Appendix A

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APPENDIX A
FAA POLICIES, GUIDANCE, AND REGULATIONS

A.1 NOISE CONTROL POLICIES AND GUIDANCE

This section presents information regarding the history of noise and land use guidance that may be useful in understanding the legal and regulatory landscape. With respect to airports, the FAA has a long history of publishing noise and 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 USEPA and the Department of Defense, have developed noise and use criteria. A summary of some of the more pertinent regulations and guidelines is presented in the following paragraphs.

A.1.1 NOISE CONTROL ACT

Congress passed the Noise Control Act (42 U.S.C. §4901 et seq.) in 1972, which established a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The act set forth the foundation for conducting research and setting guidelines to restrict noise pollution.

A.1.2 U.S. ENVIRONMENTAL PROTECTION AGENCY NOISE ASSESSMENT GUIDELINES

In response to the Noise Control Act, the USEPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* This document identified safe levels of environmental noise exposure without consideration for economic cost for achieving these levels. In this document, 55 dB DNL is identified as the requisite level with an adequate margin of safety for residential and recreational uses. This document does not constitute USEPA regulations or standards; rather, it was intended to "provide state and local governments as well as the Federal government and the private sector with an informational point of departure for the purpose of decision-making." This report, as well as other research, ultimately led to the most current policies regarding the threshold for significant noise impacts, which is 65 dB DNL.

A.1.3 FEDERAL AVIATION NOISE ABATEMENT POLICY

On November 18, 1976, the U.S. Department of Transportation and FAA jointly issued the Federal Aviation Noise Abatement Policy. This policy recognized aircraft noise as a major constraint on the further development of the commercial aviation established key responsibilities for addressing aircraft noise. The policy states that the Federal government has the authority and responsibility to control aircraft noise by the regulation of source emissions, by flight operational procedures, and by management of the air traffic control system and navigable airspace in ways that minimize noise impact on residential areas, consistent with the highest standards of safety. The Federal government also provides financial and technical assistance to airport Proprietors for noise reduction planning and abatement activities and, working with the private sector, conducts continuing research into noise abatement technology.

Airport Proprietors are primarily responsible for planning and implementing action designed to reduce the effect of noise on residents of the surrounding area. Such actions include optimal site location, improvements in airport design, noise abatement ground procedures, land acquisition, and restrictions on airport use that do not unjustly discriminate against any user, impede the federal interest in safety and management of the air navigation system, or unreasonably interfere with interstate or foreign commerce.

A.1.4 AVIATION SAFETY AND NOISE ABATEMENT ACT OF 1979 (re-codified in 1994)

The Aviation Safety and Noise Abatement Act of 1979 (ASNA), which is codified as 49 U.S.C. 47501-47510, set forth the foundation for the airport noise compatibility planning program outlined in 14 Code of Federal Regulations (CFR) Part 150 (see Section A.1.6). The act established the requirements for conducting noise compatibility planning and provided assistance to and funding for which airport operators could apply to undertake such planning.

A.1.5 AIRPORT NOISE AND CAPACITY ACT OF 1990

The Airport Noise and Capacity Act (ANCA) of 1990 established two broad directives for the FAA: 1) to establish a method by which to review airport noise and access/use restrictions imposed by airport proprietors, and 2) to institute a program to phase out Stage 2 aircraft over 75,000 pounds by December 31, 1999.

A.1.6 FEDERAL REGULATIONS RELATED TO AIRPORT NOISE

The FAA has promulgated a series of regulations based on directions from Congress as provided in a series of authorizing statutes. Four separate Federal Regulations have been developed to specifically address permissible aircraft noise levels, operating procedures, and studies of aircraft noise levels. These regulations apply to activity within the U.S. Additionally, the International Civil Aviation Organization (ICAO) has developed and accepted similar regulations, which control the noise levels generated by aircraft operating in international airspace.

14 CFR Part 36, Noise Standards: Aircraft Type and Air Worthiness Certification

Title 14, Part 36 of the CFR sets forth noise levels that are permitted for aircraft of various weights, engine number, and date of certification. Originally released in 1969 and amended several times, aircraft were divided into three classes, based on the amount of noise they produced at three specific noise measurement locations during certification testing. These classes (or stages) were:

Stage 1 – the oldest and loudest aircraft, typically of the first generation of jets, designed before 1974, and having measured noise levels that exceed the standards set for the other classes of aircraft. This group included many of the first generation of jet aircraft used in passenger and cargo service, including the B-707, early B-727 and B-737 aircraft, and early DC-8s. Under 14 CFR Part 91, all such aircraft weighing more than 75,000 pounds were removed from the U.S. operating fleet by 1985, unless modified to meet Stage 2 noise standards.

Stage 2 – aircraft that were type certified before November 15, 1975 that met noise levels defined by the FAA at takeoff, sideline, and approach measurement locations. The permissible amount of noise increased with the weight of the aircraft above 75,000 pounds and the number of engines. This category included many of the second-generation jet aircraft such as the B-727, B-737-200, and DC-9 that were extensively used in passenger and cargo service. Under 14 CFR Part 91, all such aircraft weighing more than 75,000 pounds were removed from the U.S. operating fleet by 2000, unless modified to meet Stage 3 noise standards.

Stage 3 – aircraft that meet the most stringent noise level requirements at takeoff, sideline, and approach measurement locations for their weight and engine number. This category includes the great majority of active business jet aircraft and all aircraft in passenger and cargo service that weigh more than 75,000 pounds.

The Committee on Aviation Environmental Protection, an International Civil Aviation Organization subcommittee, of which the U.S. is an active participant, has been debating the merits of adopting a more stringent standard for new aircraft type designs. In July 2005, the FAA, through notice in the *Federal Register*, adopted a Final Rule for Stage 4 Aircraft Noise Standards. No action had been taken by August 2013 to establish a phase out schedule for Stage 3 aircraft.

Stage 4 – all jet and transport-category airplanes with a maximum take-off weight of 12,500 pounds or more for which application of a new type design is submitted on or after January 1, 2006. The FAA's final Part 36 Stage 4 noise levels are a cumulative 10 EPNdB (effective perceived noise level in decibels) less than the current Stage 3 limits. They are based on the work of the International Civil Aviation Organization's committee on aviation environmental protection, in which the FAA and the International Business Aviation Council are active members.

All business jets are currently manufactured meet Stage 3 limits (by law), and nearly all would qualify to be recertified to meet Stage 4. Although the proposal doesn't contain a Stage 4 retrofit requirement and the FAA said it has no plans to impose such a requirement.

14 CFR Part 91, General Operating and Flight Rules

Title 14, Part 91 of the CFR as applied to noise, established schedules for phasing louder equipment out of the operating fleet of aircraft weighing more than 75,000 pounds. The schedules called for all Stage 1 aircraft over 75,000 pounds to be removed from the fleet by 1982, with the exception of two engine aircraft in small city service, which were allowed to continue in service until 1985.

The schedule for the retirement of Stage 2 aircraft called for the removal of all such aircraft by the end of 1999, with interim retirement dates of 1994, 1996, and 1998 for the removal of portions of the Stage 2 fleet.

On July 2, 2013, the FAA issued a Final Rule which prohibits the operation in the contiguous United States of jet airplanes weighing 75,000 pounds or less that do not meet Stage 3 noise levels after December 31, 2015.

As of August 2013, no retirement schedules have been imposed for aircraft weighing less than 75,000 pounds nor has there been any indication of the imposition of a phase-out of Stage 3 aircraft.

14 CFR Part 150, Airport Noise Compatibility Planning

Title 14, Part 150 of the CFR sets forth the standards under which a Part 150 Noise Compatibility Study is conducted. The background and requirements for such studies are presented in **Section One** of this document. Notably, the preparation of a Noise Compatibility Program (NCP) under 14 CFR Part 150 is a voluntary action by an airport proprietor. The two main purposes to undertake a Part 150 study are: to determine if there are properties in the vicinity of the airport that are normally incompatible with the level of noise generated from airport operations (NEM); and to propose and evaluate measures that upon implementation would reduce the number of identified existing and/and future incompatible properties (NCP). The process of preparing the plan is intended to open/enhance lines of communication between the airport, its neighbors, and users. It is the only mechanism to provide for the mitigation of aircraft noise impacts on noise-sensitive surrounding areas that is not directly tied to the preparation of a National Environmental Policy Act (NEPA) approval document.

