA based on forecast operational assumptions for the year 2012.

4.1 Runway Layout

For the development of the 2012 noise contours, the runway layout was assumed to be the same as the existing layout.

4.2 Annual Aircraft Operations

The 2012 forecast estimates an annual total of 1,174,570 operations – or an annual average day of 3,218 operations. The 2012 forecast by aircraft category is summarized in **Table 4.1**.

TABLE 4.1
AVERAGE DAILY OPERATIONS - FUTURE 2012

Category	Subcategory	Average Daily Operations	Percent of Operations
Passenger	Air Carrier	1,926	59.9
	Commuter	1,198	37.2
Cargo	Air Carrier	54	1.7
	General Aviation	28	0.9
General Aviation		12	0.3
TOTAL		**3,218**	**100.0**

Source: ESA Airports

4.3 Fleet Mix

The 2012 fleet mix is presented in **Table 4.2**. As shown, the forecast assumes the INM aircraft McDonnell Douglas MD83's, Boeing 717-200's, and Canadair Regional Jets will be the dominant aircraft operating at HJAIA.

TABLE 4.2
AIRCRAFT FLEET MIX - 2012

Category/ Sub-Category	Representative Aircraft	INM A/C	Average Daily Arrivals		Average Daily Departures		Average Daily Operations			Annual Operations
			Day	Night	Day	Night	Arrivals	Departures	Total	
Passenger - Air Carrier	Boeing 717-200	717200	180.48	7.52	172.96	15.04	188	188	376	137,240
	Boeing 737-300	737300	18.70	3.30	19.80	2.20	22	22	44	16,060
	Boeing 737-700	737700	85.36	11.64	88.27	8.73	97	97	194	70,810
	Boeing 737-800	737800	109.80	12.20	108.58	13.42	122	122	244	89,060
	Boeing 747-400	747400	1.00	-	1.00	-	1	1	2	730
	Boeing 767-300	767300	60.52	7.48	65.96	2.04	68	68	136	49,640
	Boeing 767-400	767400	38.00	2.00	37.60	2.40	40	40	80	29,200
	Boeing 777-200	777200	12.00	-	9.96	2.04	12	12	24	8,760
	Boeing 757-200	757PW	131.13	9.87	131.13	9.87	141	141	282	102,930
	Airbus A319	A319	12.16	6.84	13.30	5.70	19	19	38	13,870
	Airbus A320	A320	11.31	1.69	12.87	0.13	13	13	26	9,490
	Airbus A340	A340	3.00	-	3.00	-	3	3	6	2,190
	McDonnell Douglas DC9-50	DC95HW	7.00	-	7.00	-	7	7	14	5,110
	McDonnell Douglas MD-83	MD83	220.80	9.20	218.50	11.50	230	230	460	167,900
Passenger - Commuter	Canadair CRJ-100, CRJ-200, CRJ-700	CLREGJ	365.94	34.06	371.90	28.10	400	400	800	292,000
	Embraer EMB-140	EMB140	94.50	10.50	99.75	5.25	105	105	210	76,650
	Embraer EMB-145	EMB145	52.20	5.80	46.98	11.02	58	58	116	42,340
	Embraer EMB-170	EMB170	34.56	1.44	31.32	4.68	36	36	72	26,280
Cargo – Air Carrier	Boeing 727-200	727EM2	1.00	1.00	1.00	1.00	2	2	4	1,460
	Boeing 747-400	747400	2.00	4.00	3.00	3.00	6	6	12	4,380
	Boeing 757-200	757RR	1.00	3.00	-	4.00	4	4	8	2,920
	Boeing 767-300	767300	-	4.00	-	4.00	4	4	8	2,920
	Airbus A300	A300	1.00	1.00	1.00	1.00	2	2	4	1,460
	McDonnell Douglas DC-10-10	DC1010	-	2.00	1.00	1.00	2	2	4	1,460

TABLE 4.2 (CONTINUED)
AIRCRAFT FLEET MIX - 2012

Category/ Sub-Category	Representative Aircraft	INM A/C	Daily Arrivals		Daily Departures		Daily Operations			Annual Operations
			Day	Night	Day	Night	Arrivals	Departures	Total	
	McDonnell Douglas DC-8-70	DC870	1.00	-	-	1.00	1	1	2	730
	McDonnell Douglas MD-11	MD11GE	3.00	3.00	4.00	2.00	6	6	12	4,380
Cargo - General Aviation	Gates Learjet 25	LEAR25	1.00	1.00	1.00	1.00	2	2	4	1,460
	Gates Learjet 35	LEAR35	3.00	9.00	4.00	8.00	12	12	24	8,760
General Aviation	Cessna 500 (Citation)	CNA500	1.00	3.00	2.00	2.00	4	4	8	2,920
	Dassault Falcon 20	FAL20	1.00	1.00	1.00	1.00	2	2	4	1,460
		Total	**1453.46**	**155.54**	**1457.88**	**151.12**	**1,609**	**1,609**	**3,218**	**1,174,570**

Source: ESA Airports

4.4 Runway Use

The anticipated runway use for 2012 is presented in **Table 4.3**. The usage is based on data collected for the 2007 contours, conversations with FAA air traffic staff, and general knowledge of Atlanta airspace and procedures. The table presents the utilization percentages for each runway for departures and arrivals separately, and by daytime and nighttime hours. The runway utilization by individual aircraft type is provided in **Appendix D**. A primary difference between the 2007 and 2012 runway use is that Runway 10-28 is expected to experience greater use overall as well as greater use at night.

TABLE 4.3
PERCENT RUNWAY UTILIZATION BY TIME OF DAY - 2012

	Arrivals		Departures		Percent of Total Operations
Runway	Daytime	Nighttime	Daytime	Nighttime	
East Flow					
8L	15	18	-	-	8
8R	-	-	16	18	8
9L	-	-	13	13	7
9R	14	10	-	-	7
10	6	7	6	4	6
Subtotal	*35*	*35*	*35*	*35*	*35*
West Flow					
26L	-	-	30	34	15
26R	29	34	-	-	15
27L	26	18	-	-	12
27R	-	-	24	25	12
28	11	13	10	7	10
Subtotal	*65*	*65*	*65*	*65*	*65*
TOTAL	100%	100%	100%	100%	100%

- Denotes that a runway is not typically used for this type of operation
Note: Numbers reflect rounding and may not add up to 100 percent
Source: ESA Airports

4.5 Flight Tracks

The departure headings and splay of aircraft for the 2012 noise contours were assumed to be the same as those used to develop the 2007 noise contours.

4.6 Stage Lengths

The stage length distributions assumed for 2012 were the same as those used for 2007.

4.7 Time of Day

The nighttime assumptions by category of aircraft used for 2012 are the same as those used for 2007. Overall, the percentage of nighttime operations is anticipated to be approximately 10 percent of total operations.

4.8 Meteorological Data

The average annual temperature and humidity values used in the preparation of the 2007 noise exposure map were also assumed for the evaluation of the future 2012 conditions.

4.9 Future (2012) Noise Contours

The 2012 noise contours are shown on **Figure 4-1**. The 65 DNL contour encompasses 18.23 square miles including Airport property (11.24 square miles excluding Airport property). For the north and south runway sets, there are slight changes in the contours. However, there is a substantial increase in noise contour size off Runway 10-28. This is a result of the assumption that Runway 10-28 will see increased use as aircraft activity increases and the runway's available capacity is used to a greater degree than in 2007.

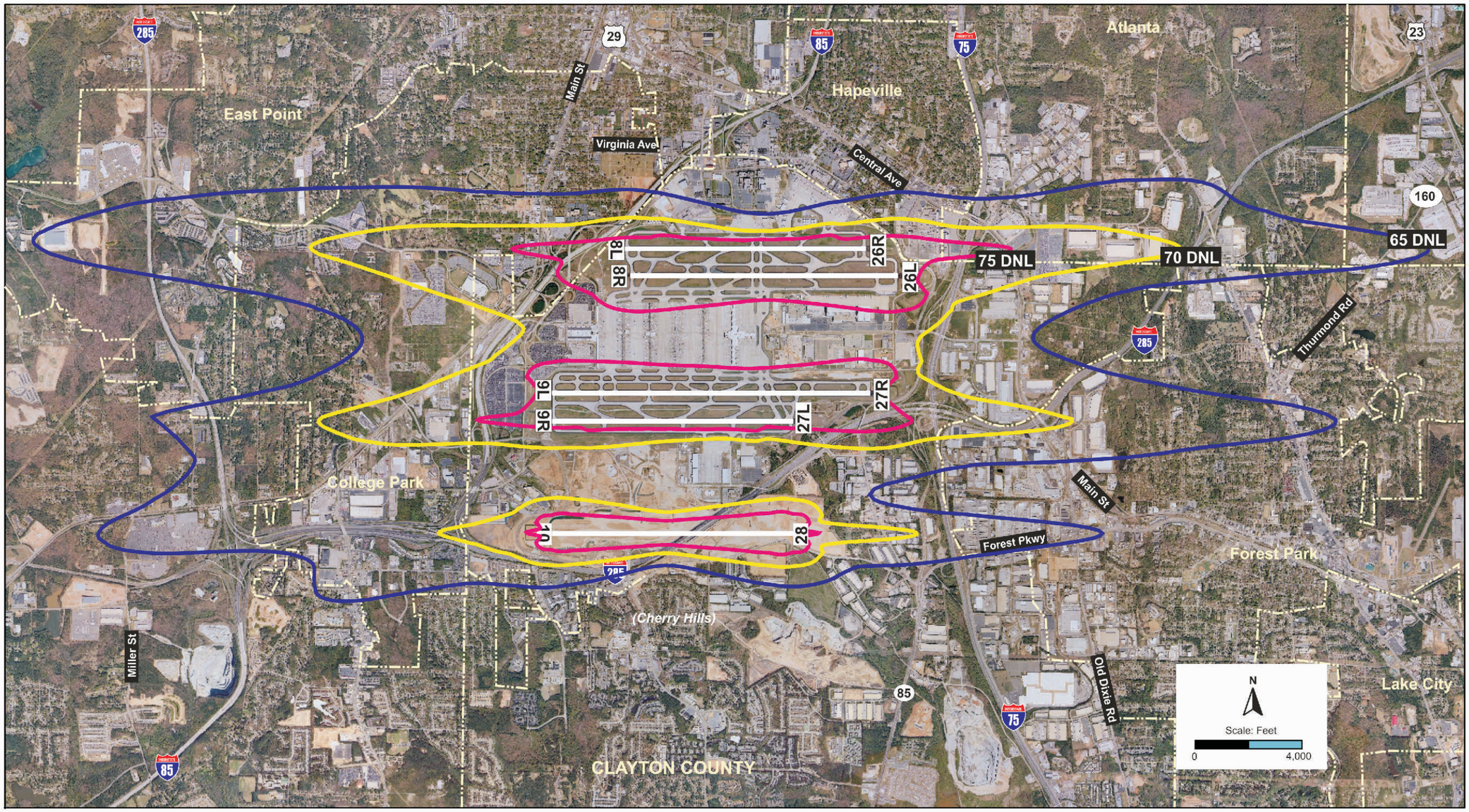
Table 4.4 summarizes the area of the noise exposure for each contour range (65-70 DNL, 70-75 DNL, and 75 and greater DNL).

TABLE 4.4
NOISE CONTOURS: AREA - 2012

	Area (Square Miles)		
DNL Range	**On-Airport**	**Off-Airport**	**Total**
65-69	1.73	8.97	10.70
70-74	2.56	2.03	4.58
75+	2.71	0.24	2.95
Total	*6.99*	*11.24*	*18.23*

Source: Planners for Environmental Quality

Table 4.5 provides the estimated number of people residing within HJAIA's 2012 65 and greater DNL noise contours (based on year 2000 U.S. Census data). As shown, approximately 17,322 people will be located within the 65-69 DNL (92 percent of the total population) and approximately 1,600 people will reside within the 70-74 DNL (8 percent of the total population). Notably, these population estimates include persons in residences that were previously acoustically treated through the DOA's noise abatement program. Based on a field survey and data provided by the DOA, it is estimated that approximately 3,447 persons reside in dwellings within the 65-69 DNL that have already been addressed by the DOA. Within the 70-74 DNL, it is estimated that none of the persons currently reside in dwellings that were previously addressed by the DOA. Of the people that reside in the 65-69 DNL that were not previously addressed, it is estimated that 262 persons reside in single-family residences and 13,613 reside in 58 multi-family dwellings/complexes. Within the 70-74 DNL, it is estimated that 8 people reside in single-family residences and 1,592 persons reside in 4 multi-family dwellings/complexes.



AERIAL SOURCE: GlobeXplorer, January 2004

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure 4-1

2012 Noise Contours

TABLE 4.5
NOISE EXPOSURE CONTOURS: POPULATION - 2012

Noise Range	Total Population[a, b]	Previously Addressed
65-69 DNL	17,322	3,447
70-74 DNL	1,600	0
75+ DNL	0	-
Total	*18,922*	*3,447*

[a] Based on year 2000 U.S. Census data.
[b] Includes people whose residences have previously been acoustically treated.
Source: ESA Aiirports/Planners for Environmental Quality

Table 4.6 provides the area (in square miles) of each political jurisdiction within the 65 and greater DNL noise contour. The distribution of affected persons within each jurisdiction is also provided. As shown, it is projected that 4.61 square miles, or 41 percent, of the off-Airport contour will lie within the City of College Park while 10,510 persons, or 56 percent, of the affected population will be located within this area.

TABLE 4.6
JURISDICTIONS: AREA AND POPULATION - 2012

Item	Atlanta	Hapeville	College Park	Union City	Morrow	Riverdale	East Point	Forest Park	Lake City	Fulton	DeKalb	Clayton	Total
Area of Each Jurisdiction (sq mi)[a]	1.27	0.23	4.61	0.00	0.00	0.00	0.79	0.70	0.00	0.92	0.10	2.62	11.24
Population Distribution by Jurisdiction (persons)	1,573	280	10,510	0	0	0	3,144	1,545	0	1,497	25	348	18,922

[a] Does not include Airport property.
Source: Planners for Environmental Quality

Table 4.7 provides the INM-predicted aircraft noise levels for the noise sensitive sites other than residential within the 65 DNL contour. As shown, there are 27 noise sensitive sites located within the 65-69 DNL noise contour with churches accounting for approximately 60 percent of the sites. There are no noise sensitive sites located within the 70 and greater DNL noise contour. **Appendix C, *Airport Environs***, contains a detailed description of each political jurisdiction.

TABLE 4.7
NOISE LEVELS AT NOISE SENSITIVE SITES (OTHER THAN RESIDENTIAL) - 2012

Site*	Description	DNL
CH-12	United Mission Ministries	67.1
CH-13	Piney Grove Baptist Church	68.2
CH-14	Christians in Motion for Christ	65.0
CH-15	Mid-way Missionary Baptist Church	66.8
CH-18	Forest Park Methodist Church	65.5
CH-19	Amazing Grace World Outreach Church	65.1
CH-20	Christian Mission Holiness Church	67.2
CH-21	From The Heart Church Ministries	66.1
CH-24	College Park First United Methodist Church	67.2
CH-25	Believers Walking in the Way of Righteousness	65.6
CH-26	Israel, the Church of God	65.6
CH-27	Oliver Grove Baptist Church	66.9
CH-28	God First Baptist Church	67.3
CH-29	Laster Chapel United Methodist Church	66.4
CH-30	Solid Rock Pentacostal Church	65.1
CH-31	First Baptist Church of Red Oak	65.2
CH-34	Lakemont Missionary Baptist	65.3
CH-35	Iglesia de Cristo Mi-El Ministerio Elim	66.1
CH-36	Iglesia Cristana Penteostes	65.8
CH-37	New Freedom Baptist Church	65.8
DC-1	Kinder Kollege Christian School	69.1
DC-3	Globes Learning Center	66.1
DC-7	Home Away From Home	66.7
DC-8	Daystar Christian Academy	67.6
DC-9	The Toddler's Institute Child Care Center	65.7
DC-10	Home Away From Home	65.6
RF-2	Fellowship Senior Day Care Center	68.6
SC-8	Hendrix Drive Elementary	67.3
SC-9	Atlanta Police Academy	68.5
SC-11	Brookview Elementary School	65.4
SC-14	Atlanta Montessori Academy	66.9

*CH – Church; DC - Daycare; RF – Retirement Facility; SC – School; LI - Library
Source: ESA Airports

Appendices

Noise Exposure Maps Report

Appendix A
History of Noise Mitigation

APPENDIX A

History of Noise Mitigation

Introduction

Over the past quarter century, increased passenger and cargo demand for aviation activity has created the need to expand airports throughout the United States (U.S.). Along with this growth, the impact of aircraft noise has been a significant issue in the U.S. Attaining a balance between serving demand and striving for the reduction in noise impacts is a challenge faced by most airports in the country, and HJAIA is no different. Over the past thirty years, passenger activity at HJAIA has increased substantially, the Airport has grown significantly, and a continuing program of noise mitigation has evolved.

Noise Mitigation

HJAIA's noise mitigation program has been ongoing for the past 30 years. However, the mitigation program has not been accomplished solely by the Airport. Other entities have played a role as well. These include:

- passage of legislation at the federal level;
- new aircraft engine designs by aircraft manufacturers;
- quieter aircraft acquired by the airlines and other aircraft owners;
- operational procedures recommended by the Airport and implemented by the FAA;
- off-airport land use planning and zoning controls implemented by communities that surround the Airport;
- property acquisition and sound insulation programs instituted by the Airport;
- installation of a Noise and Operations Monitoring System (NOMS) at the Airport; and
- input related to noise issues over the years from citizens living and working in communities around the Airport.

The effect that each of these noise abatement and mitigation measures has had on improving noise compatibility for the Airport is discussed in the following sections.

Federal Legislation

Noise issues that have been present over the years at the Airport are not unique to HJAIA. Significant noise issues across the U.S. date back the late 1950s and early 1960s with the introduction of commercial jet service. The impacts created by aircraft, particularly the turbojets, led to the FAA establishing noise standards. A key standard for noise control of aircraft was the Federal Aviation Regulation (FAR) Part 36 that was first issued in 1969 and has been amended

several times since then. This standard established maximum allowable noise levels for newly designed and manufactured aircraft.