Once an airport operator completes a Part 150 study they are able to apply for Federal financial assistance to carry out approved noise reduction measures that meet Airport Improvement Program (AIP) funding eligibility requirements. The Part 150 Program allows airport operators to voluntarily request and receive FAA funding to prepare Part 150 studies that include Noise Exposure Maps (NEMs) and Noise Compatibility Plans (NCPs) that must be submitted to the FAA for acceptance or approval as appropriate.

14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions

Title 14, Part 161 of the CFR was published in 1991, subsequent to passage of the ANCA. That act established the requirement and schedule for the phase out of Stage 2 aircraft over 75,000 pounds. In return for that action, Congress restricted the ability of local communities to impose actions that would restrict aircraft access to any airport. Different levels of requirements were established for voluntary restrictions, restrictions on Stage 2 aircraft, and restrictions on Stage 3 aircraft. These requirements are applicable to all aircraft except propeller-driven aircraft weighing less than 12,500 pounds, supersonic aircraft, and Stage 1 aircraft.

Restrictive Agreements

Subpart B of 14 CFR Part 161 sets notification requirements for the implementation of Stage 3 restrictions through agreements between airport operators and all affected airport users. (Presumably, this same procedure would be followed for implementing agreements for Stage 2 restrictions.) Before going into effect, notice of these proposed agreements must be published in local newspapers of area wide circulation, posted prominently at the airport, and sent directly to all regular airport users; the FAA; Federal, state, and local agencies with land use control authority; community groups and business organizations; and any aircraft operators that are known to be interested in providing service to the airport (new entrants). After this notification period, the agreement can be implemented if all current users and any new entrants proposing to serve the airport within 180 days sign on to the proposed restriction.

Stage 2 Restrictions

Subpart C of 14 CFR Part 161 sets forth the requirements for establishing restrictions on Stage 2 aircraft operations. It requires a study of the proposed restriction that must include:

1. An analysis of the costs and benefits of the proposed restriction;
2. A description of the alternative restrictions;
3. A description of the non-restrictive alternatives that were considered and a comparison of the costs and benefits of those alternatives to the costs and benefits of the proposed restriction.

It further requires that the study use the noise methodology and land use compatibility criteria established in 14 CFR Part 150.[1] The study must also use currently accepted economic methodology. Where restrictions on Stage 2 aircraft weighing less than 75,000 pounds are involved, the study must include separate detail on how the restriction would apply to aircraft in this class.

After completing the study, the airport operator must publish a notice of the proposed restriction and an opportunity for public comment in a newspaper of general circulation in the area, post a notice prominently in the airport; and notify the FAA, local governments, all airport tenants whose operations might be affected by the proposed restrictions, and community groups and business organizations.[2] The FAA must publish an announcement of the proposed restriction in the *Federal Register*.[3]

[1] 14 CFR Part 161, Sec. 161.9, 161.11, and Sec. 161.205(b).
[2] 14 CFR Part 161, Sec. 161.203(b).
[3] 14 CFR Part 161, Sec. 161.203(e).

The required study and public notice must be completed at least 180 days before the airport operator implements the proposed restriction.[4] There is no specific provision in ANCA or Part 161 for FAA action on the airport's proposed Stage 2 restriction. In practice, the FAA has reviewed Stage 2 Part 161 Studies for completeness. No specific deadlines for this review process are established in Part 161.

Stage 3 Restrictions

Subpart D of 14 CFR Part 161 establishes the requirements that an airport operator must follow in order to implement a noise or access restriction on Stage 3 aircraft. The required analysis must include the same elements required for a proposed restriction on Stage 2 aircraft. In addition, the required Part 161 Study must demonstrate "by substantial evidence that the statutory conditions are met." These six conditions, specified in ANCA are:

- Condition 1: The restriction is reasonable, non-arbitrary, and non-discriminatory.
- Condition 2: The restriction does not create an undue burden on interstate or foreign commerce.
- Condition 3: The proposed restriction maintains safe and efficient use of the navigable airspace.
- Condition 4: The proposed restriction does not conflict with any existing Federal statute or regulation.
- Condition 5: The applicant has provided adequate opportunity for public comment on the proposed restriction.
- Condition 6: The proposed restriction does not create an undue burden on the national aviation system.[5]

The applicant must also prepare an EA or documentation supporting a categorical exclusion.[6]

After submission by an airport operator of a complete Part 161 application package, the FAA has 30 days to review it for completeness. Notice of the proposed restriction must be published by the FAA in the *Federal Register*. After reviewing the application and public comments, the FAA must issue a decision approving or disapproving the proposed restriction within 180 days after receipt of a complete application. This decision is a final decision of the FAA Administrator for purposes of judicial review.[7]

[4] 14 CFR Part 161, Sec. 161.203(a).
[5] 14 CFR Part 161, Sec. 161.305(e).
[6] 14 CRF Part 161, Sec. 161.305(c).
[7] 14 CFR Part 161, Sec. 161.313(b)(2).

Consequences of Failing to Comply with Part 161

Subpart F of 14 CFR Part 161 describes the consequences of an airport operator's failure to comply with Part 161. The sanction provided for in Subpart F is the termination of the airport's eligibility to receive airport grant funds and to collect PFCs.[8] Most of Subpart F describes the process for notifying airport operators of apparent violations, dispute resolution, and implementation of the required sanctions.

A.1.7 FEDERAL INTERAGENCY COMMITTEE ON NOISE

FICON was formed in 1990 to review specific elements of the assessment of airport noise impacts and to make recommendations regarding potential improvements. 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;
- the extent of impacts outside of DNL 65 decibels (dB) that should be reviewed in a National Environmental Policy Act (NEPA) document;
- the range of FAA-controlled mitigation options (noise abatement and flight track procedures) analyzed; and,
- the relationship of the 14 CFR Part 150 process to the NEPA process; including ramifications to the NEPA process if they are separate, and exploration of the means by which the two processes can be handled to maximize benefits.

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 committee recommended the continued use of DNL as the principle means of assessing noise impacts and encouraged agency discretion in the use of supplemental noise analysis. FICON also recommended continued research on the impact of aircraft noise, and recommended that “a standing federal interagency committee should be established to assist agencies in providing adequate forums for discussion of public and private sector proposals, identifying needed research, and in encouraging the conduct of research and development in these areas."

[8] 14 CFR Part 161, Sec. 161.501.

Federal Interagency Committee on Aviation Noise

The FICAN was formed in 1993 to fulfill the FICON recommendation. The following Federal agencies concerned with aviation noise, including those with policy roles, are represented on the Committee:

- Department of Defense
  - U.S. Air Force
  - U.S. Army
  - U.S. Navy
- Department of Interior
  - National Park Service
- Department of Transportation
  - Federal Aviation Administration
- Environmental Protection Agency
- National Aeronautics and Space Administration (NASA)
- Department of Housing and Urban Development

A.1.8 FEDERAL REQUIREMENTS TO USE DNL IN ENVIRONMENTAL NOISE STUDIES

DNL is the standard metric used for environmental noise analysis in the U.S. This practice originated with the USEPA's effort to comply with the Noise Control Act of 1972. The USEPA designated a task group to "consider the characterization of the impact of airport community noise and develop a community noise exposure measure."[9] The task group recommended using the DNL metric. The USEPA accepted the recommendation in 1974, based on the following considerations:

- The measure is applicable to the evaluation of pervasive, long-term noise in various defined areas and under various conditions over long periods of time.
- The measure correlates well with known effects of the noise environment on individuals and the public.
- The measure is simple, practical, and accurate.
- Measurement equipment is commercially available.
- The metric at a given location is predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.[10]

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[9] *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety.* U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.

[10] *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety*. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, Pp. A-1–A-23.