Implementation of subsequent noise legislation resulted in the phase-out of Stage 1 aircraft (the noisiest aircraft in the 1970's and 1980's fleet) by December 31, 1988. These included such aircraft as the non-retrofitted B-707's and DC-8's. The Airport Noise and Capacity Act of 1990 directed an accelerated phase-out of Stage 2 aircraft by the year 2000. Although the Act included waivers that would have allowed some delay in full compliance to the year 2004, the commercial aircraft fleet operating in the U.S. was fully compliant with the Act by midnight on December 31, 1999.

It is important to note that the acts mentioned above only apply to those aircraft weighing greater than 75,000 pounds maximum take-off weight. This excludes most business jets and regional commuter jets. The newer models of the business and commuter jets meet Stage 3 noise levels, however, many of the older model business jets still flying are Stage 2 aircraft.

New Technology

The best form of aircraft noise control is a reduction at the source. Federal legislation and the establishment of aviation regulations to reduce noise levels from aircraft was made possible because of advances in aircraft engine noise technology. In particular, the industry has developed quieter engines and improved aircraft climb performance capabilities. Turbojets of the 1960s (older B707 aircraft for example) were replaced by quieter low-bypass ratio turbofans (such as the B727). Low bypass ratio engines of the 1970s (those associated with B727, DC-9, and B737-200) were replaced by the significantly quieter, high-bypass ratio engines (used on aircraft such as the B757, B767, and B777) in the 1980s and 1990s.

Operational Noise Mitigation

Although advances in aircraft engine and airframe design has reduced aircraft noise over the years, additional noise control has resulted from the establishment of aircraft operational noise control procedures at HJAIA. The procedures developed are specific to the Airport and to the locations of the sensitive land uses surrounding the Airport. The Airport, which began evaluating operational procedures to reduce aircraft noise in the early 1970s, has implemented modified flight tracks and ground level engine run-up controls as part of its mitigation program.

Flight Tracks

In the early 1970s, the Airport began an informal noise study involving the airlines, FAA, and local elected officials in an initial effort to identify noise corridors over the least populated areas. This study resulted in the establishment of departure tracks to mitigate noise which consisted of aircraft turning to a 70-degree heading off Runway 8 and a 105-degree heading off Runway 9L. These departure procedures continued for nearly 10 years, then after subsequent noise studies, the departure tracks were again adjusted to reduce the number of people affected by aircraft noise. These subsequent departure track changes were developed as part of a comprehensive land use and airport noise compatibility study, conducted in the late 1970s and early 1980s. Specifically, departure procedures on Runway 8 and 9L were re-evaluated. The alternative procedures resulted

in Runway 8 departures being turned at the Runway 26 middle marker to a heading of 70 degrees, while simultaneous departures from Runway 9L climbed out maintaining a 90-degree heading.

Runway 9L-27R was extended, at the same time that the fourth runway (existing Runway 8L-26R) became operational (mid 1980s). Noise evaluations associated with the Runway 27R extension recommended that the departure flight track also be extended to enable departure turns to occur over the same area that they did prior to the extension. Implementation of this procedure resulted in two noise controls: no new areas would be exposed to aircraft flyovers as a result of the extended Runway 27R, and aircraft would be at slightly higher altitudes over affected communities compared to the no-extension condition.

Noise Contour Documentation

Noise analyses have been on-going at the Airport for the past 25 years, and a significant amount of data is available through documents prepared by DOA and the FAA. Key milestones in the identification of noise impacts are documented from noise contour maps prepared in conjunction with Master Plans (and Airport Layout Plan Updates), EA's, EIS's, and FAR Part 150 studies. To give an indication of the change in noise exposure around the Airport over the past 20 years, noise contours developed in conjunction with five major studies prepared for the Airport are summarized below.

Prior to discussing these studies, it should be noted that during the timeframe these studies were prepared, various computer models and noise descriptors were used to assess aircraft noise. The model used was the most current and most accurate available at the time of each study. The initial noise contours developed for the Airport described noise in terms of Composite Noise Rating (CNR) values, while later evaluations presented DNL values. Although these descriptors are different, they are based on the same information. Both include the impact of the level and duration of noise generated by individual aircraft, the effect of the number of daily aircraft events, and a penalty (increase in noise impact) for aircraft operating at night (10 p.m. - 7 a.m.). In addition, the noise contours resulting from both represent the cumulative noise exposure for an average 24-hour day. For the purposes of comparison in this report, the CNR 100 value has been assumed to generally correspond to the DNL 65.

The 1973 Airport Layout Plan presented one of the first sets of noise contours prepared for the Airport. In 1973, approximately 85 percent of the departure activity and virtually all of the arrival activity occurred on the three east-west runways; approximately 15 percent of the departing aircraft used the crosswind Runway 3-15. The majority (70 percent) of the large air carrier aircraft operations were Stage 1 B727s and DC9s, with only two percent representing the Stage 3 fleet. Approximately 20 percent of the 520,000 aircraft operations that year occurred at night (10 p.m. – 7 a.m.). In 1973, the DNL noise methodology was not in use, but noise contours were developed using the CNR methodology. Criteria associated with this methodology indicated that the high noise impacts associated with aircraft activity were those areas within the CNR-100 or greater noise contour. The 1973 contour covered approximately 160 square miles of land (inclusive of Airport property).

The next comprehensive noise analysis was conducted as part of the **Noise Assessment and Abatement Study** published in April, 1980. That study developed the DNL noise contours for the 1978 condition at the Airport. By 1978, the crosswind Runways 3-21 and 15-33 had been decommissioned. Compared to the 1973 condition, nighttime activity had reduced to about 18

percent, true turbojets were continuing to be phased out, the Stage 3 fleet had increased to nine percent (mostly L-1011s), and the total number of operations had increased to approximately 560,000 per year.

In early 1982, the **Environmental Assessment for the Proposed Fourth Runway** was published and contained a noise analysis of the 1980 base case condition. The 1980 condition represented slightly improved noise conditions from those in 1978 (Stage 2 aircraft up to 60 percent of the fleet and Stage 3 up to 10 percent), substantial reductions in noise contour area resulted. This reduction was attributable, in part, to an improved fleet mix, but also to improved methods of aircraft noise modeling. During the 1970s, aircraft noise modeling was in its infancy stage. By the early 1980s, additional aircraft-specific noise data had been developed, noise modeling techniques had improved, and new noise models had been developed based on extensive validation by the federal government. The updated noise model used for the Fourth Runway EA (NOISEMAP) led to a 65 DNL contour encompassing a substantially smaller area (about 60 square miles inclusive of Airport property). The report also documented population within the noise contours and indicated that approximately 81,000 people lived within the 65 DNL or greater contour in 1980.

The fourth milestone noise analysis, included in the **Environmental Assessment for the Proposed Commuter Runway** (published in 1993), analyzed the baseline 1991 condition. By 1991, major changes had taken place: the fourth parallel runway had been constructed, Stage 3 aircraft at the Airport were up to 50 percent of the fleet, and nighttime activity was down to 14 percent. However, annual operations, which had grown steadily through the 1980s, reduced to the year 1980 levels of about 600,000 due primarily to Eastern Airlines ceasing operation. The noise contours for 1991 indicated that the 65 DNL noise contour area had been reduced to approximately 25 square miles (inclusive of Airport property).

The fifth milestone noise analysis was completed in 2001 for the **Final Environmental Impact Statement for the 9,000-Foot Fifth Runway and Associated Projects.** This analysis analyzed the years of 1998, 2007, and 2012. In 1998, the percentage of Stage 3 aircraft at the Airport continued to climb and overall traffic was exhibiting a steady growth. The future years of 2007 and 2012 assumed an all Stage 3 fleet, with the majority of those consisting of original manufacture Stage 3 aircraft, and the full operation of the new 9,000-foot air carrier runway. The square miles within the contours for 1998 were at 37.79. The 2007 and 2012 contours indicated a decrease in the overall size of the contours to 29.45 and 27.87 square miles. This is attributed to the phase out of Stage 2 aircraft.

Off-Airport Land Use Planning

An important part of overall noise mitigation in the Airport environs is the control of land uses located in areas considered significantly affected by aircraft noise (areas within the 65 DNL). Land use controls are the responsibility of each of the political jurisdictions that has property within these areas.

As early as the mid 1960s, City and Airport officials maintained a close working relationship with Atlanta Region Metropolitan Commission (the forerunner of the current Atlanta Regional Commission). The Commission, working with the Airport, incorporated the adopted plan for HJAIA into the Regional Comprehensive Plan. In this undertaking, the City of Atlanta implemented the recommendations of the Commission with respect to long range planning and

coordinated with affected governmental jurisdictions in the preparation of the Airport Layout Plan.

In preparation of future growth, a series of public hearings was also conducted in Atlanta, College Park, Forest Park, and Clayton County to inform citizens of future plans for the Airport and its noise abatement and mitigation programs. Citizens were given the opportunity to provide input on noise impacts in their communities and how the noise abatement/mitigation programs should be designed and coordinated. These meetings also provided Airport officials with additional information needed to analyze noise impacts around the Airport and assisted in identifying specific areas for immediate and long-term action. Written surveys were widely distributed to citizens living in the participating jurisdictions to obtain additional information related to land use and noise around the Airport, and to map specific residential locations. As the noise abatement and land use programs were more formally developed and implemented, citizen involvement programs in each jurisdiction were also more formally established to involve citizens in the planning process (discussed in more detail in the following sections).

1980 ANALUC Program

An Atlanta Airport Noise Abatement and Land Use Compatibility (ANALUC) study began in 1978. DOA, Clayton County, and the cities of Forest Park and College Park sponsored the study. Funding for this study was provided under FAA's ANCLUC Program. The study included the evaluation of a series of operational controls considered for noise reduction and a series of Land Use Compatibility Plans prepared by each of the political jurisdictions participating in the study. The plans identified the land use control measures, which each political jurisdiction proposed, to minimize the impact of aircraft noise. The initial focus of the Land Use Compatibility Plans was on those portions of Atlanta, College Park, Forest Park, and unincorporated Clayton County located in the future 75 DNL noise exposure area; with later expansion of control evaluations for areas within the 65 DNL contour.

The four political jurisdictions developed their own land use compatibility plans based on a variety of noise mitigation techniques including:

- rezoning,
- subdivision ordinance amendments,
- building code revisions,
- easements,
- soundproofing,
- purchase guarantee programs,
- acquisition/relocation/redevelopment,
- tax incentives, and
- noise impact districts.

A Monitoring and Review Committee was established as an advisory board to provide ongoing guidance for implementation of the land use compatibility plans for each of the four participating jurisdictions. The Committee was officially established during the ANALUC study. The Committee met quarterly during the year to conduct Committee business, with membership consisting of one representative appointed from each of the jurisdictions and the U.S. Environmental Protection Agency (EPA). Non-voting members included representatives from

the FAA, the ARC, airline operational representatives, and a representative from the Noise Abatement office of the DOA.

In addition, each jurisdiction implemented a formal Citizens Airport Advisory Committee (CAAC). This committee, established during the ANALUC study, aimed at involving a wide spectrum of the noise-impacted residents in the planning process early in each study. Regular meetings were held with each CAAC as well as the general public at intervals where significant planning alternatives were being considered. Between the four participating jurisdictions, a total of 81 public involvement meetings and/or hearings were conducted to involve local citizens in the planning process. Primary concerns expressed by citizens during that time included the preservation of residential areas and compatible redevelopment plans of acquired properties.

Several regulatory controls (through zoning) have been adopted and future land use plans were prepared and implemented by the four participating jurisdictions as a result of the ANALUC studies. Each jurisdiction's land use compatibility plan envisioned redevelopment primarily through industrial and commercial uses. However, because of the magnitude of buyouts in the Airport vicinity, redevelopment was staged over long periods of time. Additionally, local funding needed to consider the provision of new infrastructure to support changing land uses.

Property Acquisition and Reuse

Significant progress has been made toward reducing the numbers of people and noise sensitive uses exposed to high noise levels through property acquisition and the reuse of land. In 1976, initial steps were taken to alleviate the noise problem with the initiation of two pilot land acquisition and relocation programs in an area called Plunkettown and in the City of Mountain View. The Plunkettown program acquired 49 homes with Community Development Block Grant (CDBG) monies to make way for future industrial development. This program was completed in 1982 at a cost of approximately $1.6 million. The Mountain View land acquisition and relocation program was undertaken by the City of Atlanta with assistance from Airport Development Aid Program (ADAP) grants funded through the FAA. Over 400 homes were acquired in this area at a total cost of approximately $16.3 million. These two programs were integral parts of the City of Atlanta and Clayton County Land Use Compatibility Plans.

In 1980, the City of Atlanta began purchasing homes in the noise impacted community of Poole Creek. A combination of CDBG and Airport Improvement Program (AIP) funds were used to fund the acquisition of approximately 455 homes. This was also an integral part of the Land Use Compatibility Plan for the City of Atlanta.

Implementation of the Land Use Compatibility Plan for the City of College Park began in 1981 with the acquisition of homes in a high noise area immediately west of the Airport. Approximately 600 homes were acquired and approximately 200 families relocated at a total cost of $20.0 million. To date, approximately 2,720 homes have been acquired at a total cost of $71.5 million.

Acoustical Treatment Program

In the early 1980s, sound insulation and right-of-flight easement programs were developed to permit persons who live and own property near the Airport to enjoy a maximum amount of freedom from noise and other impacts generated by the operation of the Airport while inside their

home. Residential structures (single and multi-family) located in the 75 DNL contour were identified as eligible for voluntary participation in the program to reduce interior noise to a maximum level of 45 dBA.

With federal funding becoming available, the Airport worked closely with the four participating ANALUC jurisdictions to begin treating residential structures on a noise impact priority basis, with first priority given to owner-occupied dwellings located in areas where noise was most intense. The program was initiated in phases with more than 1,700 structures receiving insulation during the first phase of the program.

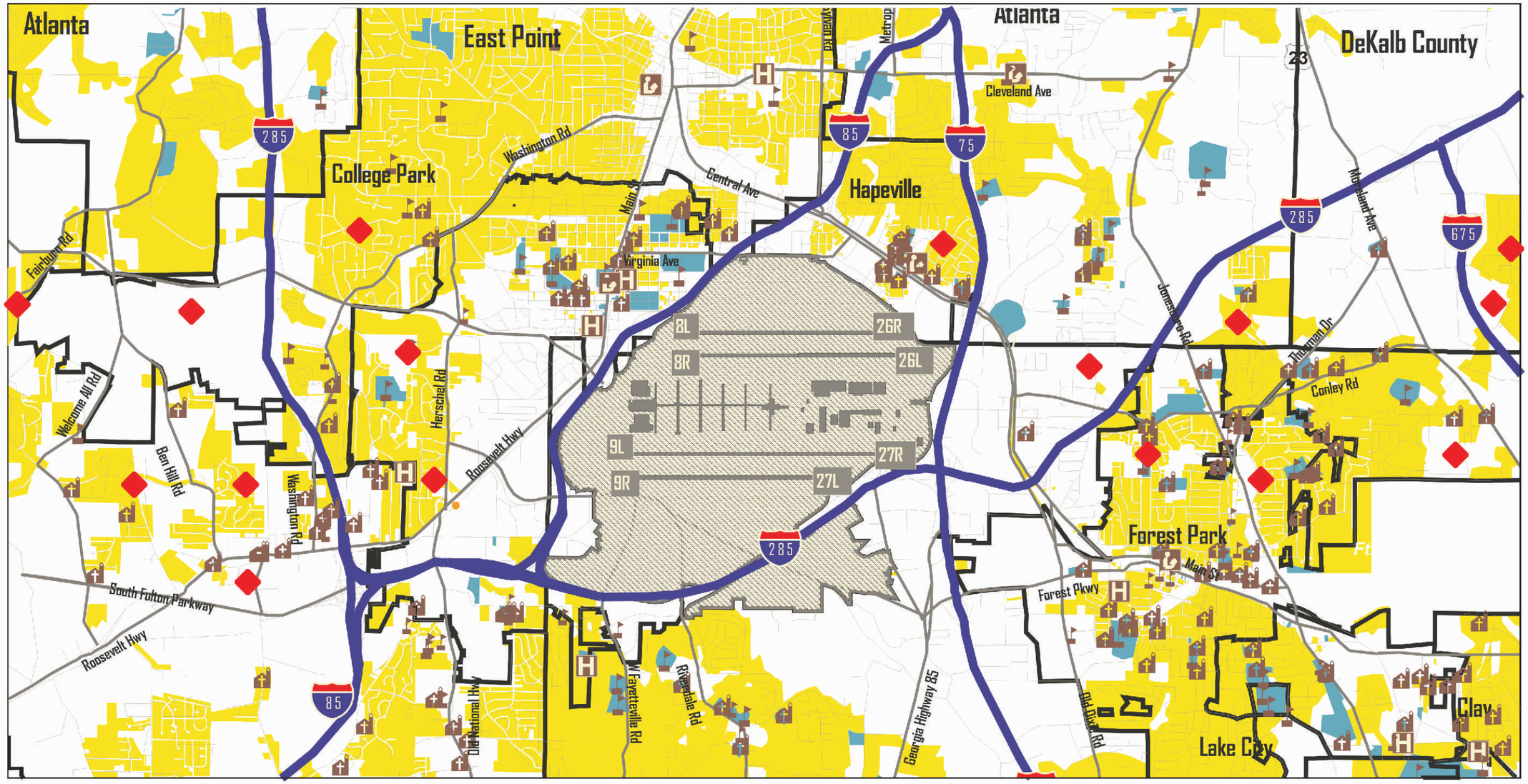
The scope of the sound insulation program generally consists of methods involving storm doors and windows, sound protective exterior doors, attic insulation, mechanical systems, and electrical revisions. Each eligible structure received an individual noise insulation survey to determine what sound attenuation method was needed.

Those persons participating in the acoustical treatment programs were also required to participate in avigation easement programs. An avigation easement allows the Airport to operate aircraft over a particular land area under a long-term agreement with the land owner. The affected property owner receives compensation representing a certain percentage of the fair market value of the property. In return for the insulation treatment and the one-time differential payment, the property owner agrees to allow the Airport to operate over the property without the threat of litigation.

Noise and Operations Monitoring System (NOMS)

In 1996, the Airport began the installation of its noise and operations monitoring system (NOMS). The system includes analytical tools for providing highly accurate information about aircraft flight paths and the level of aircraft noise in the Airport vicinity. The system provides valuable information for use in evaluating noise exposure, reducing noise impacts, and communicating with noise impacted neighbors.

The system consists of 16 permanent noise monitoring stations, shown in **Figure A-1**, located primarily around the 65 DNL noise contour. The permanent monitors continually collect and accumulate noise exposure data. In addition, the NOMS has a direct connection to the FAA's ARTS for documenting aircraft identification and flight track information. Data from both the noise monitors and the ARTS system are fed to a central monitoring and control station located in the terminal building. This data is managed by Airport noise monitoring personnel and is available for use to respond to noise complaints and enhance communications with Airport neighbors. The development of the NOMS data is also of use in accurately refining noise contours associated with the property acquisition program, environmental assessments, FAR Part 150 studies, and Airport master plans.



SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure A-1

Permanent Noise Monitoring Sites

Appendix B
Noise Analysis

APPENDIX B

Noise Analysis

While a great deal is known about aircraft noise, the methods used to calculate noise exposure can be difficult to understand. Determining aircraft noise impacts involves logarithmic averages and the noise energy from single events. In 14CFR150 (Part 150), the FAA requires use of a primary metric for assessing aircraft noise impacts called the Day-Night Average Sound Level (DNL) to describe aircraft noise and potential impacts. The DNL combines the noise energy from all aircraft operations occurring from the events in one day into an average, even applying a penalty to nighttime events, between the hours of 10:00 p.m. and 7:00 a.m., when people are more negatively affected by unwanted noise impacts. This appendix describes what noise is, what metrics exist (including DNL) to measure noise impacts, and how certain metrics relate to one another.

Characteristics of Sound

Amplitude and Frequency

Sound can be technically described in terms of its sound pressure (amplitude) and frequency (similar to pitch). Amplitude is a direct measure of the magnitude, or loudness, of a sound without consideration for other factors that may influence its perception. The ranges of sound pressures that occur in the environment are so large that it is convenient to express these pressures as sound pressure levels on a logarithmic scale. The standard unit of measurement of sound is the decibel (dB). A sound pressure level in dB describes the pressure of a sound relative to a reference pressure. The logarithmic scale compresses the wide range in sound pressures to a more usable range of numbers.

For example, a sound level of 70 dB has 10 times as much acoustic energy as a level of 60 dB; while a sound level of 80 dB has 100 times as much acoustic energy as a level of 60 dB. In terms of human response to noise, the perception is very different. A sound 10 dB higher than another sound is usually judged to be twice as loud; 20 dB higher four times as loud; and so forth.

The frequency of sound is expressed as Hertz (Hz) or cycles per second. The normal audible frequency range for young adults is 20 Hz to 20,000 Hz. The prominent frequency range for community noise, including aircraft and motor vehicles, is between 50 Hz and 5,000 Hz. The human ear is not equally sensitive to all frequencies, with some frequencies judged to be louder for a given signal than others. As a result, research studies have analyzed how individuals make relative judgments as to the “loudness” or “annoyance” to a sound. The most prominent of these scales includes Loudness Level, Frequency-Weighted Contours (such as the A-weighted scale), and Perceived Noise Level. Noise metrics used in aircraft noise assessments are based upon these frequency weighting scales, which are discussed in the following paragraphs.

Loudness Level

This scale has been devised to approximate the human subjective assessment to the "loudness" of a sound. Loudness is the subjective judgment of an individual as to how loud or quiet a particular sound is perceived. This sensitivity difference varies for different sound pressure levels.

Frequency-Weighted Contours (dBA, dBB, and dBC)

In order to simplify the measurement and computation of sound loudness levels, frequency-weighted networks have obtained wide acceptance. The equal loudness level contours for 40 dB, 70 dB, and 100 dB have been selected to represent human frequency response to low, medium, and loud sound levels. By inverting these equal loudness level contours, the A-weighted, B-weighted, and C-weighted frequency weightings were developed. These frequency-weighted contours are presented in **Figure B-1**.

The most common weighting is the A-weighted noise curve. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. In the A-weighted decibel, everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Most community noise analyses are based upon the A-weighted decibel scale. Examples of various sound environments, expressed in dBA, are presented in **Figure B-2**.

Communities close to some airports have expressed an interest in utilizing a noise curve other than A-weighting for lower frequency noise sources. For example, the C-weighted curve is used for the analysis of the noise impacts from artillery noise. For evaluation of aircraft noise, A-weighting is used as the majority of the noise associated with aircraft operations is better suited to the A-weighting, and no mitigation methods have been proven to be effective for C-weighted noise (i.e., sound insulation).

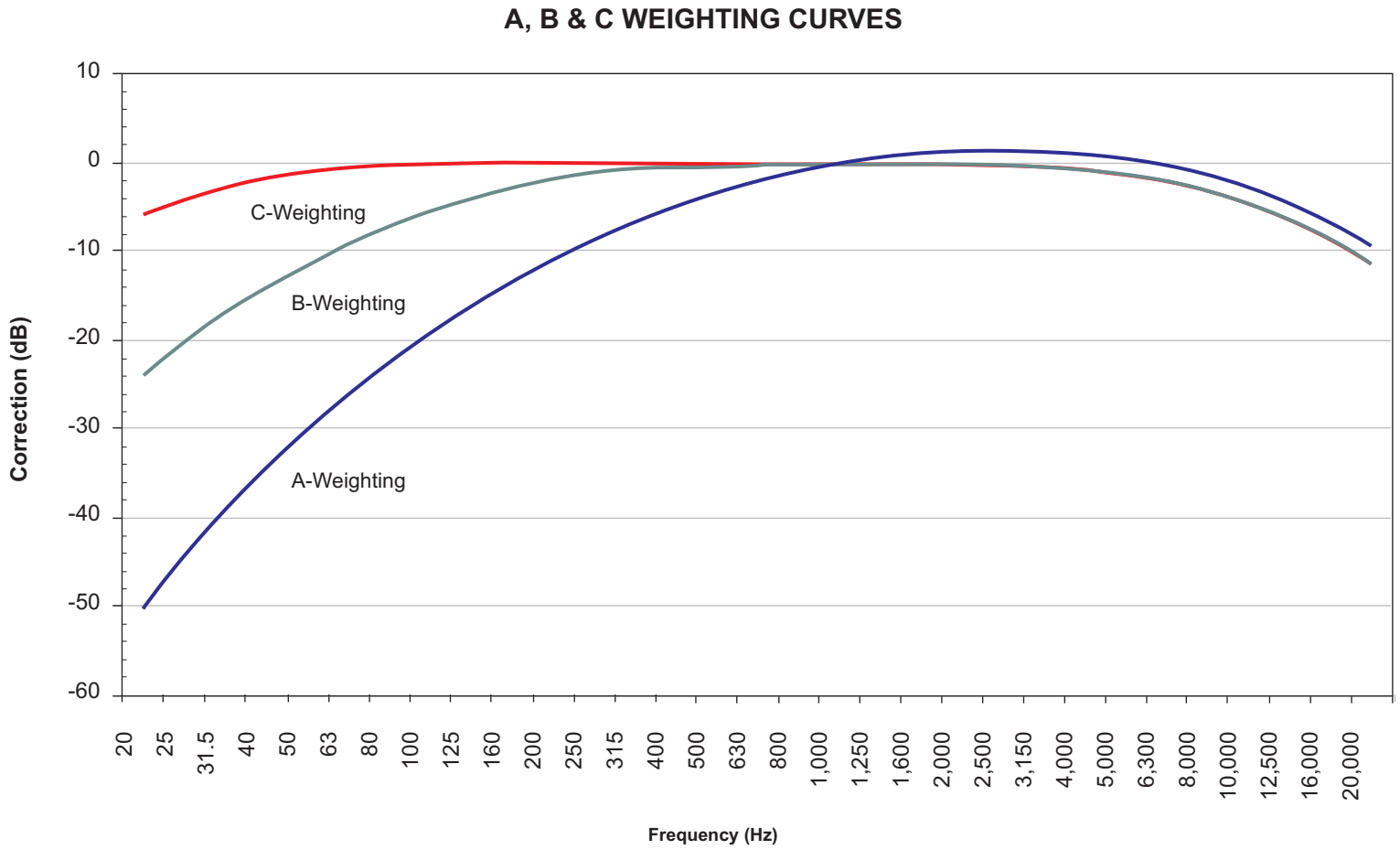
Perceived Noise Level

Perceived noisiness is another method of rating sound. It was originally developed for the assessment of aircraft noise. Perceived noisiness is defined as "the subjective impression of the unwantedness of a not-unexpected, nonpain, or fear-provoking sound as part of one's environment," (Kryter, 1970). "Noisiness" curves differ from "loudness curves" in that they have been developed to rate the noisiness or annoyance of a sound as opposed to the loudness of a sound.

As with loudness curves, noisiness curves have been developed from laboratory psychoacoustic surveys of individuals. However, in noisiness surveys, individuals are asked to judge in a laboratory setting when two sounds are equally noisy or disturbing if heard regularly in their own environment. These surveys are more complex and are therefore subject to greater variability.

Propagation of Noise

Outdoor sound levels decrease as a function of distance from the source, and as a result of wave divergence, atmospheric absorption, and ground attenuation. If sound is radiated from a source in a homogenous and undisturbed manner, the sound travels as spherical waves. As the sound wave

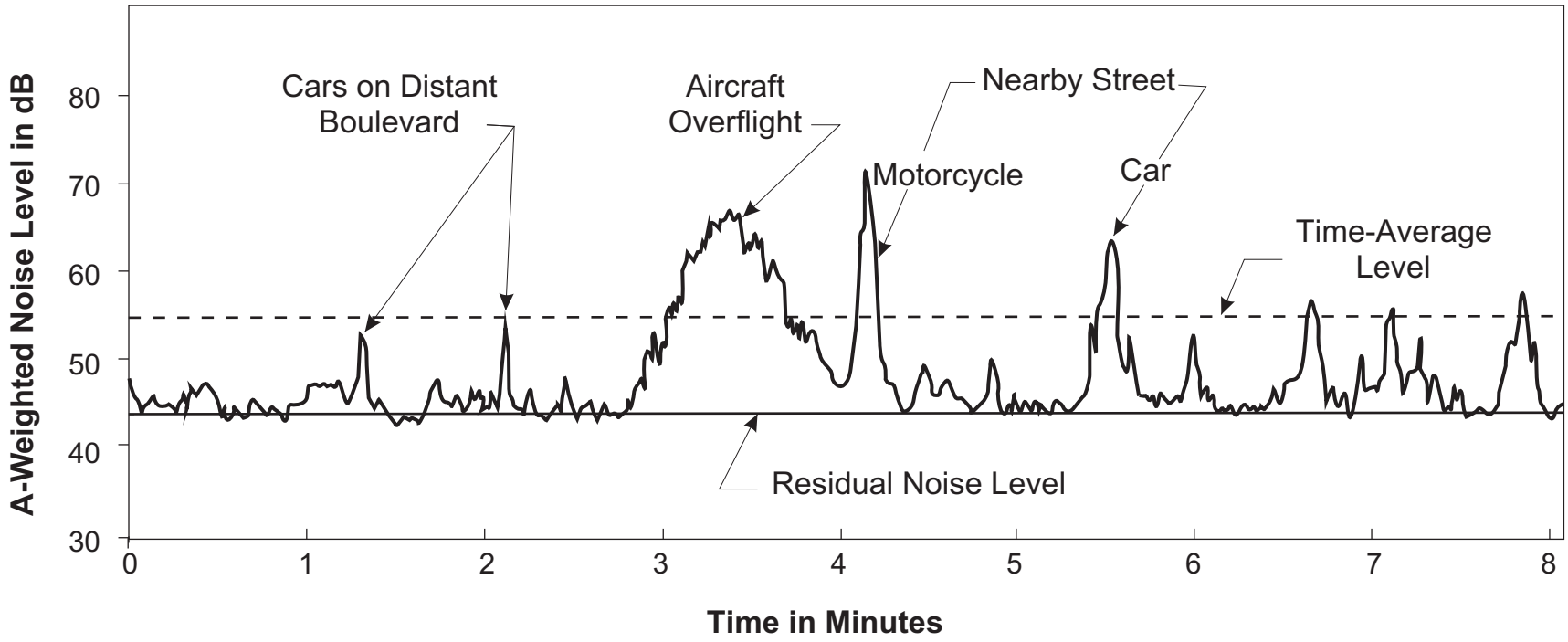


SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure B-1

Frequency Weighting Curves



SOURCE: *Aircraft Noise: How We Measure It and Assess Its Impact*, USDOT FAA

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Figure B-2

Examples of Various Sound Environments

travels away from the source, the sound energy is distributed over a greater area, dispersing the sound power of the wave. Spherical spreading of the sound wave reduces the noise level, for most sound sources, at a rate of 6 dB per doubling of the distance.

Atmospheric absorption also influences the levels that are received by the observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of absorption is a function of the sound frequency, of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest at high humidity and higher temperatures. Turbulence and gradients of wind, temperature, and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can also result in higher noise levels that would result from spherical spreading as a result of channeling or focusing the sound waves.

Absorption effects in the atmosphere vary with frequency. The higher frequencies are more readily absorbed than the lower frequencies. Over large distances, the lower frequencies become the dominant sound as the higher frequencies are attenuated.

The effects of ground attenuation on noise propagation are a function of the height of the source and/or receiver and the characteristics of the terrain. The closer the source of the noise is to the ground, the greater the ground absorption. Terrain consisting of soft surfaces, such as vegetation, provide for more ground absorption than hard surfaces such as a body of water. Ground attenuation is important for the study of noise from airfield operations (such as thrust reversals) and in the design of noise berms and engine run-up facilities.

These factors are an important consideration for assessing in-flight and ground noise in the Atlanta region. Atmospheric conditions will play a role in affecting the sound levels on a daily basis and how the population perceives these sounds.

Duration of Sound

Research has shown that the annoyance from a noise event increases with increased duration of the event. The “effective duration” of a sound is the time between when a sound rises above the background sound level until it drops back below the background level. Psychoacoustic studies have determined a relationship between duration and annoyance. These studies determined the amount a sound must be reduced to be judged equally annoying for increased duration (longer durations at low sound levels are equally annoying as shorter durations at higher levels). Duration is an important factor in describing sound in a community setting.

The relationship between duration and noise level is the basis of the equivalent energy principal of sound exposure. Reducing the acoustic energy of a sound by one-half results in a 3 dB reduction. Doubling the duration of the sound increases the total energy of the event by 3 dB. This equivalent energy principal is based upon the premise that the potential for a noise to impact a person is dependent on the total acoustical energy content of the noise.

Change in Noise

The concept of change in ambient sound levels can be understood with an explanation of the hearing mechanism's reaction to sound. The human ear is a far better detector of relative differences in sound levels than absolute values of levels. Under controlled laboratory conditions, listening to a steady unwavering pure tone sound that can be changed to slightly different sound levels, a person can just barely detect a sound-level change of approximately 1 dB for sounds in the mid-frequency range. When ordinary noises are heard, a young healthy ear can detect changes of 2 to 3 dB. A 5 dB change is readily noticeable, while a 10 dB change is judged by most people as a doubling or halving of the loudness of sound.

Masking Effect

Another characteristic of sound is its ability to interfere with the ability of the listener to hear another sound. This interference is defined as the masking effect. The presence of one sound effectively raises the threshold of audibility for the hearing of a second sound. For a signal to be heard, it must exceed the threshold of hearing for that particular individual and exceed the masking threshold for the background noise.

The masking characteristics of sound depend upon many factors, including the spectral (frequency) characteristics of the two sounds, the sound pressure levels, and the relative start time of the sounds. The masking effect is greatest when the masking frequency is closest to the frequency of the signal. Low frequency sounds can mask higher frequency sounds; however, the reverse is not true.

Sound Rating Scales

The description, analysis, and reporting of community sound levels is made difficult by the complexity of human response to sound and the myriad of sound-rating scales and metrics that have been developed for describing acoustic effects. Various rating scales have been devised to approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters, such as duration and cumulative effect of multiple events.

Noise metrics can be categorized as single-event metrics and cumulative metrics. Single-event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day.

Single Event Metrics

- *Frequency-Weighted Metrics (dBA)* – In order to simplify the measurement and computation of sound loudness levels, frequency-weighted networks have obtained wide acceptance. The A-weighting (dBA) scale has become the most prominent of these scales and is widely used in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured.

- *Maximum Noise Level* – The highest noise level reached during a noise event is called the "Maximum Noise Level," or Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets, the louder the sound until the aircraft is at its closest point. As the aircraft passes, the noise level decreases until the sound settles to ambient levels. It is this metric to which people generally respond to when an aircraft flyover occurs. An aircraft flyover is graphically illustrated at the top of **Figure B-3**.

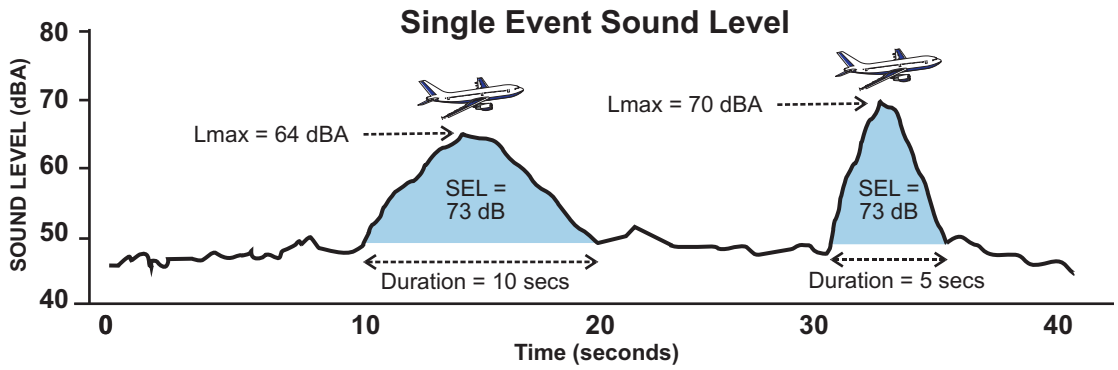
Supplemental Metrics

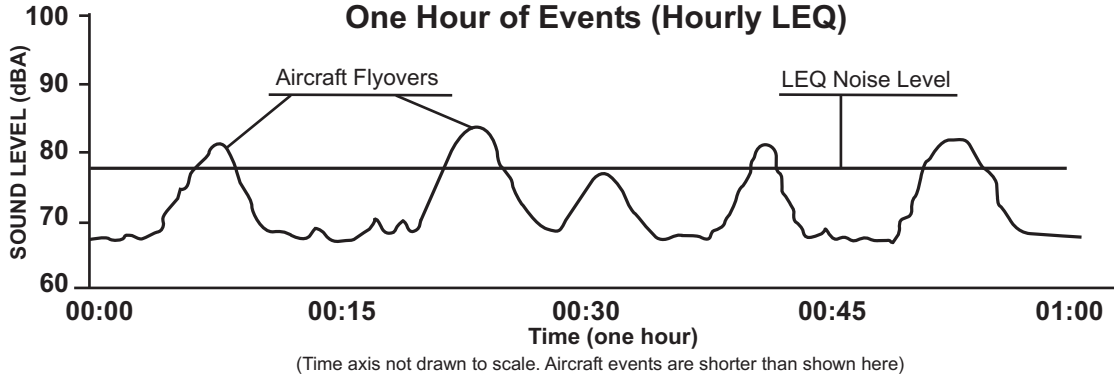
- *Time Above (TA)* – The FAA has developed the Time Above metric as a second metric for assessing the impacts of aircraft noise around airports. The TA index refers to the total time in seconds or minutes that aircraft noise levels exceed certain dBA noise levels in a 24-hour period. It is typically expressed as Time Above 75 and 85 dBA sound levels. While this metric is not widely used, it may be used by the FAA in environmental assessments of airport projects that show a significant increase in noise levels (a 1.5 DNL increase within the 65 DNL contour due to a project). There are no noise/land use standards in terms of the TA index.