In 1980, the Federal Interagency Committee on Urban Noise (FICUN) met to consolidate Federal guidance on incorporating noise considerations in local land use planning. The committee selected DNL as the best noise metric for the purpose, thus endorsing the USEPA's earlier work and making it applicable to all Federal agencies.[11]

In response to the requirements of the ASNA Act of 1979 and the recommendations of FICUN and USEPA, the FAA established DNL in 1981 as the single metric for use in airport noise and land use compatibility planning. This decision was incorporated into the final rule implementing ASNA, 14 CFR Part 150, in 1985. Part 150 established the DNL as the noise metric for determining the exposure of individuals to aircraft noise and identified residential land uses as being normally compatible with noise levels below DNL 65 dBA.

In the early 1990s, Congress authorized the creation of a new interagency committee to study airport noise issues. The FICON was formed with membership from the USEPA, the FAA, the U.S. Air Force, the U.S. Navy, HUD, the Department of Veterans Affairs, and others. FICON concluded in its 1992 report that Federal agencies should "continue the use of the DNL metric as the principal means for describing long term noise exposure of civil and military aircraft operations."[12] FICON further concluded that there were no new sound descriptors of sufficient scientific standing to substitute for the DNL cumulative noise exposure metric.[13]

In 1993, the FAA issued its *Report to Congress on Effects of Airport Noise*. Regarding DNL, the FAA stated, "Overall, the best measure of the social, economic, and health effects of airport noise on communities is the Day-Night Average Sound Level (DNL)."[14] According to this report, DNL 65 dBA "…as a criterion of significance, and of the land use compatibility guidelines in in Part 150 is reasonable."[15]

A.2 FEDERAL LAWS AND POLICIES RELATED TO NOISE/LAND USE COMPATIBILITY

A.2.1 LAND USE COMPATIBILITY GUIDELINES

The FAA adopted land use compatibility guidelines relating types of land use to airport sound levels in 1985. These guidelines were promulgated in Title 14 of the Code of Federal Regulations (14 CFR) Part 150. These guidelines, reproduced here as **Table A-1**, show the compatibility parameters for the following land use types: residential; noise-sensitive public facilities that include schools, places of worship (churches), nursing homes, hospitals, and libraries; commercial; manufacturing and production; and recreation.

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11 *Guidelines for Considering Noise in Land Use Planning and Control*. Federal Interagency Committee on Urban Noise (FICUN). 1980.
12 *Federal Agency Review of Selected Airport Noise Analysis Issues*. Federal Interagency Committee on Noise (FICON). August 1992, Pp. 3-1.
13 *Federal Agency Review of Selected Airport Noise Analysis Issues, Technical Report, Volume 2.* Federal Interagency Committee on Noise (Technical). August 1992, Pp. 2-3.
14 *Report to Congress on Effects of Airport Noise.* Federal Aviation Administration. 1993, P. 1.
15 *Report to Congress on Effects of Airport Noise.* Federal Aviation Administration. 1993, P. 13.

As shown in Table A-1, all land uses within areas below 65 DNL are considered to be compatible with airport operations. Residential land uses are normally incompatible with noise levels above 65 DNL. In some areas, residential land use may be permitted in the 65 to 70 DNL with appropriate sound insulation measures implemented. This is done at the discretion of local communities. Schools and other public use facilities located between 65 and 75 DNL are normally incompatible without sound insulation. Above 75 DNL, schools, hospitals, nursing homes, and places of worship (churches) are considered incompatible land uses. The information presented in Table A-1 is meant to act as a guideline for the minimum information required. According to 14 CFR Part 150, "Adjustments or modifications of the descriptions of the land-use categories may be desirable after consideration of specific local conditions."[16] Adjustments are allowed as necessary to address local zoning that indicates/defines other noise levels or land use types are incompatible in the 65-75 DNL.

[16] 14 CFR Part 150, Part B Noise Exposure Map Development, Section A150.101 Noise contours and land usages, paragraph (c).

Table A-1
LAND USE COMPATIBILITY GUIDELINES - 14 CFR PART 150

	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
LAND USE	**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)	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						
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

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

Table A-1, *Continued*
LAND USE COMPATIBILITY GUIDELINES - 14 CFR PART 150

Key to Table A-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 for Table A-1

(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 and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR 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 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 level is low.
(5) Land use compatible provided 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: 14 CFR Part 150 *Airport Noise Compatibility Planning*, Appendix A, Table 1.

A.2.2 CHANGE IN FAA'S NOISE MITIGATION POLICY

The FAA issued a final policy to establish a distinction between remedial and preventive noise mitigation measures proposed by airport operators and submitted for approval by the FAA under noise compatibility planning regulations. In the notice of final policy[17] effective October 1, 1998, the FAA stated the following:

- As of October 1, 1998, the FAA will approve under 14 C.F.R. Part 150 only remedial noise mitigation measures for existing incompatible development and only preventive noise mitigation measures in areas of potential new incompatible development.
- The FAA will not approve remedial noise mitigation measures for new incompatible development that occurs in the vicinity of airports.
- The use of AIP funds will be affected to the extent that such use depends on approval under Part 150.

A.2.3 FAA POLICY ON SOUND INSULATION ELIGIBILITY

Per 14 C.F.R. Part 150, a 45 dB standard has been adopted by the FAA for interior noise. This was further clarified in 1992 by the Federal Interagency Committee on Noise (FICON) findings of 45 dB to be the interior noise level that will accommodate indoor conversations or sleep. Therefore, a structure located within a noise contour level that would normally be incompatible based on the land use guidelines may not necessarily be considered incompatible if the interior noise levels do not exceed 45 dB. If an Airport sponsor wishes to apply for federal funding for a sound insulation program then the properties that are identified for participation will be tested in accordance with FAA methodologies[18] to determine if the interior noise levels make the home eligible or not eligible for treatment.

[17] FAA Notice of Final Policy, October 1, 1998.
[18] FAA Order 5100.38D, Airport Improvement Program Handbook, September 30, 2014.

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APPENDIX B
TEMPORARY NOISE MEASUREMENT PROGRAM

B.1 INTRODUCTION

As part of the aircraft noise analysis conducted for the Charlotte Douglas International Airport (CLT or Airport) Noise Exposure Map Update, a temporary noise measurements program was conducted from July 31, 2014 to August 13, 2014. The temporary noise measurement program was conducted in accordance with 14 C.F.R. Part 150 guidelines as provided in Section A150.5. Noise meters were located at different residences and public locations to capture noise from aircraft operations. Noise measurements were taken using two methods, short-term monitoring (up to one hour per site) and long term monitoring (five consecutive days at each site). Each site was selected relative to flight patterns, proximity to other monitoring sites, and in response to community suggestions on places to measure aircraft noise. The following sections describe the methodologies, locations, and results of the short-term and long-term noise measurement efforts.

B.2 NOISE MEASUREMENT METHODOLOGY

B.2.1 EQUIPMENT TYPE

State of the art equipment used in this program included the Larson Davis 824 and 831 sound level meters. These are Class I Precision Sound Level Meters (as defined by American National Standards Institute (ANSI) and International Electrotechnical Commission (IEC)). The equipment was calibrated in compliance with manufacturer's procedures. Microphones and recording equipment were of the highest quality and capable of recording and calculating the various noise metrics. The equipment settings included the “A” frequency weighting, filter characteristics, and the “slow response” characteristics. The instrumentation that was used for collecting short-term and long-term measurements is listed in **Table B-1**.

Table B-1
ACOUSTICAL MEASUREMENT INSTRUMENTATION
NOISE MEASUREMENT PROGRAM
Charlotte Douglas International Airport

Method	**Equipment Type**		
	Sound Level Meter	**Microphone**	**Pre-amp**
Long-Term	Larson Davis 831 Sound Level Meter w/ Windscreen, Cabling, and Tripod	377B02	PRM831
Short-Term	Larson Davis 824 Sound Level Meter w/ Windscreen	377B02	PRM902

Source: Landrum & Brown, 2013.