- *Percent Noise Level (Ln)* – To account for intermittent or fluctuating noise, another method to characterize noise is the Percent Noise Level (Ln). The Percent Noise Level is the level exceeded n% of the time during the measurement period. It is usually measured in dBA, but can be an expression of any noise rating scale. For example, L90 is the noise level exceeded 90 percent of the time; L50 is the level exceeded 50 percent of the time; and L10 is the level exceeded 10 percent of the time. L90 is generally regarded as the background sound level, L50 represents the median level, and L10 represents the peak or intrusive noise levels. Percent noise level is commonly used in community noise ordinances that regulate noise from mechanical equipment, entertainment noise sources, etc. It is not normally used for transportation noise regulation. This noise metric is also referred to as Time Above (Ta) in certain publications.

- *Sound Exposure Level (SEL)* – Another metric that is reported for aircraft flyovers is the Sound Exposure Level (SEL) metric. It is computed from dBA sound levels. Referring again to the top of Figure B-3, the shaded area, or the area within 10 dB of the maximum noise level, is the area from which the SEL is computed. The SEL value is the integration of all the acoustic energy contained within the event into a time period of 1 second. Speech and sleep interference research can be assessed relative to Single-Event Noise Exposure Level data.

  This metric takes into account the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is typically about 10 dBA higher than the maximum noise level. Single event metrics are a convenient method for describing noise from individual aircraft events. This metric is useful in that airport noise models contain aircraft noise curve data based upon the SEL metric. In addition, cumulative noise metrics such as Equivalent Noise Levels (Leq) and DNL can be computed from SEL data.





(Time axis not drawn to scale. Aircraft events are shorter than shown here)

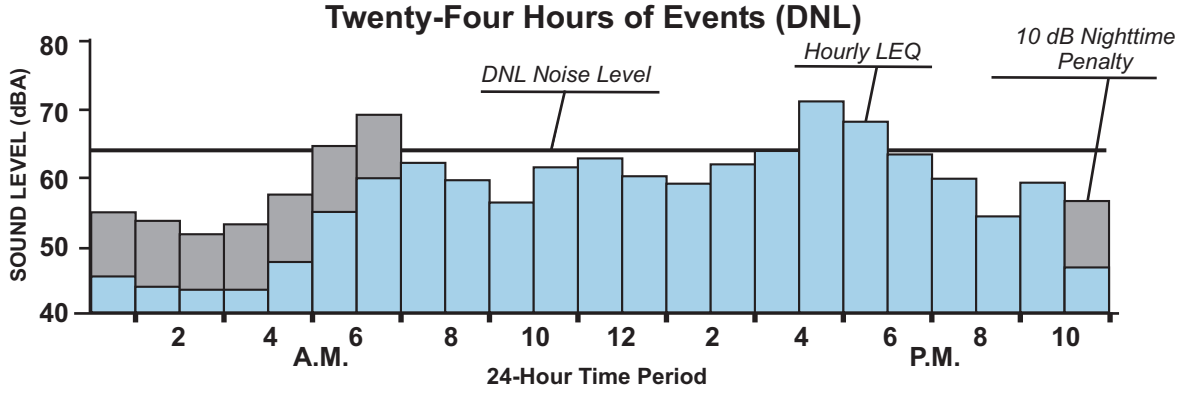


Figure B-3

SEL, LEQ and DNL Illustrations

Cumulative Metrics

Cumulative noise metrics have been developed to assess community response to noise. They are useful because these scales attempt to include the loudness of the noise, the duration of the noise, the total number of noise events, and the time of day these events occur into one single number rating scale.

- *Equivalent Noise Level (Leq)* – Leq is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. Leq is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. It is the energy sum of all the sound that occurs during that time period. This is graphically illustrated in the middle graph of Figure B-3. Leq can be measured for any time period, but is typically measured for 15 minutes, 1 hour, or 24 hours.

- *Day-Night Noise Level (DNL)* – The DNL index is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The time-weighting refers to the fact that noise occurring during certain sensitive time periods is penalized for occurring at these times. In the DNL scale, noise occurring between the hours of 10 p.m. to 7 a.m. is penalized by 10 dB. This penalty was selected to attempt to account for the higher sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occur in the nighttime. The FAA specifies DNL for airport noise assessment, and the EPA specifies DNL for community noise and for airport noise assessments. DNL is graphically illustrated in the bottom of Figure B-3.

Appendix C
Airport Environs

APPENDIX C

Airport Environs

The general FAR Part 150 Study area encompasses those areas contained within and slightly beyond the noise contours. The detailed study area is a specified area closer to the Airport and contained within the noise contours. The detailed study area is analyzed and evaluated for population and housing impacts, land use compatibility, and several other types of relevant technical data.

The cities of Atlanta, College Park, East Point, Forest Park, Hapeville, Jonesboro, Lake City, Union City, Morrow, Riverdale, Fulton County, and Clayton County are the political jurisdictions included in the study area. **Figure C-1** illustrates the study area, as well as the boundaries of each political jurisdiction.

The following provides a brief description of each jurisdiction within the FAR Part 150 general study area.

Atlanta

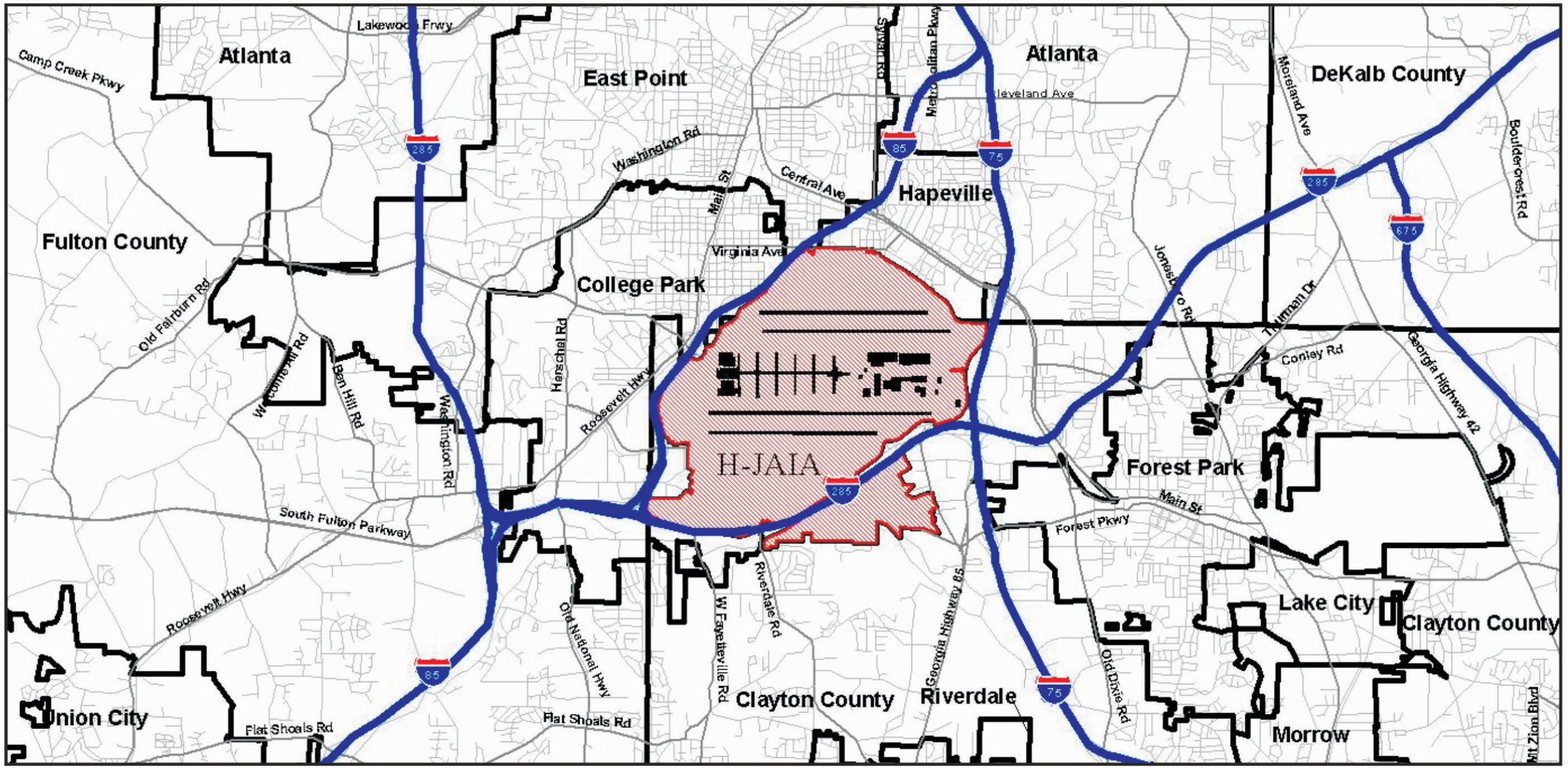
Portions of the study area, within the City of Atlanta, are located northwest and northeast of the Airport. Northwest of the Airport, in the vicinity of East Point and College Park, the land use in Atlanta is commercial, industrial and residential. Interstate 285 (I-285) also extends through this area. Northeast of the Airport, the land use is also residential, commercial, and industrial with I-75 and I-85 both extending through the area. According to the 2000 US Census, there are approximately 420,000 residents in the City of Atlanta.

Clayton County

The cities of Forest Park and Lake City and a portion of the City of College Park are located with Clayton County. Unincorporated portions of Clayton County abut Hartsfield-Jackson International Airport's southern and western property line. In the year 2000, 236,517 persons resided in 82,243 households within the 142.6 square miles of the County. Within the 2007 noise contours, Clayton County does not presently have any land uses that are incompatible with aircraft noise. A review future land use plans for the area indicate that the political jurisdiction's plans are for the area within the 2007 and 2012 noise contours to remain compatible. The cities of Forest Park and Lake City are located with Clayton County.

College Park

The City of College Park, a 9.7 square mile area, is located west of the Airport. Based on year 2000 US Census data, approximately 20,380 persons reside within the City of College Park (with approximately 92 percent of the population residing within the Fulton County portion of the City). College Park has, and is, undergoing expansion by annexing neighboring, unincorporated portions of north Clayton and south Fulton counties. Within the 2007 noise contours, the vast



SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Figure C-1

Study Area

majority of the incompatible land uses within the City of College Park are residences (single-family and multi-family) located west of Hershel Road. A review of future land use plans for the area indicates that these areas are expected to remain incompatible with aircraft noise.

Jonesboro

The City of Jonesboro is located 3 miles south of I-75 and 10 miles south of the Airport. This city is the County seat of Clayton County. Based on year 2000 US Census data, approximately 3,829 persons reside in this area. A review of the noise contours for the years 2007 and 2012 indicate that the City of Jonesboro is not and would be located within the Airport's noise contours.

East Point

The City of East Point is located north of the Airport and west of I-85. Founded in 1887, East Point is the third largest city in Fulton County and is home to nearly 40,000 residents. The City of East Point is comprised of primary residential and commercial land uses. Within the 2007 noise contours, the vast majority of the incompatible land uses are residences (single-family and multi-family) located west of Washington Road. A review of future land use plans for the area indicates that these areas are expected to remain incompatible with aircraft noise.

Forest Park

The City of Forest Park is located east of the Airport in northern Clayton County. The City encompasses the Fort Gillem Military Reservation which is located in the northern section of the City. Forest Park has a population of approximately 21,447 and the land uses consists of a mix of residential, commercial, and light industrial.

Fulton County

The City of Atlanta, a portion of the City of College Park, and the cities of East Point, and Hapeville are located with Fulton County. According to the 2000 Census, approximately 816,006 persons reside within this 535 square mile area. An unincorporated portion of Fulton County is located southwest of the Airport. Within the unincorporated portion that lies within the 2007 noise contours, the land use is primarily residential and a review of future land use plans indicate that this use is expected to remain. Notably, a vast majority of the residences have been either acquired or have received sound insulation treatment for aircraft noise.

Hapeville

The City of Hapeville is located along the northern boundary of the Airport between I-75 and I-85. The City of Hapeville has a population of approximately 6,000 residents and is comprised of a mixture of land uses including residential, commercial, and industrial.

Lake City

The City of Lake City is located southeast of Hartsfield-Jackson Atlanta International Airport. The area, encompassing 1.8 square miles, has approximately 3,000 residents. No portions of the City of Lake City are located within either the 2007 or 2012 noise contours for the Airport.

Morrow

The City of Morrow is located approximately 4 miles southeast of the Airport. There are approximately 5,000 residences in this area. The land use in the City of Morrow is a mixture of residential, commercial, and industrial land uses. No portions of the City of Morrow are located within either HJAIA's 2007 or 2012 noise contours.

Union City

The City of Union City is located approximately 4 miles southwest of the Airport. The land use within the boundaries of Union City consists of mostly residential and commercial uses. Roosevelt Highway, Jonesboro Road and Flat Shoals Road are major roadways that extend through the City. These roadways are significant commercial corridors.

Riverdale

The City of Riverdale is located approximately 2 miles south of the Airport within Clayton County. Based on the 2000 US Census, approximately 12,000 people reside in this area. The land use in the City of Riverdale consists mostly of residential and commercial development. The residential areas of Riverdale are concentrated in the eastern and western portions of the city, while commercial land uses are located mostly in the central portions. State Route 85, which extends north/south through this area, is located in the central portion of Riverdale. No portions of the City of Riverdale are located within either the 2007 or 2012 noise contours for the Airport.

Appendix D
Runway Utilizations

Number of Operations by Aircraft Type and Time of Day - 2007

Hartsfield-Jackson Atlanta International Airport - FAR Part 150 Study

			Day																				Night															Total	
			Arrivals										Departures										Arrivals										Departures								
Category	A/C Type	No. of Ops	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	Arrivals	Departures
Passenger - Air Carrier	717200	368	28.98			25.12	7.73		53.82	46.64		14.35	176.64		26.40	30.27		3.22	49.04			56.21	5.98	171.12	1.29			1.29			2.39	2.39			7.36		1.93	2.58			3.5880			4.78		12.88	184.00	184.00
	737300	44	2.54			2.93	1.08		4.72	5.43		2.00	18.70		3.31	3.31		0.39	6.15			6.15	0.72	20.02	0.77			0.39			1.43	0.72			3.30			0.69						1.29		1.98	22.00	22.00
	737700	154	10.24			10.51	2.96		19.02	19.52		5.51	67.76		11.32	12.13		1.35	21.02			22.52	2.50	70.84	1.89			1.35			3.50	2.50			9.24		0.81	1.35			1.5015			2.50		6.16	77.00	77.00
	737800	144	9.83			9.58	3.28		18.25	17.78		6.08	64.80		10.58	10.84		1.26	19.66			20.12	2.34	64.80	1.26			1.26			2.34	2.34			7.20		1.01	1.51			1.8720			2.81		7.20	72.00	72.00
	747400	2	0.35						0.65				1.00			0.35						0.65		1.00																						1.00	1.00
	767300	130	10.24			8.19	1.82		19.01	15.21		3.38	57.85		5.69	15.47		1.14	10.56			28.73	2.11	63.70	1.14			1.37			2.11	2.54			7.15			0.46						0.85		1.30	65.00	65.00
	767400	48	3.36			2.94	1.68		6.24	5.46		3.12	22.80		2.94	5.04			5.46			9.36		22.80				0.42				0.78			1.20			0.42						0.78		1.20	24.00	24.00
	777200	14	1.59			0.86			2.96	1.59			7.00		0.42	1.62			0.77			3.00		5.81														0.42						0.77		1.19	7.00	7.00
	757PW	256	16.13			19.71	5.82		29.95	36.61		10.82	119.04		14.34	25.54		2.24	26.62			47.42	4.16	120.32	2.24			0.90			4.16	1.66			8.96		0.90	1.79			1.6640			3.33		7.68	128.00	128.00
	A319	32	2.80			0.78			5.20	1.46			10.24		3.58	0.39			6.66			0.73		11.36	2.02						3.74				5.76		1.62				3.0160					4.64	16.00	16.00
	A320	18	1.20			1.17	0.38		2.22	2.16		0.70	7.83		2.74	0.41			5.09			0.76		9.00				0.41				0.76			1.17											9.00	9.00
	A340	4	0.35			0.35			0.65	0.65			2.00			0.70						1.30		2.00																						2.00	2.00
	DC95HW	20	2.80			0.70			5.20	1.30			10.00		3.50				6.50					10.00																						10.00	10.00
	MD83	458	31.26			29.66	16.03		58.05	55.07		29.77	219.84		42.48	30.46		4.01	78.89			56.56	7.44	219.84	2.40			0.80			4.47	1.49			9.16		0.80	2.40			1.4885			4.47		9.16	229.00	229.00
	Subtotal	1,692	121.66			112.48	40.78		225.95	208.90		75.73	785.50		127.30	136.51		13.60	236.42			253.53	25.25	792.61	13.00			8.17			24.15	15.18			60.50		7.07	11.62			13.13			21.57		53.39	846.00	846.00
Passenger - Commuter	ATR72	68	3.33			5.59	2.38		6.19	10.39		4.42	32.30		4.05	6.55		0.60	7.51			12.16	1.11	31.96	0.24			0.36			0.44	0.66			1.70		0.24	0.48			0.4420			0.88		2.04	34.00	34.00
	CLREGJ	636	40.92			40.25	21.63		75.99	74.75		40.17	293.71		65.28	33.35		5.41	121.23			61.93	10.04	297.23	4.78			3.72			8.87	6.92			24.29		4.63	2.64			8.5930			4.91		20.77	318.00	318.00
	EMB140	176	9.55			10.16	8.01		17.73	18.88		14.87	79.20		16.94	12.63			31.46			23.45		84.48	1.54			1.54			2.86	2.86			8.80		0.31	0.92			0.5720			1.72		3.52	88.00	88.00
	EMB145	100	9.45			5.08	1.23		17.55	9.43		2.28	45.00		13.13	0.35		0.88	24.38			0.65	1.63	41.00	1.23			0.53			2.28	0.98			5.00		2.45	0.70			4.5500			1.30		9.00	50.00	50.00
	EMB170	56	5.59			2.65	1.18		10.37	4.91		2.18	26.88		7.94	0.69			14.74			1.27		24.64	0.39						0.73				1.12		1.18				2.1840					3.36	28.00	28.00
	Subtotal	1,036	68.83			63.73	34.42		127.84	118.35		63.92	477.09		107.32	53.56		6.88	199.32			99.46	12.77	479.31	8.17			6.15			15.18	11.41			40.91		8.80	4.74			16.34			8.81		38.69	518.00	518.00
Cargo - Air Carrier	744CRG	8				0.35				0.65			1.00			0.35						0.65		1.00	0.70			0.35			1.30	0.65			3.00		0.35	0.70			0.6500			1.30		3.00	4.00	4.00
	757RR	4																							0.70						1.30				2.00		0.70				1.3000					2.00	2.00	2.00
	763CRG	2																							0.35						0.65				1.00		0.35				0.6500					1.00	1.00	1.00
	A300	4	0.35						0.65				1.00		0.35				0.65					1.00	0.35						0.65				1.00		0.35				0.6500					1.00	2.00	2.00
	DC1010	6	0.35						0.65				1.00		0.35				0.65					1.00	0.70						1.30				2.00		0.70				1.3000					2.00	3.00	3.00
	DC870	6				0.35				0.65			1.00												0.70						1.30				2.00		0.70	0.35			1.3000			0.65		3.00	3.00	3.00
	DC8QN																																															
	EM2CRG	8	0.35			0.35			0.65	0.65			2.00			0.35						0.65		1.00	0.70						1.30				2.00		0.70	0.35			1.3000			0.65		3.00	4.00	4.00
	MD1CRG	6	0.35			0.35			0.65	0.65			2.00		0.35	0.35			0.65			0.65		2.00				0.35				0.65			1.00		0.35				0.6500					1.00	3.00	3.00
	Subtotal	44	1.40			1.40			2.60	2.60			8.00		1.05	1.05			1.95			1.95		6.00	4.20			0.70			7.80	1.30			14.00		4.20	1.40			7.80			2.60		16.00	22.00	22.00
Cargo - General Aviation	L25CRG	4	0.35						0.65				1.00		0.3500				0.6500					1.0000	0.35						0.65				1.00		0.35				0.6500					1.00	2.00	2.00
	L35CRG	24	1.05						1.95				3.00		1.40				2.60					4.00	3.15						5.85				9.00		2.80				5.2000					8.00	12.00	12.00
	Subtotal	28	1.40						2.60				4.00		1.75				3.25					5.00	3.50						6.50				10.00		3.15				5.85					9.00	14.00	14.00
General Aviation	CNA500	8	0.35						0.65				1.00		0.70				1.30					2.00	1.05						1.95				3.00		0.70				1.3000					2.00	4.00	4.00
	FAL20	4	0.35						0.65				1.00		0.35				0.65					1.00	0.35						0.65				1.00		0.35				0.6500					1.00	2.00	2.00
	Subtotal	12	0.70						1.30				2.00		1.05				1.95					3.00	1.40						2.60				4.00		1.05				1.95					3.00	6.00	6.00
Total		2812	194.00			177.61	75.20		360.28	329.85		139.65	1276.59		238.48	191.12		20.48	442.88			354.94	38.03	1285.92	30.28			15.02			56.23	27.89			129.41		24.27	17.76			45.07			32.98		120.08	1406.00	1406.00

Number of Operations by Aircraft Type and Time of Day - 2012

Hartsfield-Jackson Atlanta International Airport - FAR Part 150 Study

			Arrivals											Departures											Arrivals											Departures											Total	
Category	A/C Type	No. of Ops	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	8L	8R	9L	9R	10	26L	26R	27L	27R	28	Total	Arrivals	Departures
Passenger - Air Carrier	717200	376	28.29			26.98	7.90		52.55	50.10		14.66	180.48		26.98	23.69		9.87	50.10			43.99	18.33	172.96	0.66			0.66	1.32		1.22	1.22		2.44	7.52		1.97	2.63		0.66	3.67			4.89	1.22	15.04	188.00	188.00
	737300	44	2.54			2.93	1.08		4.72	5.43		2.00	18.70		3.08	2.70		1.16	5.72			5.01	2.15	19.80	0.62			0.39	0.15		1.14	0.72		0.29	3.30			0.69		0.08				1.29	0.14	2.20	22.00	22.00
	737700	194	12.90			13.24	3.73		23.96	24.59		6.94	85.36		13.24	12.56		5.09	24.59			23.33	9.46	88.27	1.70			1.70	0.68		3.15	3.15		1.26	11.64		1.02	1.70		0.34	1.89			3.15	0.63	8.73	97.00	97.00
	737800	244	16.65			16.23	5.55		30.93	30.13		10.31	109.80		17.08	14.52		6.41	31.72			26.96	11.90	108.58	1.28			2.14	0.85		2.38	3.97		1.59	12.20		1.71	2.56		0.43	3.17			4.76	0.79	13.42	122.00	122.00
	747400	2	0.35						0.65				1.00			0.35						0.65		1.00																							1.00	1.00
	767300	136	10.00			9.28	1.90		18.56	17.24		3.54	60.52		5.95	13.57		3.57	11.05			25.19	6.63	65.96	1.19			0.95	0.48		2.21	1.77		0.88	7.48			0.48		0.24				0.88	0.44	2.04	68.00	68.00
	767400	80	5.60			4.90	2.80		10.40	9.10		5.20	38.00		4.90	6.16		2.10	9.10			11.44	3.90	37.60				0.42	0.28			0.78		0.52	2.00			0.70		0.14				1.30	0.26	2.40	40.00	40.00
	777200	24	2.73			1.47			5.07	2.73			12.00		0.71	2.77			1.33			5.15		9.96															0.71						1.33		2.04	12.00	12.00
	757PW	282	17.77			21.71	6.42		32.99	40.33		11.91	131.13		15.79	22.70		7.40	29.33			42.16	13.75	131.13	1.48			0.99	0.99		2.75	1.83		1.83	9.87		0.99	1.97		0.49	1.83			3.67	0.92	9.87	141.00	141.00
	A319	38	3.33			0.93			6.18	1.73			12.16		3.19	0.47		1.00	5.93			0.86	1.85	13.30	2.26				0.13		4.20			0.25	6.84		1.93			0.07	3.58				0.12	5.70	19.00	19.00
	A320	26	1.73			1.68	0.55		3.21	3.13		1.01	11.31		3.25	0.57		0.68	6.04			1.06	1.27	12.87				0.50	0.09			0.93		0.17	1.69					0.05					0.08	0.13	13.00	13.00
	A340	6	0.53			0.53			0.98	0.98			3.00			1.05						1.95		3.00																							3.00	3.00
	DC95HW	14	1.96			0.49			3.64	0.91			7.00		2.45				4.55					7.00																							7.00	7.00
	MD83	460	35.42			25.76	16.10		65.78	47.84		29.90	220.80		37.03	27.37		12.08	68.77			50.83	22.43	218.50	0.81			0.81	1.61		1.50	1.50		2.99	9.20		0.81	2.42		0.81	1.50			4.49	1.50	11.50	230.00	230.00
	Subtotal	1,926	139.79			126.13	46.03		259.61	234.23		85.48	891.26		133.66	128.47		49.35	248.23			238.58	91.65	889.93	9.99			8.54	6.58		18.55	15.86		12.22	71.74		8.42	13.86		3.29	15.64			25.75	6.11	73.07		
Passenger Commuter	ATR72																																															
	CLREGJ	800	50.60			52.00	25.48		93.96	96.58		47.32	365.94		66.82	42.35		21.00	124.09			78.65	39.00	371.90	6.57			2.55	2.80		12.21	4.73		5.20	34.06		5.58	2.86		1.40	10.36			5.30	2.60	28.10	400.00	400.00
	EMB140	210	11.39			12.13	9.56		21.16	22.52		17.75	94.50		14.33	15.07		5.51	26.62			27.98	10.24	99.75	1.10			1.84	0.74		2.05	3.41		1.37	10.50		0.37	1.10		0.37	0.68			2.05	0.68	5.25	105.00	105.00
	EMB145	116	10.96			5.89	1.42		20.36	10.93		2.64	52.20		10.96	2.44		3.05	20.36			4.52	5.66	46.98	1.02			0.61	0.41		1.89	1.13		0.75	5.80		2.84	0.81		0.20	5.28			1.51	0.38	11.02	58.00	58.00
	EMB170	72	7.18			3.40	1.51		13.34	6.32		2.81	34.56		8.19	0.88		1.89	15.21			1.64	3.51	31.32	0.25				0.25		0.47			0.47	1.44		1.51			0.13	2.81				0.23	4.68	36.00	36.00
	Subtotal	1,198	80.13			73.42	37.97		148.82	136.35		70.51	547.20		100.30	60.74		31.45	186.27			112.79	58.40	549.95	8.94			4.99	4.19		16.61	9.28		7.79	51.80		10.30	4.77		2.10	19.13			8.86	3.89	49.05	599.00	599.00
Cargo - Air Carrier	744CRG	12	0.35			0.35			0.65	0.65			2.00		0.35	0.70			0.65			1.30		3.00	0.70			0.70			1.30	1.30			4.00		0.35	0.70			0.65			1.30		3.00	6.00	6.00
	757RR	8	0.35						0.65				1.00												1.05						1.95			3.00	1.40			2.60						4.00	4.00	4.00
	763CRG	8																							1.40						2.60			4.00	1.40			2.60						4.00	4.00	4.00
	A300	4	0.35						0.65				1.00		0.35				0.65					1.00	0.35						0.65			1.00	0.35					0.65					1.00	2.00	2.00
	DC1010	4													0.35				0.65					1.00	0.70						1.30			2.00	0.35					0.65					1.00	2.00	2.00
	DC870	2				0.35				0.65			1.00																									0.35								0.65		1.00	1.00	1.00
	DC8QN																																															
	EM2CRG	4				0.35				0.65			1.00			0.35						0.65		1.00	0.35						0.65			1.00			0.35							0.65		1.00	2.00	2.00
	MD1CRG	12	0.70			0.35			1.30	0.65			3.00		0.70	0.70			1.30			1.30		4.00	0.35			0.70			0.65	1.30			3.00		0.70				1.30					2.00	6.00	6.00
	Subtotal	54	1.75			1.40			3.25	2.60			9.00		1.75	1.75			3.25			3.25		10.00	4.90			1.40			9.10	2.60			18.00		4.55	1.40			8.45			2.60		17.00	27.00	27.00
Cargo - General Aviation	L25CRG	4	0.35						0.65				1.00		0.35				0.65					1.00	0.35						0.65			1.00			0.35				0.65					1.00	2.00	2.00
	L35CRG	24	1.05						1.95				3.00		1.40				2.60					4.00	3.15						5.85			9.00			2.80				5.20					8.00	12.00	12.00
	Subtotal	28	1.40						2.60				4.00		1.75				3.25					5.00	3.50						6.50			10.00			3.15				5.85					9.00	14.00	14.00
General Aviation	CNA500	8	0.35						0.65				1.00		0.70				1.30					2.00	1.05						1.95			3.00			0.70				1.30					2.00	4.00	4.00
	FAL20	4	0.35						0.65				1.00		0.35				0.65					1.00	0.35						0.65			1.00			0.35				0.65					1.00	2.00	2.00
	Subtotal	12	0.70						1.30				2.00		1.05				1.95					3.00	1.40						2.60			4.00			1.05				1.95					3.00	6.00	6.00
Total		3218	223.77			200.95	83.99		415.58	373.18		155.99	1453.46		238.51	190.95		80.80	442.95			354.62	150.05	1457.88	28.73			14.93	10.77		53.36	27.74		20.01	155.54		27.47	20.03		5.39	51.02			37.21	10.00	151.12	1609.00	1609.00

Appendix E

Noise / Land Use Compatibility Standards and Guidelines

APPENDIX E

Noise / Land Use Compatibility Standards and Guidelines

The use of noise metrics is an attempt to quantify community response to various noise exposure levels. The public reaction to different noise levels has been estimated based upon extensive research on human responses to exposure of different levels of aircraft noise. **Figure E-1** relates DNL noise levels to community response from one of these surveys. Community noise standards are derived from tradeoffs between community response surveys, such as this, and economic considerations for achieving these levels. These standards generally are in terms of the DNL 24-hour averaging scale that is based upon a dBA. Utilizing these metrics and surveys, agencies have developed standards for assessing the compatibility of various land uses within the noise environment.

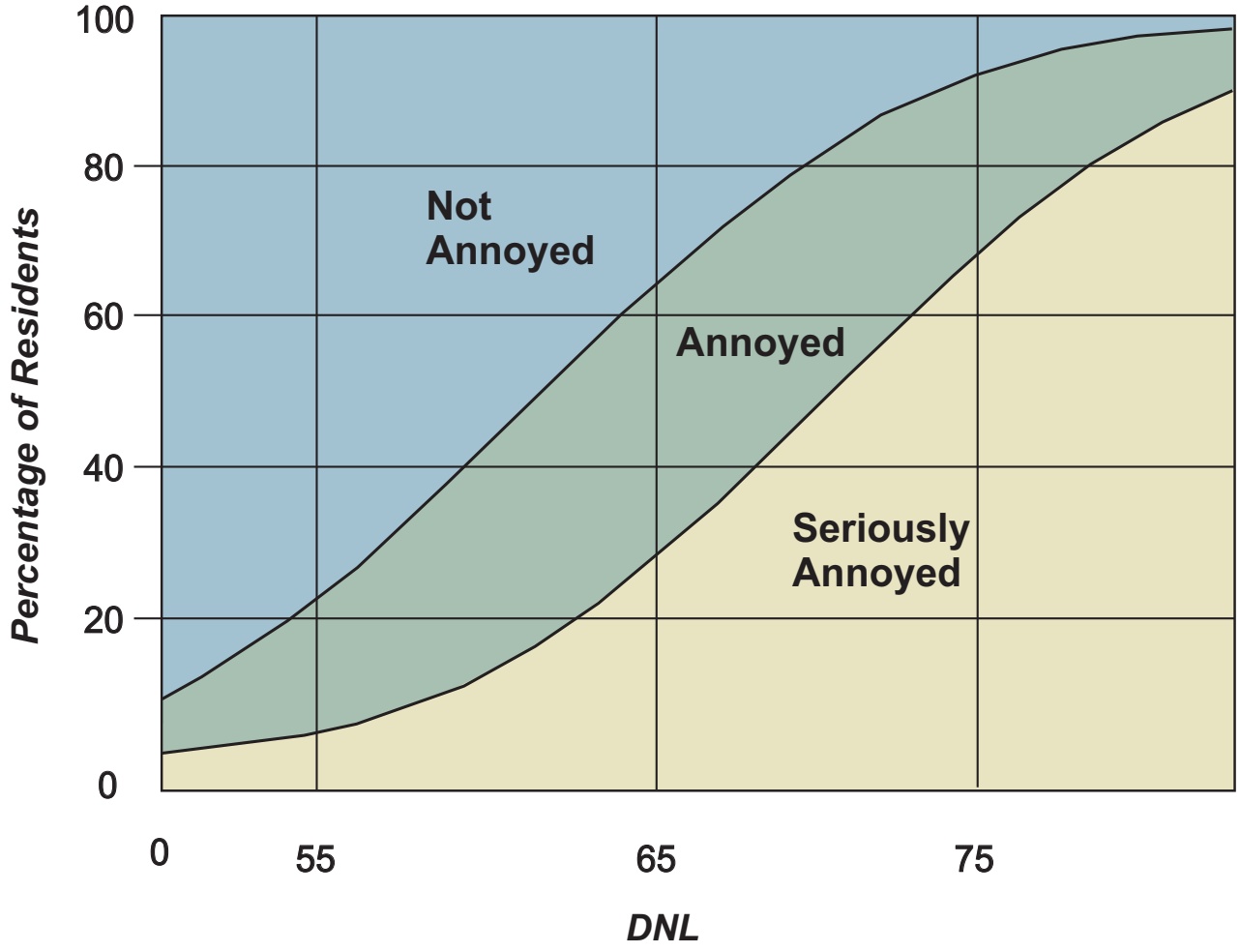
This appendix section presents information regarding noise and land use criteria that may be useful in the evaluation of noise impacts. With respect to airports, the FAA has a long history of publishing noise/land use assessment criteria. These laws and regulations provide the basis for local development of airport plans, analyses of airport impacts, and the enactment of compatibility policies. Other agencies, including the EPA and the Department of Defense, have developed noise/land use criteria. The most common noise/land use compatibility standard or criteria used, and the one mandated to be used by the FAA for eligibility of Federal Funds, is the 65 DNL for residential land use with outdoor activity areas. A summary of some of the more pertinent regulations and guidelines is presented in the following paragraphs.

Federal Aviation Regulations, Part 36, "Noise Standards: Aircraft Type and Airworthiness Certification"

Originally adopted in 1960, FAR Part 36 prescribes noise standards for issuance of new aircraft type certificates. Part 36 prescribes limiting noise levels for certification of new types of propeller-driven, small airplanes, as well as for transport category large airplanes. Subsequent amendments extended the standards to certain newly produced aircraft of older type designs. Other amendments have at various times extended the required compliance dates. Aircraft may be certified as Stage 1, Stage 2, or Stage 3 aircraft based on their noise level, weight, number of engines, and in some cases, number of passengers. Stage 1 and Stage 2 aircraft weighing more than 75,000 pounds are no longer permitted to operate in the United States. However, this ruling only applies to those aircraft over 75,000 pounds. Many corporate and commuter jets are lighter in weight than this. Although aircraft meeting Part 36 standards are noticeably quieter than many of the older aircraft, the regulations make no determination that such aircraft are acceptably quiet for operation at any given airport.