B.2.2 NOISE MEASUREMENT SITE SELECTION

Noise measurements were taken at eight long-term sites and 33 short-term sites. The long-term and short-term noise measurement sites were chosen based on their proximity to the Airport, the flow of aircraft operations during the measurement program, and areas of past noise concerns. General sites were selected on the basis of ambient noise level (or more specifically, the absence of loud ambient noise such as vehicular traffic), locations of flight tracks derived from radar data, locations of noise complaints received by the Airport, and the locations of concentrations of residential land uses that experience high numbers of aircraft overflights. Specific locations were suggested by Airport staff, as well as through application of consultant experience. Attempts were also made to select sites where noise measurements were taken during previous noise studies. Specific selection criteria included the following:

- Emphasis on areas of numerous aircraft noise events according to earlier evaluations;
- Representative sampling of all major types of operations and aircraft operating at CLT;
- Screening of each site for local noise sources or unusual terrain characteristics, which could affect measurements; and
- Location where there are concentrations of residential development.

Airport staff also periodically conduct noise measurement from ten specific locations. These sites were also avoided when selecting monitoring sites for this NEM Update to avoid duplication of data and to provide coverage of additional areas.

For the eight long-term noise measurement sites, additional emphasis was placed upon the location of flight corridors for operations arriving and departing each runway end. While there numerous locations available for monitoring, the selected sites fulfill the above criteria and provide a representative sampling of the varying aircraft noise conditions in the vicinity of the Airport. **Exhibit B-1** illustrates the locations of both the short-term and long-term noise measurement sites as well as the ten Airport monitoring sites.[1] **Table B-2** lists the eight long-term sites and **Table B-3** lists the 33 short-term sites.

B.2.3 WEATHER INFORMATION

The temporary noise monitoring was conducted for approximately one hour at some sites and over five days at other sites. The weather during the monitoring period ranged from clear skies to rainy/overcast conditions. Both north and south air traffic flow occurred during the measurement dates and use of the crosswind runway was similar to average-annual conditions.

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1 Note that the CLT Airport Monitoring sites are labeled from 1 through 12 although two sites, 5 and 11 are no longer used, thus there are ten remaining sites. The numbering of these ten remaining sites has been kept consistent.

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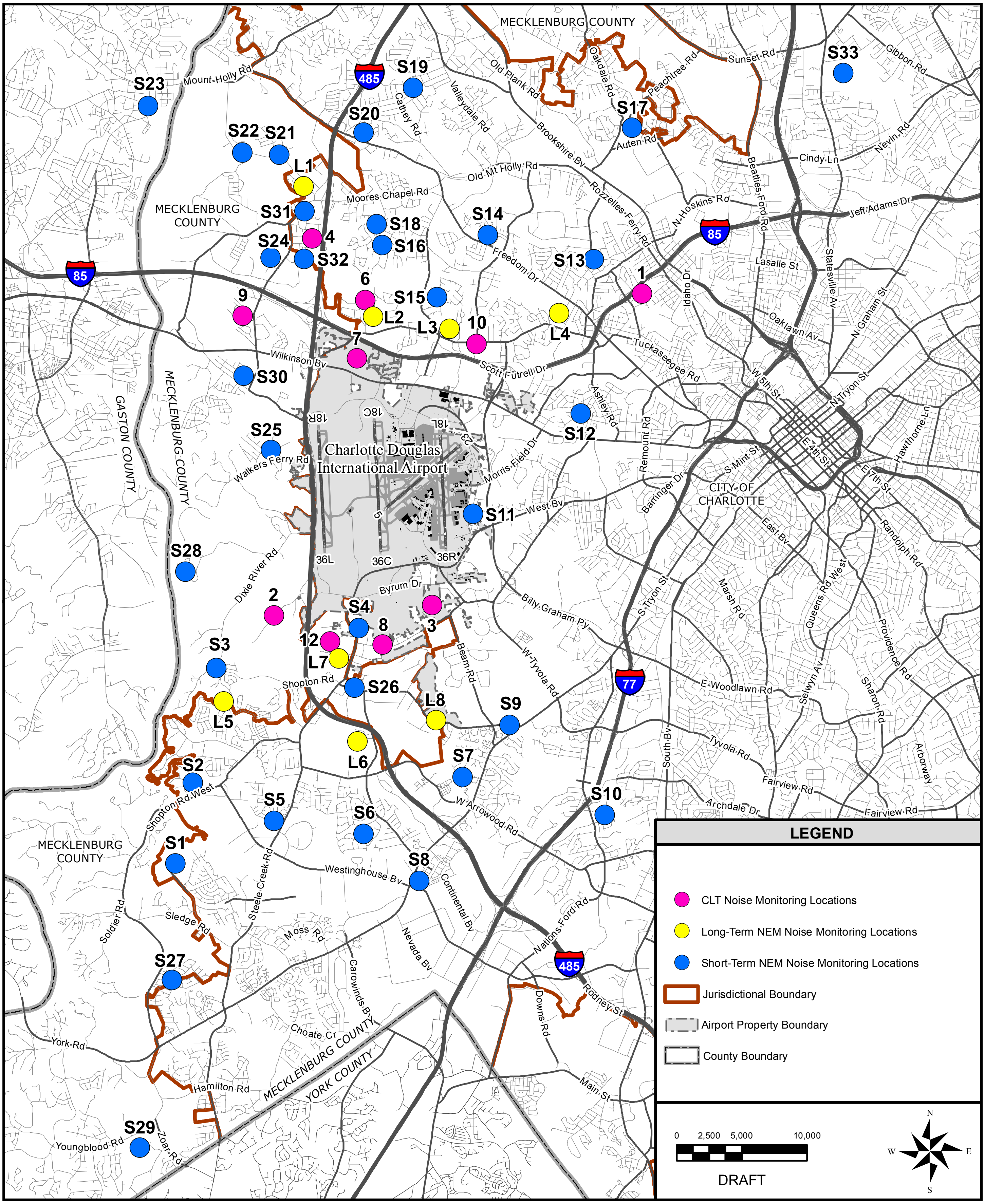

Charlotte·Douglas INTERNATIONAL AIRPORT	*Noise Exposure Map Update* ***CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT***	Noise Measurement Sites	EXHIBIT: **B-1**

Date: 9/3/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\B-1_Noise Measurement Sites.mxd

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Table B-2
SHORT-TERM NOISE MEASUREMENT SITES
Charlotte Douglas International Airport

SITE ID	SITE DESCRIPTION
S1	Winget Park
S2	River Cabin Lane
S3	Ramoth Zion AME Church - 6600 Dixie River Rd
S5	Cades Cove Drive & Steele Meadow Road
S4	Steele Creek Presbyterian Church
S6	O'Hara Drive & Bonnie Blue Lane
S7	Thornfield Road cul-de-sac
S8	Central Steele Creek Church - 9401 S Tryon St
S9	Steele Creek A.M.E. Zion Church - 1500 Shopton Road
S10	Farmhurst Drive - Treetops Apartments
S11	Airport Dr. & Ashley Crescent - Jackson Park Ministries
S12	Corbett Street
S13	Hovis Rd & Bradford Drive - Chappell Baptist Church
S14	Eagles Landing Drive
S15	1854 Still Pond Court
S16	7114 Cabe Lane
S17	Peachtree Road and Emmanuel Drive - Church Parking
S18	Dylan Shane Road
S19	Coulwood Drive & Fielding Road
S20	Oak Grove Baptist Church - 9000 Mt Holly Rd
S21	John Chapel Baptist Church - 2239 Belmeade Drive
S22	Whitewater Middle School - 1520 Belmeade Drive
S23	Glendale Avenue & Highland Street - Mt Holly
S24	Garden Memorial Presbyterian Church - 2324 Sam Wilson Road
S25	Berryhill Baptist Church - 9801 Walkers Ferry Rd
S26	8814 Gerren Drive
S27	11610 Village Pond Drive
S28	4600 Lochfoot Drive
S29	14029 Appling Ln
S30	Whisper Lane & Oak Island Court
S31	10324 Prairiegrouse Lane
S32	2226 Pleasant Dale Drive
S33	Nevin Park - 6000 Statesville Road

Table B-3
LONG-TERM NOISE MEASUREMENT SITES
Charlotte Douglas International Airport