U.S. Department of Transportation – Aviation Noise Abatement Policy

This policy, adopted in 1976, sets forth the noise abatement authorities and responsibilities of the Federal government, airport proprietors, State and local governments, the air carriers, air travelers and shippers, and airport area residents and prospective residents. The basic thrust of the policy is that the FAA's role is primarily one of regulating noise at its source (the aircraft) plus



Source: FAA Report EE-85-2-Aviation Noise Effects

Figure E-1

Annoyance Caused by Aircraft Noise in Residential Communities Near Major Airports

supporting local efforts to develop airport noise abatement plans. The FAA will give high priority in the allocation of Airport Improvement Program (AIP) funds to projects designed to ensure compatible use of land near airports, but it is the role of State and local governments and airport proprietors to undertake the land use and operational actions necessary to promote compatibility.

Aviation Safety and Noise Abatement Act of 1979

Congress further emphasized the FAA's supporting role in noise compatibility planning by congressional adoption of this legislation. Among the stated purposes of this act is, "to provide assistance to airport operators to prepare and carry out noise compatibility programs." The law establishes funding for noise compatibility planning and sets the requirements by which airport operators can apply for funding. The law does not require any airport to develop a noise compatibility program.

Federal Aviation Regulations, Part 150, "Airport Noise Compatibility Planning"

As a means of implementing the Aviation Safety and Noise Abatement Act, the FAA adopted Regulations on Airport Noise Compatibility Planning Programs. These regulations are spelled out in FAR Part 150. As part of the FAR Part 150 Noise Control program, the FAA published noise and land use compatibility charts to be used for land use planning with respect to aircraft noise. An expanded version of this chart appears in Aviation Circular 150/5020-1 (dated August 5, 1983) and is reproduced in **Figure E-2**. These guidelines represent recommendations to local authorities for determining acceptability and permissibility of land uses. The guidelines specify a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that will be considered acceptable to or compatible with people in living and working spaces.

The noise levels are derived from case histories involving aircraft noise problems at civilian and military airports and the resultant community response. Note that residential land use is deemed acceptable for noise exposure up to 65 DNL. Recreational areas are considered acceptable for noise levels above 65 DNL (with certain exceptions for amphitheatres that are recommended not to exceed 65 DNL). Several important notes appear for the FAA guidelines, including one which indicates that ultimately "the responsibility for determining acceptability and permissible land uses remains with the local authorities."

Federal Aviation Order 5050.4 and Directive 1050.1 for Environmental Analysis of Aircraft Noise around Airports

The FAA has developed guidelines (Order 5050.4B) for the environmental analysis of airports. Federal requirements now dictate that increases in noise levels in noise-sensitive land uses of over 1.5 DNL within the 65 DNL contour are considered significant (1050.1E, 12.21.83). The FAA considers only those noise impacts that occur at the 65 DNL or greater. Analysis is not required by the FAA beyond the 65 DNL.

Airport Noise and Capacity Act of 1990

The Airport Noise and Capacity Act of 1990 (PL 101-508, 104 Sat.1388), also known as ANCA or the Noise Act, established two broad directives to the FAA: (1) establish a method to review aircraft noise and airport use or access restrictions imposed by airport proprietors, and (2) institute a program to phase-out Stage 2 aircraft over 75,000 pounds by December 31, 1999. Stage 2 aircraft were older, noisier aircraft (B737-200, B727, and DC9); Stage 3 aircraft are newer, quieter aircraft (B737-300, B757, and MD80/90). To implement ANCA, the FAA

Land Use	Yearly Day-Night Noise Level (DNL) in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)1	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

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

Key to Table 1

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land Use and related structures compatible without restrictions.
N(No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

Notes

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

SOURCE: FAR Part 150

Figure E-2

FAR Part 150 Study Guidelines

amended FAR Part 91 and issued a new phase-out of large Stage 2 aircraft and a phase-in of Stage 3 aircraft.

Part 91 generally stated that all Stage 2 aircraft, over 75,000 pounds, would be out of the domestic fleet by December 31, 1999. There was room for a few exceptions, but for the most part, only Stage 3 aircraft greater than 75,000 pounds were to be in the domestic fleet after that date. The airlines all achieved compliance with the regulation and all aircraft in the civilian fleet, over 75,000 pounds, were Stage 3 by the deadline.

Part 161 sets out the requirements and procedures for implementing new airport use and access restrictions by airport proprietors. Proprietors must use the DNL metric to measure noise effects. The Part 150 land use guideline table, including 65 DNL as the threshold contour, must also be used to determine compatibility, unless there is a locally adopted, more stringent standard.

The Part 161 regulation identifies three types of use restrictions and treats each one differently: negotiated restrictions, Stage 2 aircraft restrictions, and Stage 3 aircraft restrictions. Generally speaking, any use restriction which affects the number, type, or time of aircraft operations will be considered an access restriction. Even though the Part 91 phase-out did not apply to aircraft under 75,000 pounds, FAA has determined that the Part 161 limitation on the proprietor's authority applies to the smaller aircraft as well.

Negotiated restrictions are more favorable from the FAA's standpoint, but still require complex procedures for approval and implementation. The restrictions must be agreed upon by all affected operators (airlines, cargo carriers, etc.) and public notice must be given. Stage 3 restrictions are especially difficult to implement. A restriction on Stage 3 aircraft operations, involves considerable analysis, justification, evaluation, and financial discussion. In addition, this restriction must result in a decrease in noise exposure of the 65 DNL to noise-sensitive land uses (residences, schools, churches, parks). The regulation also requires both public notice and FAA approval.

ANCA applies to all local noise restrictions that are proposed after October 1990. It also applies to amendments on existing restrictions proposed after October 1990. There have not been any Part 161 evaluations approved by the FAA to date.

Federal Interagency Committee on Noise (FICON) Report of 1992 [13]

The use of the DNL metric and the 65 DNL criteria has been subject to criticism from various interest groups concerning its usefulness in assessing aircraft noise impacts. As a result, at the direction of the EPA and the FAA, the Federal Interagency Committee on Noise was formed to review specific elements of the assessment of airport noise impacts and to make recommendations regarding potential improvements. FICON is composed of representatives from the Departments of Transportation, Defense, Justice, Veterans Affairs, Housing and Urban Development, the Environmental Protection Agency, and the Council on Environmental Quality. FICON was formed to review Federal policies that are used in the assessment of airport noise impacts. The FICON review focused primarily on the manner in which noise impacts are determined, including whether aircraft noise impacts are fundamentally different from other transportation noise impacts; the manner in which noise impacts are described; and the extent of impacts outside of Day-Night Average A-Weighted Sound Level (DNL) 65 decibels (dB) that should be reviewed in a National Environmental Policy Act (NEPA) document.

The committee determined that there are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric. The methodology

employing DNL as the noise exposure metric and appropriate dose-response relationships to determine noise impact is considered the proper one for civil and military aviation scenarios in the general vicinity of airports. The report does support agency discretion in the use of supplemental noise analysis. The report does also recommend improvement in public understanding of the DNL, supplemental methodologies, and aircraft noise impacts.

The report states that if the screening analysis shows that noise-sensitive areas are exposed to noise levels at or above 65 DNL, and experience an increase of 1.5 DNL or more as a result of the proposed airport noise exposure, then further analysis should be conducted. For noise-sensitive areas between 60-65 DNL, with an increase of 3 DNL or more due to the proposed airport noise exposure, further analysis should also be conducted.

Federal Interagency Committee on Aviation Noise (FICAN)

The Federal Interagency Committee on Aviation Noise (FICAN) was formed in 1993 to provide forums for debate over needs for future aviation noise research and to encourage new developments in this area. All federal agencies concerned with aviation noise are represented on the Committee. Agency members of FICAN include:

- Department of Defense
- Air Force
- Army
- Navy
- Department of Interior
- National Park Service
- Department of Transportation
- Office of the Secretary
- Federal Aviation Administration
- Environmental Protection Agency
- National Aeronautics and Space Administration
- Department of Housing and Urban Development

FICAN holds regular membership meetings and annual public forums in different locations. The most recent one, as of this writing, was held in February of 2004 in conjunction with the annual Noise Symposium sponsored by the University of California at Berkeley. Information on FICAN and their latest research efforts can be found on their website at http://www.fican.org.

Appendix F
Acronyms and Initialisms

AC ..... Advisory Circular
ADF ..... Automatic Direction Finder
ADAP ..... Airport Development Aid Program
AFD ..... Airport Facility Directory
AGL ..... Airport Ground Level
ALP ..... Airport Layout Plan
AOA ..... Airport Operations Area
ARC ..... Airport Reference Code
ARFF ..... Aircraft Rescue and Fire Fighting Facilities
ARTCC ..... Air Route Traffic Control Center
ARTS ..... Automated Radar Terminal System
ASOS ..... Automated Surface Observation System
ATIS ..... Automated Terminal Information Service
ATCT ..... Air Traffic Control Tower
dB ..... Decibel
dBA ..... Weighted decibel
DNL ..... Day Night Sound Level
ERG ..... Effective Runway Gradient
EPA ..... Environmental Protection Agency
EPNL ..... Effective Perceived Noise Level
FAA ..... Federal Aviation Administration
FAF ..... Final Approach Fix
FAR ..... Federal Aviation Regulation
FBO ..... Fixed Base Operator
FSS ..... Flight Service Station
GA ..... General Aviation
IAF ..... Initial Approach Fix
IFR ..... Instrument Flight Rules
ILS ..... Instrument Landing System
IM ..... Inner Marker
IMC ..... Instrument Meteorological Conditions
INM ..... Integrated Noise Model
Ldn ..... Day Night Noise Metric
Leq ..... Equivalent Noise Level
Lmax ..... Maximum Sound Level
LOA ..... Letter of Agreement
MOA ..... Military Operating Area
MSL ..... Mean Sea Level
NAVAIDS ..... Navigational Aids
NCP ..... Noise Compatibility Program
NDB ..... Non-Directional Beacon
NEM ..... Noise Exposure Map
NLR ..... Noise Level Reduction
NOTAM ..... Notice to Airmen
NAS ..... National Airspace System
NPIAS ..... National Plan of Integrated Airport Systems
OAG ..... Official Airline Guide
OM ..... Outer Marker
PAPI ..... Precision Approach Path Indicator
RPZ ..... Runway Protection Zone
RSA ..... Runway Safety Area

RWY..... Runway
SCASP..... South Carolina Airport Systems Plan
SEL..... Sound Exposure Level
TAC..... Technical Advisory Committee
TACAN ..... Tactical Air Navigation
TAF ..... Terminal Area Forecasts
TRACON..... Terminal Radar Approach Control Facility
TW..... Taxiway
VFR ..... Visual Flight Rules
VHF ..... Very High Frequency
VMC..... Visual Meteorological Conditions
VOR-VHF ..... Omni Directional Radar Beacon
VORDME..... VHF Omni Directional Radar Beacon with Distance Measuring Equipment
VORTAC..... VHF Omni Directional Range with Tactical Aircraft Approach and Navigation

Appendix G
Glossary of Terms

A-Weighted Sound (DBA) - A measurement representing a sound generally as the human ear hears it by filtering out as much as 20 to 40 decibels of sound below 100 hertz. Used for aircraft noise evaluations.

Airman's Information Manual - 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 Air Space.

Advisory Circular (AC) - A document published by the Federal Aviation Administration (FAA) giving guidance on aviation issues.

Air Route Traffic Control Center (ARTCC) - An FAA facility established to provide air traffic control service to aircraft operating on an Instrument Flight Rule (IFR) flight plan within controlled airspace during the en route portion of a flight.

Air Traffic - Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Control (ATC) - Control of the airspace by an appropriate authority to promote the safe, orderly and expeditious movement of terminal air traffic.

Aircraft Operation - An aircraft arrival or departure from an airport with FAA airport traffic control service. There are two types of operations: local and itinerant.

Airport - Any public use airport, including heliports, as defined by the Aviation Safety and Noise Abatement Act of 1979 (ASNA), including: (a) Any airport which is used or to be used for public purposes, under the control of a public agency, the landing area of which is publicly owned; (b) any privately owned reliever airport; and (c) any privately owned airport which is determined by the Secretary to enplane annually 2,500 or more passengers and receive scheduled passenger service of aircraft, which is used or to be used for public purposes.

Airport Hazard - Any structure or object of natural growth located on or near the airport, or any use of land near the airport that obstructs the airspace required for the flight of aircraft in landing or taking off, or is otherwise hazardous to such landing and taking off.

Airport Impact Zones - Defined areas on and off airport property that are zoned to ensure airport compatible land uses. Low-activity airports without significant aircraft noise exposure contours can benefit by identifying and implementing land use controls in Airport Impact Zones. The Impact Zones generally include the runway protection zone, the FAR Part 77 approach surface and the airport traffic pattern.

Airport Improvement Program (AIP) - The AIP is authorized by the Airport and Airway Improvement Act of 1982 (P.L. 97-248, as amended). The Act's broad objective is to assist in the development of a nationwide system of public-use airports adequate to meet the current and projected growth of civil aviation. The Act provides funding for airport planning and development projects at airports included in the National Plan of Integrated Airport Systems. The Act also authorizes funds for noise compatibility planning and to carry out noise compatibility programs as set forth in the Aviation Safety and Noise Abatement Act of 1979 (P.L. 96-143).

Airport Layout Plan (ALP) - A scaled drawing of existing and proposed land and facilities necessary for the operation and development of the airport. The ALP shows (1) boundaries and

proposed additions to areas owned or controlled by the sponsor, (2) the location and nature of existing and proposed airport facilities and structures and (3) the location on the airport of existing and proposed and non-aviation areas and improvements.

Airport Layout Plan Set - Included in the Airport Layout Plan set are six drawings: (1) Airport Layout Drawing (Plan), (2) Airport Airspace Drawing, (3) Inner Portion of the Approach Surface Drawing, (4) Terminal Area Drawing, (5) Land Use Drawing and (6) Airport Property Map. The drawings depict existing and proposed airport facilities, land uses, approach zones and other defined areas of airspace, and environmental features that may influence airport usage and expansion capabilities.

Airport Manager - The person authorized by the airport sponsor to exercise administrative control of the airport.

Airport Master Plan - A planning document, including appropriate documents and drawings that describe the development of a specific airport from a physical, economical, social, environmental and political jurisdictional perspective. The airport layout plan drawing is part of the Master Plan.

Airport Noise Compatibility Program - A program including the measures proposed or taken by the airport owner to reduce existing incompatible land uses and to prevent the introduction of additional incompatible land uses within the area.

Airport Operations - The total number of movements in landings (arrivals) plus takeoffs (departures) from an airport.

Airport Owner - Any person or authority having the operational control of an airport as defined in the ASNA Act.

Airport and Airway Improvement Act of 1982 - This Act authorizes the Secretary of Transportation to make project grants for airport planning and development to maintain a safe and efficient nationwide system of public-use airports.

Airport Noise and Capacity Act of 1990 - This act required the establishment of a National Noise Policy and a requirement to eliminate Stage 2 aircraft weighing 75,000 pounds or greater operating in the contiguous United States by the year 2000.

Airport Reference Code (ARC) - The ARC is a FAA coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.

Airport Sponsor - A public agency or tax-supported organization such as an airport authority, that is authorized to own and operate the airport, to obtain property interests, to obtain funds, and to legally, financially and otherwise able to meet all applicable requirements of current laws and regulations.

Airport Surveillance Radar (ASR) - A radar system which allows air traffic controllers to identify an arriving or departing aircraft distance and direction from an airport.

Air Traffic Control Tower (ATCT) - The air traffic control facility located on an airport that is responsible for providing air traffic control services to airborne aircraft near the airport and to aircraft operating on the airport movement area.

Airside - That portion of the airport facility where aircraft movements take place, airline operations areas, and areas that directly serve the aircraft, such as taxiway, runway, maintenance and fueling areas.

Airspace - The space lying above the earth or above a certain area of land or water that is necessary to conduct aviation operations.

Airway - A corridor of controlled airspace whose centerline is established by radio navigational aids (NAVAIDS).

Ambient Noise - The total amount of noise in a given place and time, which is usually a composite of sounds from varying sources at varying distances.

Approach Surface - A surface defined by FAR Part 77 "Objects Affecting Navigable Airspace," that is longitudinally centered on the runway centerline and extends outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based on the type of approach available or planned for that runway end.

ASNA Act - The Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. 2101 et seq.).

Attainment Area - An area in which the federal or state standards for ambient air quality is being achieved.

Attenuation - Acoustical phenomenon whereby a reduction of sound energy is experienced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, man made features, and natural features.

Automated Radar Terminal System (ARTS) - Computer aided radar display subsystems capable of associating alphanumeric data such as weather and Notices to Airmen (NOTAMS).

Automatic Terminal Information Service (ATIS) - Continuous radio broadcast of recorded air traffic control information at selected high activity airports.

Average Sound Level - The level in decibels, of the mean square, A-weighted sound pressure during a specified period, with reference to the square of the standard reference sound pressure of 20 micropascals.

Avigation Easement - A grant of a property interest in land over which a right of unobstructed flight in the airspace is established.

Aviation Safety and Noise Capacity Act - Provides assistance to airport operators to prepare and carry out noise compatibility programs. Authorizes the FAA to help airport operators develop noise abatement programs and makes them eligible for AIP grants.

Based Aircraft - An aircraft permanently stationed at an airport by agreement between the aircraft owner and the airport management.

Base Leg - A flight path, normally in the standard traffic pattern, of a landing aircraft that is at a right angle to a landing runway of its approach end. Base leg normally extends from the downwind leg to the final approach in the standard traffic pattern.

Baseline Condition - The existing condition or conditions prior to future development, which serve as a foundation for analysis.

Building Codes - Codes, either local or state, that control the functional and structural aspects of buildings and/or structures. Local ordinances typically require proposed buildings to comply with zoning requirements before building permits can be issued under the building codes.

CAT I - Category I instrument landing system

CAT II - Category II instrument landing system

CAT III - Category III instrument landing system

Class A Airspace - Generally, that airspace from 18,000 feet mean sea level (MSL) up to and including a flight level of 60,000 feet, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under Instrument Flight Rule (IFR).