SITE	LOCATION
L1	Shady Brook Baptist Church 2940 Belmeade Drive, Charlotte, NC 28214
L2	West Mecklenburg High School 7400 Tuckaseegee Road, Charlotte, NC 28214
L3	Mulberry Baptist Church 6450 Tuckaseegee Road Charlotte, NC 28214
L4	Tuckaseegee Park 4801 Tuckaseegee Road
L5	Windygap Road near intersection with Hermsley Road
L6	Olympic High School 4301 Sandy Porter Road, Charlotte, NC 28273
L7	Airport-Owned Property near 9220 Snow Ridge Lane
L8	Airport-Owned Property on north side of Shopton Road 500 feet east of Lebanon Drive

B.2.2 SHORT-TERM MEASUREMENT PROCEDURES

Aircraft noise levels were recorded using the equipment indicated in Table B-1 for each of the 33 short-term sites. Radar data was obtained from the Airport flight tracking system to correspond to the times of measurement. The noise-measurement program was designed to provide a sampling of single events throughout the study area. It was not designed to record cumulative noise levels. The monitors were attended while active to ensure that only aircraft noise events were recorded, or to note instances where a non-aircraft noise event was recorded simultaneously with an aircraft noise event. The monitoring procedure called for the operator to enable the noise monitor when an aircraft noise event first became audible and continue monitoring that event until the noise level receded back to ambient levels, usually lasting a duration of 30-90 seconds. After the event, the operator recorded the average noise level (Leq), the sound exposure level (SEL), the event duration, and the maximum sound level (Lmax). Other event information, such as aircraft type and operational characteristics, was also annotated, as available. Ambient noise levels, without aircraft noise or intermittent community noise, were recorded at each site.

The short-term noise measurement program provided for the collection of a large number of single-event measurements at a variety of locations throughout the community at distances ranging from several hundred feet to several miles between the aircraft and the monitoring site. This information, when correlated with the radar data and operating schedules, allowed for a comparison to the determination of applicable noise curves and performance characteristics within the Integrated Noise Model (INM) database for the most significant aircraft and operators. **Section B.3.3** discusses the analysis of short-term noise measurement data and comparison to INM aircraft profiles based on the initial results of the noise measurement data correlation and further investigation of average aircraft weights upon departure.

B.2.4 LONG-TERM MEASUREMENT PROCEDURES

For the long-term measurement, equipment was placed at eight sites and ran continuously for approximately one week. The equipment was set up on August 1, 2014 and taken down on August 7, 2014. This provided for five full days of measurements starting at 12:00 a.m. on August 2, 2014 and ending at 11:59 p.m. on August 6, 2014. Measurement staff coordinated with property owners and caretakers to gain access to these properties; which including parks, schoolyards, and undeveloped land in the vicinity of CLT.

The sound level meters were programmed to record one-second Leq in addition to "event" Leq, SEL, Lmax, and duration.[2] The sound level meters were programmed to classify an "event" as a period of time in which the noise level rose above 62 dB for a duration of at least five seconds. Noise event data was then correlated to radar data to determine if the noise was likely cause by an aircraft overflight that occurred over the site at the time of the noise event.

B.3 NOISE MEASUREMENT RESULTS

B.3.1 SHORT-TERM MEASUREMENT RESULTS

The noise measurement program revealed a wide range of noise exposure levels from aircraft activity in the airport environs. The measured noise levels from departing aircraft tended to produce peak decibel levels several decibels higher than those of arriving aircraft. This difference is caused by two characteristics of the separate operations. First, exposure to noise above the background levels from arriving aircraft is typically shorter than from departing aircraft. Second, the power settings used during approach are lower than those necessary to climb during the takeoff, resulting in noise levels for arrivals of several decibels less than measured at similar locations during departure. It should be noted that the Lmax noise levels represent the peak noise level for each individual aircraft event and should not be confused with the average Day-Night Level (DNL) contours that are used for determining the threshold of significance per Federal guidelines.

[2] See Appendix C, Noise Methodology for additional information on noise metrics.

The peak aircraft noise level (Lmax) of 83.1 dB was recorded at Site S26, at 8814 Gerren Court, near the intersection of Steele Creek Road and Shopton Road. This peak level was recorded during the take-off of a McDonnell Douglas MD-88 from Runway 18C. The peak level from an aircraft upon arrival was 78.2 at Site S18, on Dylan Shane Road to the north of CLT. This peak event was recorded during an arrival of a Canadair Regional Jet CRJ900 (CR9) on approach to Runway 18C. **Table B-2** provides a summary of the short-term noise measurement results. The sponsor will retain copies of the measurement logs recorded at each location.

Table B-2
SHORT-TERM NOISE MEASUREMENT RESULTS
Charlotte Douglas International Airport

SITE ID	SITE DESCRIPTION	DATE OF MEASUREMENTS	TIME OF MEASUREMENTS	AMBIENT NOISE LEVEL	TYPE OF EVENTS	NUMBER OF EVENTS	LOUDEST EVENT (LMAX)	LOUDEST AIRCRAFT	SEL RANGE
S1	Winget Park	8/5/2014	9:54 am to 10:55 am	43.9	Arrivals	11	54.9	CR9	59.1 - 66.3
S2	River Cabin Lane	8/5/2014	5:55 pm to 6:55 pm	44.9	Departures	21	60.5	A321	59.0 - 70.5
S3	Ramoth Zion AME Church - 6600 Dixie River Rd	8/5/2014	3:15 pm to 4:15 pm	48.2	Departures	4	61.8	MD88	62.7 - 73.4
S4	Steele Creek Presbyterian Church	7/31/2014	3:15 pm to 3:35 pm	53.7	Arrivals	14	71.4	DH8C	73.1 - 79.1
		8/1/2014	3:36 pm to 3:46 pm	53.4	Arrivals	6	67.1		62.3 - 73.8
S5	Cades Cove Drive & Steele Meadow Road	8/6/2014	2:00 pm to 3:11 pm	43.9	Departures	23	77.7	MD88	60.2 - 87.9
S6	O'Hara Drive & Bonnie Blue Lane	8/5/2014	4:15 pm to 5:17 pm	49.0	Departures	40	74.1	E170	61.9 - 83.8
S7	Thornfield Road cul-de-sac	8/6/2014	1:00 pm to 2:00 pm	42.8	Departures	30	78.4	A321	62.4 - 87.3
S8	Central Steele Creek Church - 9401 S Tryon St	8/5/2014	12:30 pm to 1:33 pm	57.8	Arrivals and Departures	29	75.1	MD88	70.9 - 84.5
S9	Steele Creek A.M.E. Zion Church - 1500 Shopton Road	8/6/2014	2:25 pm to 4:25pm	46.0	Departures	30	69.9	A319	66.8 - 80.1
S10	Farmhurst Drive - Treetops Apartments	8/6/2014	6:22 pm to 7:23 pm	47.9	Departures	11	65.0	E190	62.2 - 75.6
S11	Airport Drive & Ashley Crescent	8/6/2014	11:38 am to 12:38 pm	53.3	Departures	30	72.3	A320	65.2 - 81.5
S12	Corbett Street	8/6/2014	4:55 pm to 5:36 pm	46.7	Arrivals	12	60.7	A300	56.8 - 68.5
		8/8/2014	7:40 am to 8:05 am	46.9	Arrivals	16	58.3		61.8 - 67.6
S13	Hovis Rd & Bradford Drive Chappell Baptist Church	8/8/2014	11:04 am to 12:11 pm	47.5	Arrivals	28	62.8	A320	57.3 - 71.0
S14	Eagles Landing Drive	8/13/2014	7:05 am to 8:07 am	45.1	Departures	22	77.8	A321	60.7 - 88.0
S15	1854 Still Pond Court	8/6/2014	10:15 am to 11:15 am	51.6	Departures	20	79.9	A330	69.5 - 90.3
S16	7114 Cabe Lane	8/1/2014	7:20 am to 8:20 am	49.7 - 58.5	Departures	27	79.8	A321	69.4 - 85.9
S17	Peachtree Road and Emmanuel Drive	8/13/2014	8:30 am to 10:06 am	45.3	Departures	20	67.6	CR9	66.8 - 78.9

Table B-2, ***continued***
SHORT-TERM NOISE MEASUREMENT RESULTS
Charlotte Douglas International Airport

SITE ID	SITE DESCRIPTION	DATE OF MEASUREMENTS	TIME OF MEASUREMENTS	AMBIENT NOISE LEVEL	TYPE OF EVENTS	NUMBER OF EVENTS	LOUDEST EVENT (LMAX)	LOUDEST AIRCRAFT	SEL RANGE
S18	Dylan Shane Road	8/8/2014	4:57 pm to 5:36 pm	45.3	Arrivals	16	78.2	CR9	61.8 - 87.7
		8/13/2014	10:35 am to 10:52 am	45.8	Departures	14	63.2		64.0 - 73.7
S19	Coulwood Drive & Fielding Road	8/8/2014	2:38 pm to 3:38 pm	44.0	Arrivals	27	68.4	CR9	58.5 - 74.7
S20	Oak Grove Baptist Church - 9000 Mt Holly Rd	8/6/2014	11:52 am to 12:35 pm	47.4	Arrivals	20	75.6	B733	60.6 - 84.6
		8/7/2014	4:31 pm to 4:56	49.9	Arrivals	15	72.9		67.2 - 82.0
S21	John Chapel Baptist Church, 2239 Belmeade Dr.	8/6/2014	10:09 am to 10:47	45.2	Departures	15	77.8	MD88	63.0 - 87.8
		8/8/2014	8:36 am to 9:25 am	48.1	Arrivals	4	66.6		74.3 - 76.5
S22	Whitewater Middle School - 1520 Belmeade Drive	8/7/2014	2:48 pm to 3:48 pm	41.8	Arrivals	21	61.5	CR9	58.9 - 72.3
S23	Glendale Avenue & Highland Street - Mt Holly	8/7/2014	1:40 pm to 2:15 pm	46.6	Departures	9	78.3	MD88	69.5 - 87.8
		8/8/2014	9:43 am to 9:59 am	46.6	Arrivals	5	58.1		59.8 - 64.6
S24	Garden Memorial Presbyterian Church - 2324 Sam Wilson Road	8/4/2014	2:20 pm to 3:20 pm	47.2	Departures	37	78.5	A321	57.5 - 88.1
S25	Berryhill Baptist Church - 9801 Walkers Ferry Rd	8/4/2014	3:55 pm to 4:50 pm	49.8	Departures	26	65.2	A320	60.0 - 74.5
S26	8814 Gerren Court	8/5/2014	1:59 pm to 2:55 pm	40.8	Departures	23	83.1	MD88	61.4 - 92.0
S27	11610 Village Pond Drive	8/6/2014	8:38 am to 1:35 pm	43.7	Arrivals and Departures	25	72.4	A321	55.2 - 81.7
S28	4600 Lochfoot Drive	8/5/2014	4:30 pm to 5:25 pm	37.6	Departures	5	65.9	A321	54.5 - 77.3
S29	14029 Appling Ln	8/5/2014	8:20 am to 9:30 am	46.1	Arrivals	5	59.8	CR2	60.0 - 71.0
S30	Whisper Lane & Oak Island Court	8/5/2014	12:19 pm to 1:20 pm	47.1	Arrivals	16	60.4	A321	61.0 - 70.0
S31	10324 Prairiegrouse Lane	8/6/2014	8:39 am to 9:45 am	45.3	Departures	18	74.5	MD90	71.8 - 85.1
S32	2226 Pleasant Dale Drive	8/6/2014	7:33 am to 8:30 am	44.7	Departures	29	79.3	MD90	75.3 - 89.2
S33	Nevin Park	8/8/2014	1:02 pm to 2:04 pm	41.1	Arrivals	27	68.8	SR22	62.4 - 79.7

Source: Landrum & Brown, 2014.

B.3.2 LONG-TERM NOISE MEASUREMENT RESULTS

Noise level readings were used to characterize the noise environment at each location and to distinguish the various noise levels associated with individual aircraft operations. The primary objective of the noise measurement program was to collect a sampling of noise and operational data for specific aircraft events and to measure ambient (background) noise levels. Secondarily, data from the long-term sites also included the average aircraft DNL for the five-day period; although, measured DNL levels for short periods of time can differ from average-annual levels due to differences in runway use and other operational factors, as well as influences from non-aircraft noise sources.

Table B-3

LONG-TERM NOISE MEASUREMENT RESULTS

Charlotte Douglas International Airport

SITE ID	AMBIENT NOISE LEVEL (L_{50})	DNL	AVERAGE NUMBER OF AIRCRAFT OVERFLIGHTS PER DAY	LOUDEST EVENT (LMAX)	LOUDEST AIRCRAFT
L1	51.4	58.9	409	90.6	A321
L2	56.0	64.9	483	94.3	A319
L3	53.3	59.1	195	88.2	GLF3
L4	55.1	56.2	214	93.4	B722
L5	47.1	51.6	25	93.7	SW4
L6	53.5	59.4	386	84.9	A321
L7	51.4	60.2	388	89.8	A321
L8	53.5	60.8	516	83.6	CRJ9

Source: Landrum & Brown, 2014

B.4 Comparison of Modeled to Measured Noise Levels

Aircraft Noise

The noise measurement process was designed to capture the noise levels of a representative mix of aircraft operations at CLT. Some of the noise events collected at the measurement sites were produced by non-aircraft, e.g., cars, people, pets, wildlife, etc. However, at each site, the majority of noise events were produced by aircraft operations based on observations and aircraft radar data correlation.

Methods for Noise Event Correlation

Measured noise events were matched to specific aircraft operations from radar data using the following two-step method:

1) Once the noise monitor data was downloaded, noise levels greater than 62.0 dB for duration longer that five seconds were identified as individual noise events once an event fell below the 62 dB trigger level for more than two seconds, the event was considered to have ended.

2) Using the flight data from the Airport's noise and operations monitoring system, noise events that occurred while an aircraft flight path passed within one nautical mile (6,076 feet) along the ground from the measurement site were correlated and classified as aircraft noise events.

Although this method provided positive identification of aircraft operations and highly accurate correlation with measured noise events, some community noise (e.g. cars, lawnmowers, animals) and aircraft noise occurred simultaneously and correlated as aircraft noise events. Unfortunately, there is currently no technology to separate aircraft noise levels from simultaneous non-aircraft noise levels.

Table B-3 lists the measured and the INM modeled noise levels at each long-term measurement site. The modeled noise level represents the INM's predicted noise level using the inputs from the Existing (2015) Noise Exposure Contour. As shown in Table B-3, the average difference between the measured and modeled DNL levels was -1.0 DNL. A difference of 1.2 dB is generally imperceptible to the human ear and is considered within the range of acceptable tolerance. When comparing measured and modeled data, no definitive conclusion should be drawn regarding the validity of the INM predicted DNL levels due to variations in runway use patterns, weather conditions, and fleet mix between the five-day noise measurement period and the average-annual day conditions, as well as the influence of non-aircraft noise events upon the measured noise levels. Therefore, the measured noise levels presented in Table B-3 should not be presumed to be an accurate representation of average-annual day noise levels.

Ambient Noise Levels

The data collected at the long-term noise measurement sites included 50th percentile data (L_{50}), which is the noise level at which 50 percent of the measured levels are higher. The FAA typically recommends using the L_{50} level to determine ambient noise levels (i.e., the noise level that would occur in the absence of identifiable noise events such as continuous automobile traffic, wind, wildlife, etc.). Table B-3 also shows the L_{50} level at each long-term measurement site.

Table B-3
CUMULATIVE NOISE LEVELS AT LONG-TERM SITES
Charlotte Douglas International Airport

SITE ID	L50 (DB)	DAY-NIGHT AVERAGE SOUND LEVEL (DNL)		
		INM PREDICTED	MEASURED	DIFFERENCE
L1	51.4	58.1	58.9	-0.8
L2	56.0	63.2	64.9	-1.7
L3	53.3	61.9	59.1	2.8
L4	55.1	52.0	56.2	-4.2
L5	47.1	48.7	51.6	-2.9
L6	53.5	58.3	59.4	-1.1
L7	51.4	61.0	60.2	0.8
L8	53.5	58.3	62.9	-4.6
Average	**53.3**	**59.5**	**60.6**	**-1.1**

* Note: the INM predicted value represents the INM modeled noise level at each site under average-annual day conditions using the Existing (2015) Noise Exposure Contour input data. Differences exist between average-annual DNL and the DNL measured during the five-day noise measurement period due to variations in runway use patterns, weather conditions, and fleet mix.