Class B Airspace - Generally, that airspace from the surface to 10,000 feet mean sea level surrounding the nation's busiest airports in terms of Instrument Flight Rule (IFR) operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An Air Traffic Control clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for Visual Flight Rule (VFR) operations is "clear of clouds."

Class C Airspace - Generally that airspace from the surface to 4,000 feet above the airport elevation (charted in mean sea level) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of instrument flight rule operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5 nautical mile radius, and an outer circle with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Each person must establish two-way radio communications with the Air Traffic Control facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. Visual Flight Rule aircraft are only separated from Instrument Flight Rule (IFR) aircraft within the airspace.

Class D Airspace - Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in mean sea level) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be Class D or Class E airspace. Unless otherwise authorized, each person must establish two-way radio communications

with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to Visual Flight Rule (VFR) aircraft.

Class E Airspace - Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Also in this class are Federal airways, airspace beginning at either 700 or 1,200 feet above ground level used to transition to/from the terminal or enroute environment, enroute domestic, and offshore airspace areas designated below 18,000 feet mean sea level (MSL). Unless designated at a lower altitude, Class E airspace begins at 14,500 mean sea level (MSL) over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Class E airspace does not include the airspace 18,000 mean sea level (MSL) or above.

Commercial Service Airport - A public airport that has at least 2,500 passengers boarding each year and is receiving scheduled passenger aircraft service.

Commuter Aircraft - Commuters are those operators that provide regularly scheduled passenger or cargo service with aircraft seating 72 passengers or less.

Compatible Land Use - As defined in FAR Part 150: The use of land (e.g., commercial, industrial, agricultural) that is normally compatible with aircraft and airport operations, or sound insulated lands uses (e.g., sound insulated homes, schools, nursing homes, hospitals, libraries) that would otherwise be considered incompatible with aircraft and airport operations.

Comprehensive Plan - Similar to a Master Plan, the comprehensive plan is a governmental entity's official statement of its plans and policies for long-term development. The plan includes maps, graphics and written proposals, which indicate the general location for streets, parks, schools, public buildings, airports, and other physical development of the jurisdiction.

Conditional Zoning - The imposition or exaction of conditions or promises upon the grant of zoning by the zoning authority.

Conformity (Air Quality) - No department, agency or instrumentality of the federal government shall engage in, support in any way or provide financial assistance for, license, or permit, or approve, any activity that does not conform to a State Implementation Plan (SIP).

Transportation Conformity - Under the 1990 Clean Air Act Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve Federal actions to support programs or projects that are not first found to conform to the Clean Air Act requirements. For Transportation Conformity, the programs and projects include all federally funded or approved highway or transit projects (and regionally significant non-federal highway and transit projects) within nonattainment and maintenance areas.

Controlled Airspace - An airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rule (IFR) flights and to Visual Flight Rule (VFR) flights in accordance with the airspace classification.

Day-Night Average Sound Level (DNL) - A noise measure used to describe the average aircraft noise levels over a 24-hour period, typically an average day over the course of a year. DNL

considers aircraft operations occurring between the hours of 10 p.m. and 7 a.m. to be ten decibels louder than operations occurring during the daytime to account for increased annoyance when ambient noise levels are lower and residents are sleeping. 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; when the scale increases by ten, the perceived sound is two times as loud.

Delay - The difference, in minutes, between the scheduled time and actual time of an aircraft arrival or departure. For airport planning purposes, it is often expressed as an annual average delay per aircraft operation (in minutes).

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 and landings from the opposite direction.

Distance Measuring Equipment (DME) - A flight instrument that measures the distance from a navigational radio station in nautical miles.

Duration - length of time, in seconds, a noise event such as an aircraft flyover is experienced.

Downwind Leg - A standard landing procedure in which an aircraft parallels the landing runway in the direction opposite to the landing direction.

Easement - An interest in land owned by another that entitles its holder to a specific limited use or enjoyment. Easements may include right of passage over, on, or below the property; certain air rights above the property, including view right; and the rights to any specified form of development or activity.

Effective Perceived Noise Level (EPNL) - Time integrated perceived noise level calculated with adjustments for irregularities in the sound spectrum, such as that caused by discrete frequency components (tone correction)

Enplanement - A passenger boarding of a commercial flight.

Environmental Assessment (EA) - A concise document that assesses the environmental impacts of a proposed federal action. The EA discusses the need for and environmental impacts of the proposed action and alternative actions. An EA should provide sufficient evidence and analysis for a federal determination whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact.

Environmental Impact Statement (EIS) - A document that provides full and fair discussion of the significant environmental impacts that would occur as a result of a proposed project and informs decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts.

Equivalent Sound Level (LEQ) - The steady A-weighted sound level over any specified time period. It is used to identify the average sound level over a period of time.

Euclidean Zoning - A traditional legislative method or device for controlling land use by establishing districts with set boundaries and providing for specific uniform regulations as to type

of permitted land use, height, bulk and lot coverage of structure, setback and similar building restrictions. (Reference from 1929 U.S. Supreme Court landmark decision upholding zoning as a means of land use control in "City of Euclid, Ohio v. Ambler Realty")

FAR Part 36, Certificated Airport Noise Levels - Noise certification standards for civil turbojet and large transport category aircraft. Provides a reference source for aircraft noise levels.

FAR Part 150, Airport-Land Use Compatibility Planning - Designed to assist airport operators in determining the extent and nature of noise impacts at a given airport.

Federal Aviation Administration (FAA) - A federal agency charged with regulating air commerce to promote its safety and development, encouraging and developing civil aviation, air traffic control and air navigation and promoting the development of a national system of airports.

Federal Aviation Regulations (FAR) - Regulations established and administered by the FAA that governs civil aviation and aviation-related activities.

FAR Part 77 "Objects Affecting Navigable Airspace" - Part 77 (a) establishes standards for determining obstructions in navigable airspace; (b) defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; (c) provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; (d) provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and (e) provides for establishing antenna farm areas.

Federal Grant Assurance - The terms and conditions of accepting Airport Improvement Program (AIP) grants from the Federal Aviation Administration for carrying out the provisions of Title 49, United States Code. The terms and conditions become applicable when the airport sponsor accepts a grant offer from the FAA.

Final Approach: IFR - The flight path of an aircraft that is inbound to the airport on an approved final instrument approach course.

Final Approach: VFR - The flight path, normally in the standard traffic pattern, of a landing aircraft along the extended centerline of the runway centerline. Final approach is preceded by a base leg in the standard traffic pattern.

Finding of No Significant Impact (FONSI) - A document briefly explaining the reasons an action will not have a significant effect on the human environment and therefore justifies the decision to not prepare an EIS. A FONSI is issued by the federal agency following the preparation of an EA.

Fix - A geographical position.

Fixed-Base Operator (FBO) - An airport facility that serves the general aviation community by selling and repairing aircraft and parts, selling fuel, and providing flight and ground-school instruction.

General Aviation (GA) - Refers to all civil aircraft and operations that are not classified as air carrier, commuter or regional. The types of aircraft used in general aviation activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons and dirigibles.

General Conformity - All federal actions (except those involving highways and transit projects) within non-attainment and maintenance areas that result in a net increase in emissions above specified de minimis levels.

Glide Slope - 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 Instrument Landing System (ILS), or visual ground aids, such as VASI, which provide vertical guidance for Visual Flight Rule (VFR) approach or for the visual portion of an instrument approach and landing.

Global Positioning System (GPS) - A system of satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

Grid Analysis - A type of aircraft noise analysis, which evaluates the noise levels at individual points, rather than through the 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.

Growth Policy - A local or regional governmental policy intended to influence the rate, amount, type, location and/or quality of future development within the Jurisdiction.

Hourly Noise Level (HNL) - A noise metric that considers primarily those single events that exceed a specific threshold or duration during one hour.

Housing Codes - The codes that usually apply to both existing and future living units. The codes include minimum standards of occupancy, and usually govern spatial, ventilation, wiring, plumbing, structural and heating requirements.

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

Incompatible Land Use - The use of land, which is defined in Appendix A, Table 1 of FAR Part 150, which is normally incompatible with the aircraft and airport operations (such as homes, schools, nursing homes, hospitals, and libraries). See Table X, Land Use Compatibility Guidelines – FAR Part 150, of this guide to review the FAA land use compatibility table.

Infrastructure - A community's built elements that establish the communities' development. Infrastructure elements include airports, roads and highways, bridges, water and sewer systems, waste disposal facilities, utilities and telecommunications systems, schools, and governmental and community facilities.

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 Rule (IFR) - Rules governing the procedure for conducting instrument flight. In addition, a term used by pilots and controller to indicate a type of flight plan.

Instrument Landing System (ILS) - An electronic system installed at some airports that helps guide pilots to runways during periods of limited visibility or inclement 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) - FAA's computer model used by the civilian aviation community for evaluating aircraft noise impacts near airports. The INM uses a standard database of aircraft characteristics and applies them to an airport's average operational day to produce noise contours.

Itinerant Operation - Any aircraft arrival and/or departure other than a local operation.

Knots - Airspeed measured as the distance in nautical miles covered in one hour.

Land Use Compatibility - The coexistence of land uses surrounding the airport with airport-related activities.

Land Use Controls - Measures established by state or local government that are designed to carry out land use planning. The controls include among other measures: zoning, subdivision regulations, planned acquisition, easements, covenants or conditions in building codes and capital improvement programs, such as establishment of sewer, water, utilities or their service facilities.

Land Use Management Measures - Land use management techniques that consist of both remedial and preventive measures. Remedial, or corrective, measures typically include sound insulation or land acquisition. Preventive measures typically involve land use controls that amend or update the local zoning ordinance, comprehensive plan, subdivision regulations, and building code.

Landing and Takeoff (LTO) Cycle - The time an aircraft is in operation at an airport.

Landside - That part of an airport used for activities other than the movement of aircraft, such as vehicular access roads and parking.

Ldn - Ldn is used in place of DNL in mathematical equations.

Leq - Equivalent Sound Level

Local Passenger - A passenger who either enters or exits a metropolitan area on flights serviced by the area's airport.

Localizer - The component of an ILS, which provides lateral course guidance to the runway.

Local Operation - Any operation performed by an aircraft that: (a) operates in the local traffic pattern or within sight of the tower or airport, or (b) is known to be departing for, or arriving from, flight in local practice areas located with a 20-mile radius of the control tower or airport, or (c) executes a simulated instrument approach or low pass at the airport.

Location Impact Analysis - An analysis conducted to determine if noise level increases associated with projected development would approach the FAA threshold of a 1.5 DNL increase within the 65 DNL or greater noise contours over any noise-sensitive land use.

Loudness - the subjective intensity of sound.

Maintenance Area - a geographical area which was once designated as nonattainment but the pollution levels have met the National Ambient Air Quality standards for two consecutive years and has an approved maintenance plan which outlines how the geographical area will continue to meet these standards.

Master Plan Update - An update to the long-range airport development requirements.

Mediation - The use of a mediator or co-mediators to facilitate open discussion between disputants and assist them to negotiate a mutually agreeable resolution. Mediation is a method of alternative dispute resolution that provides an initial forum to informally settle disputes prior to regulatory intervention on the part of the FAA.

Missed Approach - A prescribed procedure to be followed by aircraft that cannot complete an attempted landing at an airport.

Mitigation - The avoidance, minimization, reduction, elimination, or compensation for adverse environmental effects of a proposed action.

Mitigation Measure - An action taken to alleviate adverse impacts.

Narrowbody Aircraft - A commercial passenger jet having a single aisle and a maximum of three seats on each side of the aisle.

National Airspace System (NAS) - The common network of U.S. airspace.

National Environmental Policy Act of 1969 (NEPA) - The original legislation establishing the environmental review process.

National Plan of Integrated Airport Systems (NPIAS) - A primary purpose of the NPIAS is to identify the airports that are important to national transportation and, therefore, eligible to receive grants under the Airport Improvement Program (AIP). The NPIAS is composed of all commercial service airports, all reliever airports, and selected general aviation airports.

Nautical Mile - A measure of distance equal to one minute of arc on the earth's surface, which is approximately 6,076 feet.

Navigation Aids (NAVAIDS) - Any facility used by an aircraft for guiding or controlling flight in the air or the landing or take-off of an aircraft.

Noise - Unwanted sound

Noise Abatement Procedures - Changes in runway usage, flight approach and departure routes and procedures, and vehicle movement, such as ground maneuvers or other air traffic procedures that shift aviation impacts away from noise sensitive areas.

Noise Compatibility Plan (NCP) - The NCP consists of an optimum combination of preferred noise abatement and land use management measures, and a plan for the implementation of the measures. For planning purposes, the implementation plan also includes the estimated cost for each of the recommended measures to the airport sponsor, the FAA, airport users, and the local units of government.

Noise Compatibility Program - See "Part 150 Study."

Noise Exposure Contours - Lines drawn about a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise.

Noise Exposure Map (NEM) - The NEM is a scaled map of the airport, its noise contours and surrounding land uses. The NEM depicts the levels of noise exposure around the airport, both for the existing conditions and forecasts for the five-year planning period. The area of noise exposure is designated using the DNL (Day-Night Average Sound Level) noise metric.

Noise Impact Routing System (NIRS) - A computer simulation model that evaluates noise impacts in a defined area from the ground up to 18,000 feet.

Noise Level Reduction (NLR) - The amount of noise level reduction in decibels achieved through incorporation of noise attenuation (between outdoor and indoor levels) in the design and construction of a structure.

Noise-Sensitive Area - Areas where aircraft noise may interfere with existing or planned use of the land. Whether noise interferes with a particular use depends upon the level of noise exposure and the types of activities that are involved. Residential neighborhoods, educational, health, and religious structures and sites, outdoor recreational, cultural and historic sites may be noise sensitive areas.

Nonattainment Area - Areas where air pollutant levels have exceeded the national ambient air quality standards for any of six pollutants (ozone, or smog; carbon monoxide; lead; particulate matter; or PM-10; or nitrogen dioxide)

Nonconforming Use - Any pre-existing structure, tree, or use of land that is inconsistent with the provisions of the local land use or airport master plans.

Non-directional Beacon (NDB) - A beacon transmitting nondirectional signals that can be used by pilots whose aircraft are equipped with direction finding equipment to determine a bearing to and from the station.

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

Notice to Airman (NOTAM) - A notice containing information concerning the condition of the National Airspace System.

Off-Airport Property - Property that is beyond the boundary of land owned by the airport sponsor.

Official Airline Guide (OAG) - Contains a listing of airline flight schedules.

Official Map - A legally adopted map that conclusively shows the locations and width of proposed streets, public facilities, public areas and drainage rights-of-way.

On-Airport Property - Property that is within the boundary of land owned by the airport sponsor.

Outer Fix - An air traffic control term to describe the fixes in the terminal area from which aircraft are normally cleared to the approach fix or final approach course.

Overlay Zone - A mapped zone that imposes a set of requirements in addition to those of the underlying zoning district.

Passenger Facility Charge (PFC) Program - The PFC Program, first authorized by the Aviation Safety and Capacity Expansion Act of 1990 and now codified under Section 40117 of Title 49 U.S.C., provides a source of additional capital to improve, expand and repair the nation's airport infrastructure. The legislation allows public agencies controlling commercial service airports to charge enplaning passengers using the airport a facility charge. The FAA must approve any facility charges imposed on enplaning passengers.

Performance Standards - Minimum acceptable levels of performance, imposed by zoning, that must be met by each land use.

Positive Control - The separation of all air traffic within designated airspace.

Precision Approach Procedure - A standard instrument approach procedure in which an electronic glideslope is provided.

Primary Commercial Service Airport - A commercial airport that enplanes .01 percent or more of the total annual U.S. enplanements.

Primary Runway - The runway used for the majority of airport operations. Large, high-activity airports may operate two or more parallel primary runways.

Profile - The physical position of the aircraft during landings or takeoffs in terms of altitude and distance in relation to the runway.

Propagation - Sound propagation refers to the spreading or radiation of sound energy from the noise source.

Public Use Airport - A publicly or privately owned airport that offers the use of its facilities to the public without prior notice or special invitation or clearance.

Quadrant - A quarter part of a circle, centered on a NAVAID oriented clockwise from magnetic north.

Radial - A magnetic bearing extended from a VOR,VORTAC, or TACAN facility.

Reliever Airport - An airport that meets certain FAA criteria and relieves the aeronautical demand on a busier air carrier airport.

Rotational Runway Use - Variance in the use of runways over a specific time.

Run Up - A routine procedure for testing aircraft at high power settings conducted by maintenance personal.

Runway - A defined area on an airport for the purpose of landing and takeoff.

Runway Protection Zone (RPZ) - A trapezoidal-shaped area centered about the extended runway centerline that is used to enhance the safety of aircraft operations. It begins 200 feet beyond the end of the runway or area usable for takeoff or landing. The RPZ dimensions are functions of the design aircraft, type of operation and visibility minimums.

Runway Use Program - A noise abatement runway selection plan designed to enhance noise abatement efforts with regards to airport communities for arriving and departing aircraft.

Single Event - An occurrence of audible noise usually above a specified minimum noise level.

Slant-Range Distance - The straight line distance between an aircraft and a point on the ground.

Sound Attenuation - Acoustical phenomenon whereby a reduction of sound energy is experienced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, constructed features (e.g., sound insulation) and natural features.

Sound Exposure Level (SEL) - A measure of the physical energy of the noise event that takes into account both intensity and duration. By definition SEL values are referenced to a duration of one second. SEL is higher than the average and the maximum noise levels as long as the event is longer than one second is. Sound exposure level is expressed in decibels (dB). People do not hear SEL.

Special Exceptions - Land uses that are not specifically permitted as a matter of right but can be permitted in accordance with performance standards and other local criteria. Also known as "conditional uses."

Special Use Airspace - Six types of airspace designated to special uses and defined in the Airmans informational manual. It identifies areas wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not part of those activities.

Splay - The spread of aircraft to the side of the centerline of a departure or arrival corridor.

Stage 2 Aircraft - Aircraft that meet the noise levels prescribed by FAR Part 36 and are less stringent than noise levels established for the quieter designation Stage 3 aircraft. The Airport Noise and Capacity Act requires the phase-out of all Stage 2 aircraft by December 31, 1999, with case-by-case exceptions through the year 2003.

Stage 3 Aircraft - Aircraft that meet the most stringent noise levels set forth in FAR Part 36.

Stage Length - The distance an aircraft flies to its next destination (the distance traveled from takeoff at one airport to the arrival at the next).

Standard Instrument Departure Procedure (SID) - A preplanned Instrument Flight Rule (IFR) air traffic control departure printed for pilot use in graphic and or text form. SID's provide transition from the terminal to the en route structure.

Standard Terminal Arrival Routes (STARS) - A preplanned Instrument Flight Rule (IFR) air traffic control departure printed for pilot use in graphic and or text form. STARS provide transition from an en route structure to an outer fix or an instrument approach fix in the terminal area.

State Implementation Plan (SIP) - A detailed description of the programs a state will use to carry out its responsibilities under the Clean Air Act. State Implementation Plans are collections of the regulations used by a state to reduce air pollution.

Statute Mile - A measure of distance equal to 5,280 feet.

TACAN - Tactical Air Navigation. A navigation system used by the military.

Taxiway - A defined path established for taxing of aircraft from one part of an airport to another.

Terminal Area - A general term used to describe airspace in which airport traffic control or approach control service is provided.

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.

Threshold - The beginning of the usable section of a runway.

Time Above (TA) - Time above indicates the time in minutes that a given DBA level is exceeded in a 24 hour period.

Traffic Patterns - A traffic flow that is prescribed for aircraft landing at and taking off from an airport.

Transfer of Development Rights - This involves separate ownership and use of the various "rights" associated with a parcel of real estate. Under this concept, some of the property's development rights are transferred to a remote location where they may be used to intensify allowable development.

Turbojet Aircraft - Aircraft operated by jet engines incorporating a turbine-driven air compressor to take in and compress the air for the combustion of fuel, the gases of combustion (or the heated air) being used both to rotate the turbine and to create a thrust-producing jet.

Turboprop Aircraft - Aircraft in which the main propulsive force is supplied by a gas turbine driven conventional propeller. Additional propulsive force may be supplied from the discharged turbine exhaust gas.

Variance - An authorization for the construction or maintenance of a building or structure, or for the establishment or maintenance of a use of land that is prohibited by a zoning ordinance. A lawful exception from specific zoning ordinance standards and regulations predicated on the

practical difficulties and/or unnecessary hardships on the petitioner being required to comply with those regulations and standards from which an exemption or exception is sought.

Vector - Compass heading instructions issued by ATC to provide navigational guidance by radar.

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

Visual Approach - An approach to an airport conducted with visual reference to the terrain.

Visual Flight Rules (VFR) - Rules that govern flight procedures in good weather, with conditions usually being at least 1,000-foot ceiling and three miles visibility.

Visual Meteorological Conditions (VMC) - Weather conditions equal to or greater than those specified in 14 CFR 91.155 for aircraft operations under Visual Flight Rules.

VORTAC - Very High Frequency Omnidirectional Range with Tactical Air Navigation. A navigational aid providing VOR azimuth and TACAN distance measuring equipment at one site.

Wetlands Mitigation Banking - Involves consolidating fragmented wetland mitigation projects into one large contiguous site. Units of restored, created, enhanced or preserved wetlands are expressed as "credits" which may be withdrawn to offset "debits" incurred at a project development site.

Zoning - The partitioning of land parcels in a community by ordinance into zones and the establishment of regulations in the ordinance to govern the land use and the location, height, uses, and land coverage of buildings within each zone. The zoning ordinance usually consists of text and zoning map.

Zoning Ordinance - Primarily a legal document that allows a local government effective and legal regulation of uses of property while protecting and promoting the public interest.

Appendix H
NEM Checklist

HJAIA FAR PART 150
FAA NEM CHECKLIST

Airport Name: Hartsfield-Jackson Atlanta International Airport **Reviewer:**

	Yes/No/NA	Page No./ Other Reference	Notes/Comments
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	Page 1-1	
2. a NEM and NCP	NA		
3. a revision to NEMs which have previously been determined by FAA to be in compliance with Part 150?	NA		
B. Is the airport name and the qualified airport operator identified?	Yes	Page 1-1	
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		
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	Page 1-2 (Section 1.3.1) and Page 1-4 (Section 1.3.2)	As stated on Page 1-1 of the NEM report, Volume III of the documentation for HJAIA's Part 150 Study will present a detailed discussion of the public review and comment regarding the NEMs.
B. Identification:			
1. Are the consulted parties identified?	See response to question II.A.		
2. Do they include all those required by 150.21(b) and A150.105(a)?	See response to question II.A.		

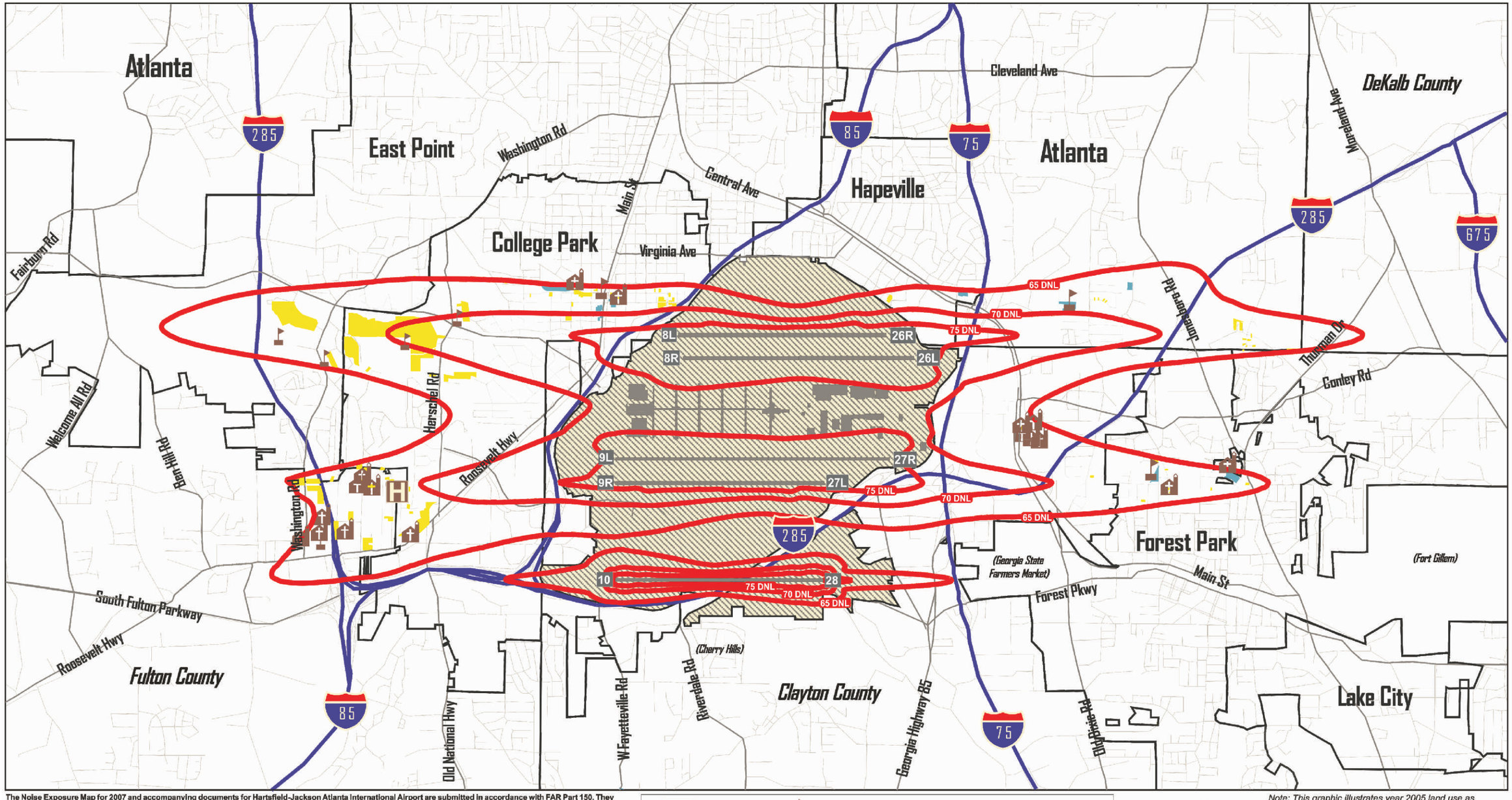
	Yes/No/NA	Page No./ Other Reference	Notes/Comments
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	See response to question II.A.		
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?	See response to question II.A.		
III. GENERAL REQUIREMENTS: [150.21]			
A. Are there two maps, each clearly labeled on the face with year (existing condition year and 5-year)?	Yes	Maps A and B (located in folder at back of this document).	The existing condition year is 2007. The future condition is for the year 2012.
B. Map currency:			
1. Does the existing condition map year match the year on the airport operator's submittal letter?	Yes		
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?	Yes		
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?	NA		
C. If the NEM and the NCP are submitted together:			
1. Has the airport operator indicated whether the 5-year contours represent conditions without the program vs. contours if the program is implemented?	NA		
2. If the 5-year map is based on program implementation:			
a. are the specific program measures which are reflected on the map identified?	NA		

	Yes/No/NA	Page No./ Other Reference	Notes/Comments
b. does the documentation specifically describe how these measures affect land use compatibilities depicted on the map	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.	N/A		
IV. MAP SCALE, GRAPHICS, AND DATA REQUIREMENTS: [A150.101, A150.103, A105.105, A150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (flight tracks not smaller than 1"=8,000 feet and extending to 30,000 feet and NEMs at a scale at least 1"= 2000 feet)?	Yes	See Figures 3-4 and 3-5 and Maps A and B.	Figures 3-4 and 3-5 (2007 east and west flow corridors, respectively) illustrate departure flight tracks extending 30,000 feet.
B. Is the quality of the graphics such that required information is clear and readable?	Yes		
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?			
a. airport boundaries	Yes		
b. runway configurations with runway end numbers	Yes		
2. Does the depiction of the off-airport data include:			
a. a land use base map depicting streets and other identifiable geographic features	Yes		
b. the area within the 65 DNL (or beyond, at local discretion)	Yes		

	Yes/No/NA	Page No./ Other Reference	Notes/Comments
c. clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the 65 DNL (or just beyond, at local discretion)	Yes		
D. 1. Continuous contours for at least the DNL 65, 70, and 75?	Yes		
2. Based on current airport and operational data for the existing condition year NEM, and forecast data for the 5-year NEM?	Yes		
E. Flight tracks for the existing condition and 5-year forecast time frames (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 3-4 and 3-5.	
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)	No	Figure A-1 in Appendix A.	
G. Incompatible land use identification:			
1. Are incompatible land uses within at least the 65 DNL depicted on the maps?	Yes	Maps A and B.	
2. Are noise sensitive public buildings identified?	Yes		
3. Are the incompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	Yes		
4. Are compatible land uses, which would normally be considered incompatible, explained in the accompanying narrative?	Yes	Sections 3.9 and 4.9 (also noted on Maps A and B)	
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	Sections 2, 3 and 4.	
2. Are the underlying technical data and planning assumptions reasonable?	Yes		
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	Yes	Sections 2, 3, and 4.	

	Yes/No/NA	Page No./ Other Reference	Notes/Comments
a. Is it FAA approved?	Yes		
b. Was the same model used for both maps?	Yes	Page 2-1.	
c. Has AEE approval been obtained for use of a model other than those which have previous blanket FAA approval?	N/A		
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?	No		
b. If so, does this have written approval from AEE?	N/A		
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	N/A		
4. For noise contours below 65 DNL, does the supporting documentation include explanation of local reasons? (Narrative explanation is highly desirable but not required by the Rule.)	N/A		
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	Pages 3-9 and 4-5 (Tables 3.8 and 4.5)	
2. Does the documentation indicate whether Table 1 of Part 150 was used by the airport operator?	Yes	Appendix E, Page E-2 and Figure E-2.	
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		
(2) does the narrative include the airport operator's complete substitution for Table 1?	N/A		
3. Does the narrative include information on self-generated or ambient noise where compatible/incompatible land use identifications consider non-airport/aircraft sources?	N/A		

	Yes/No/NA	Page No./ Other Reference	Notes/Comments
4. Where normally incompatible 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		
5. Does the narrative describe how forecasts will affect land use compatibility?	Yes	Page 4-5 (Section 4.9)	Section 4.9 describes the forecast 2012 noise contours and compares them to the 2007 contours. A narrative discussing the forecast increase incompatible land uses (residential) is also provided.
IV. 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		
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete?	Yes		



The Noise Exposure Map for 2007 and accompanying documents for Hartsfield-Jackson Atlanta International Airport are submitted in accordance with FAR Part 150. They were prepared with the best available information and are hereby certified as true and complete to the best of our knowledge and belief. Interested persons have had the opportunity to submit their views concerning the correctness and adequacy of the Noise Exposure Map and forecast operations. The FAR Part 150 Study has been conducted in consultation with state and local agencies whose area of jurisdiction is within the noise contours provided on the map.

Richard D. Alberts, P.E. Environmental Science Associates — March 29, 2007 — Date

Dr. Thomas Nissalke
City of Atlanta / Department of Aviation — March 29, 2007 — Date

2007 NEM DNL
Jurisdictions
Airport Property

Schools/Daycare Facilities
Medical Facilities
Churches

Land Use Designation
Residential[a]
Public/Institutional[b]
Compatible Land Uses

[a] The FAA considers residences and other noise sensitive uses outside the 65 DNL to be compatible with aircraft noise.
[b] Includes uses compatible with aircraft noise (i.e.,cemetaries, certain government facilities). Incompatible uses will be addressed during implementation of the Part 150 Study

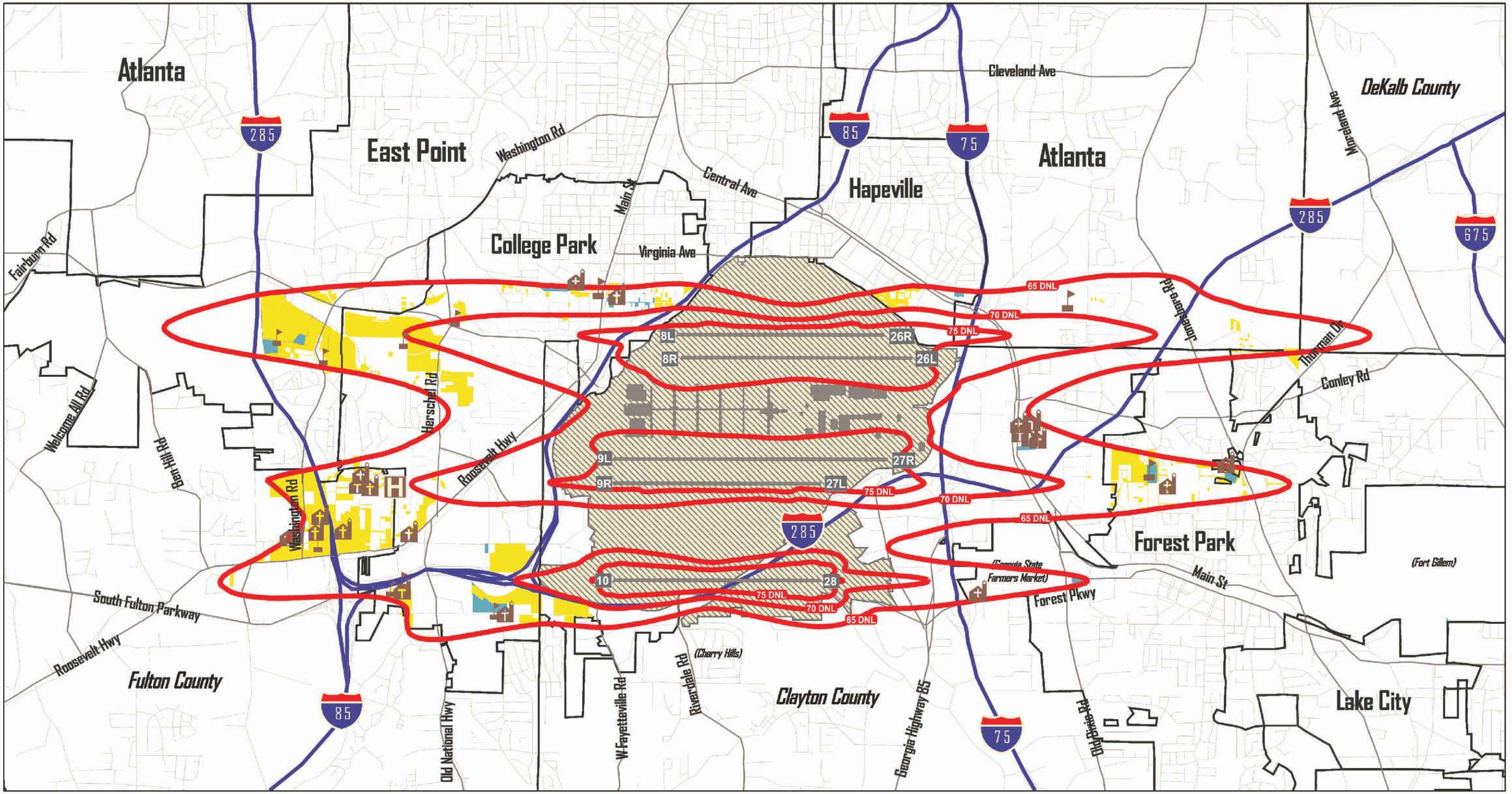
Note: This graphic illustrates year 2005 land use as obtained from the political jurisdictions within the 65 DNL.

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Map A

Noise Exposure Map: 2007



The Noise Exposure Map for 2012 and accompanying documents for Hartsfield-Jackson Atlanta International Airport are submitted in accordance with FAR Part 150. They were prepared with the best available information and are hereby certified as true and complete to the best of our knowledge and belief. Interested persons have had the opportunity to submit their views concerning the correctness and adequacy of the Noise Exposure Map and forecast operations. The FAR Part 150 Study has been conducted in consultation with state and local agencies whose area of jurisdiction is within the noise contours provided on the map.

Richard D. Alberts, P.E. Environmental Science Associates — March 29, 2007 — Date

Dr. Thomas Nissalke
City of Atlanta / Department of Aviation — March 29 2007 — Date

2007 NEM DNL
Jurisdictions
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N

0 2000 4000 Feet

Note: This graphic illustrates the future land use as obtained from the political jurisdictions within the 65 DNL.

SOURCE: ESA Airports

Hartsfield-Jackson Atlanta International Airport FAR Part 150 Study

Map B

Noise Exposure Map: 2012