Single Event Noise Levels

Individual aircraft noise events were measured using the Maximum Noise Level (Lmax). **Exhibits B- 1** thru **B-9**, ***Measured Maximum Noise Levels***, graphically represent the average Lmax recorded for each type of aircraft operation at each measurement sites that were positively matched to radar data.

EXHIBIT B-2, MEASURED MAXIMUM NOISE LEVELS – SITE L1

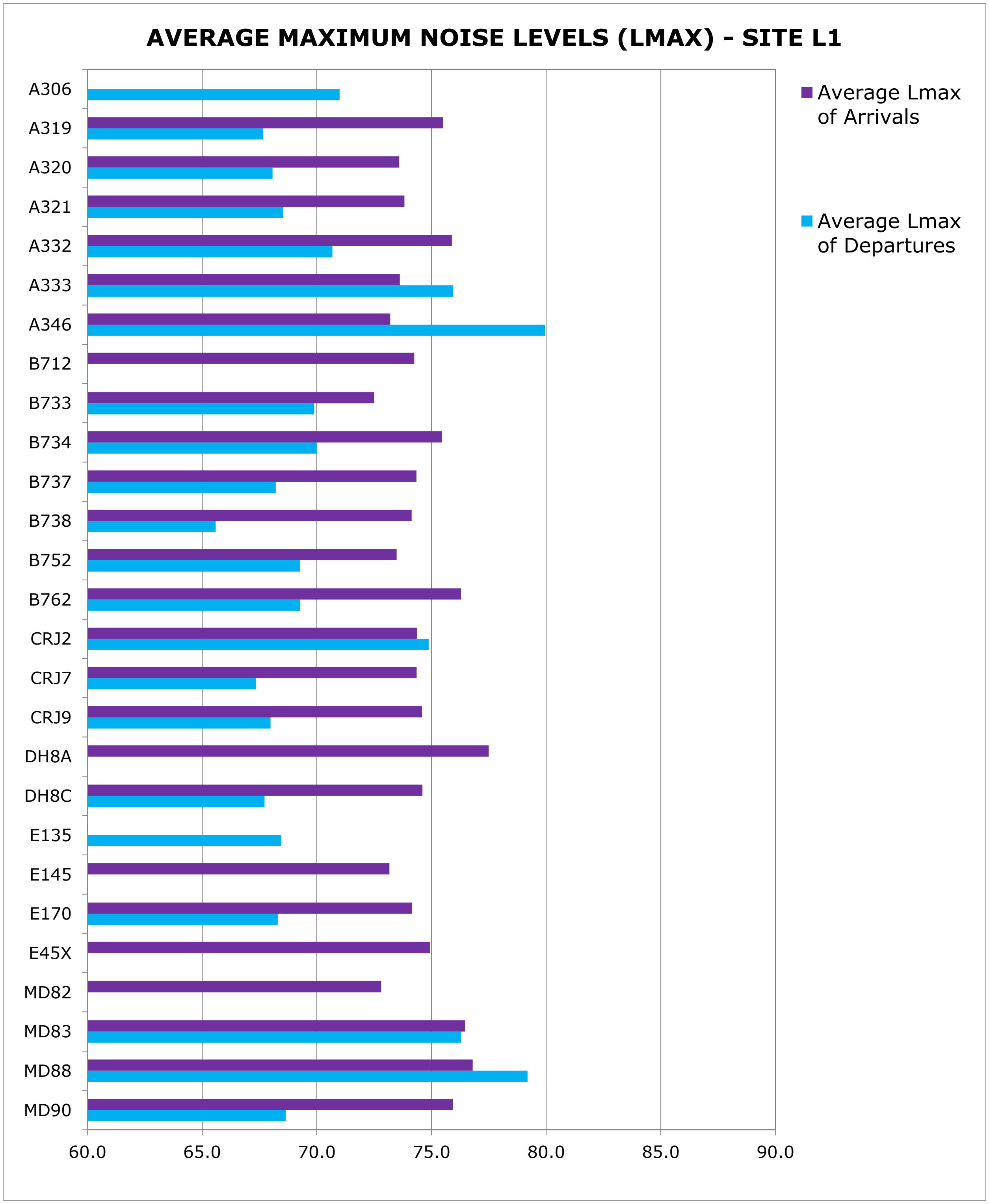


EXHIBIT B-3, MEASURED MAXIMUM NOISE LEVELS – SITE L2

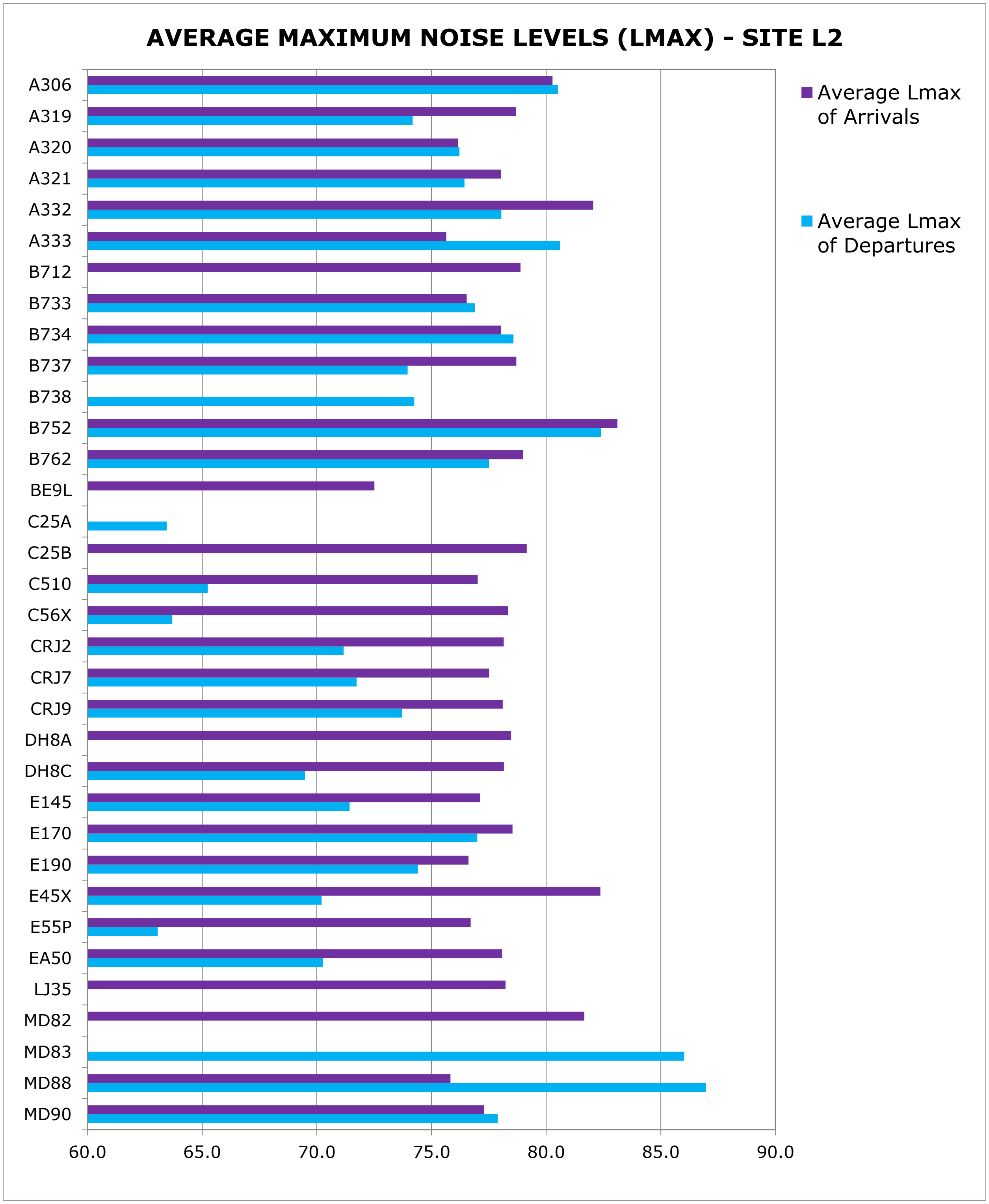


EXHIBIT B-4, MEASURED MAXIMUM NOISE LEVELS – SITE L3

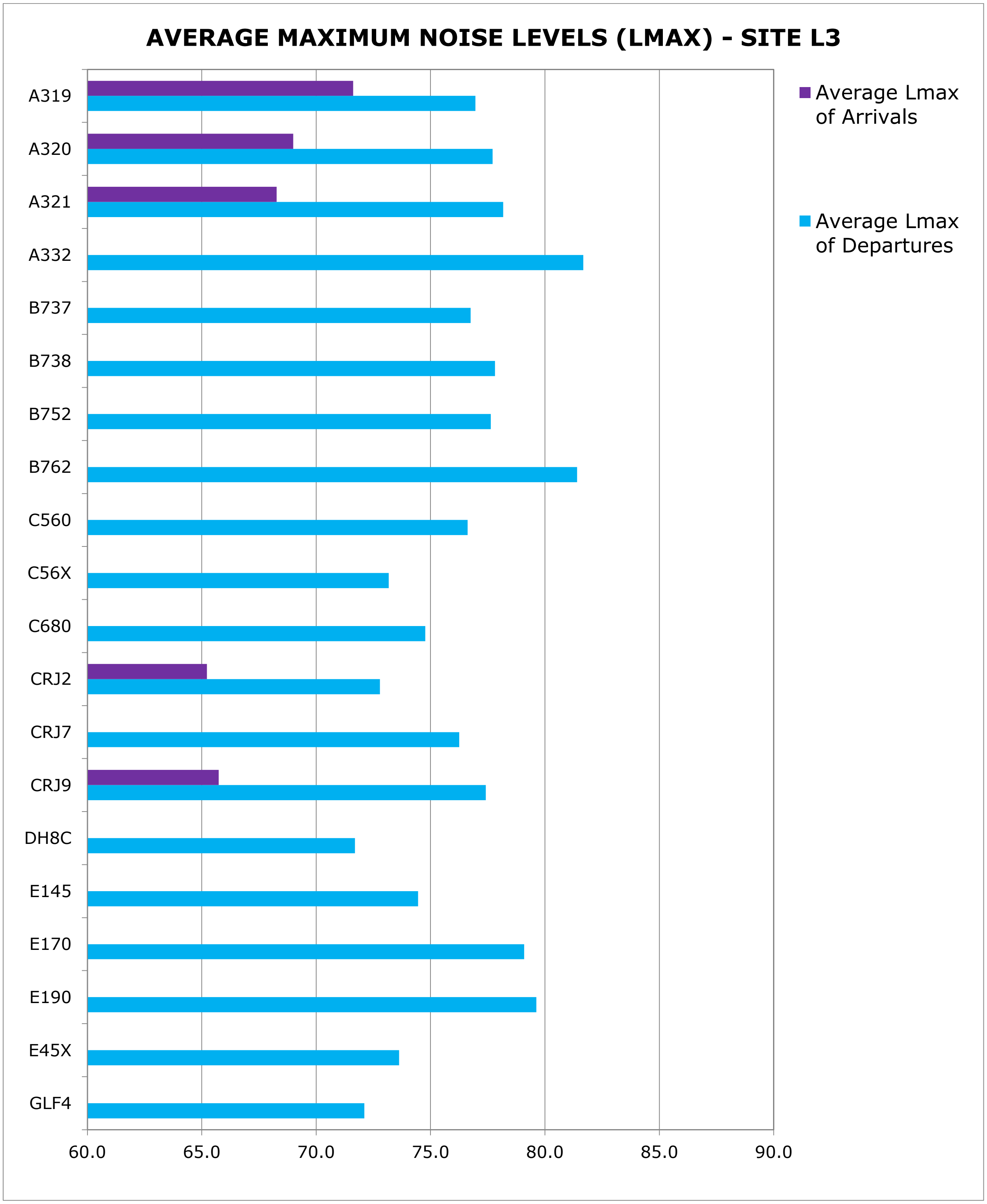


EXHIBIT B-5, MEASURED MAXIMUM NOISE LEVELS – SITE L4

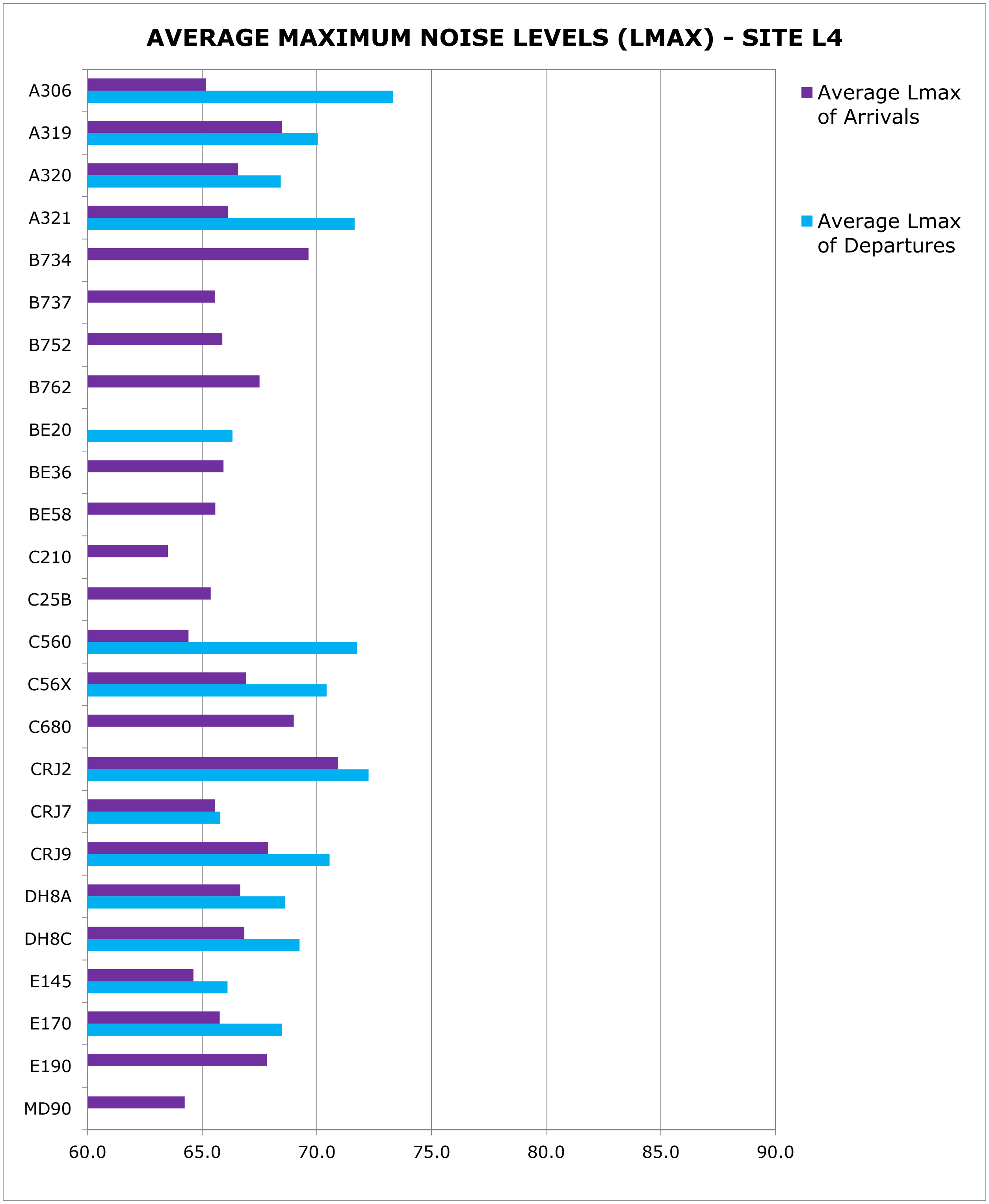


EXHIBIT B-6, MEASURED MAXIMUM NOISE LEVELS – SITE L5

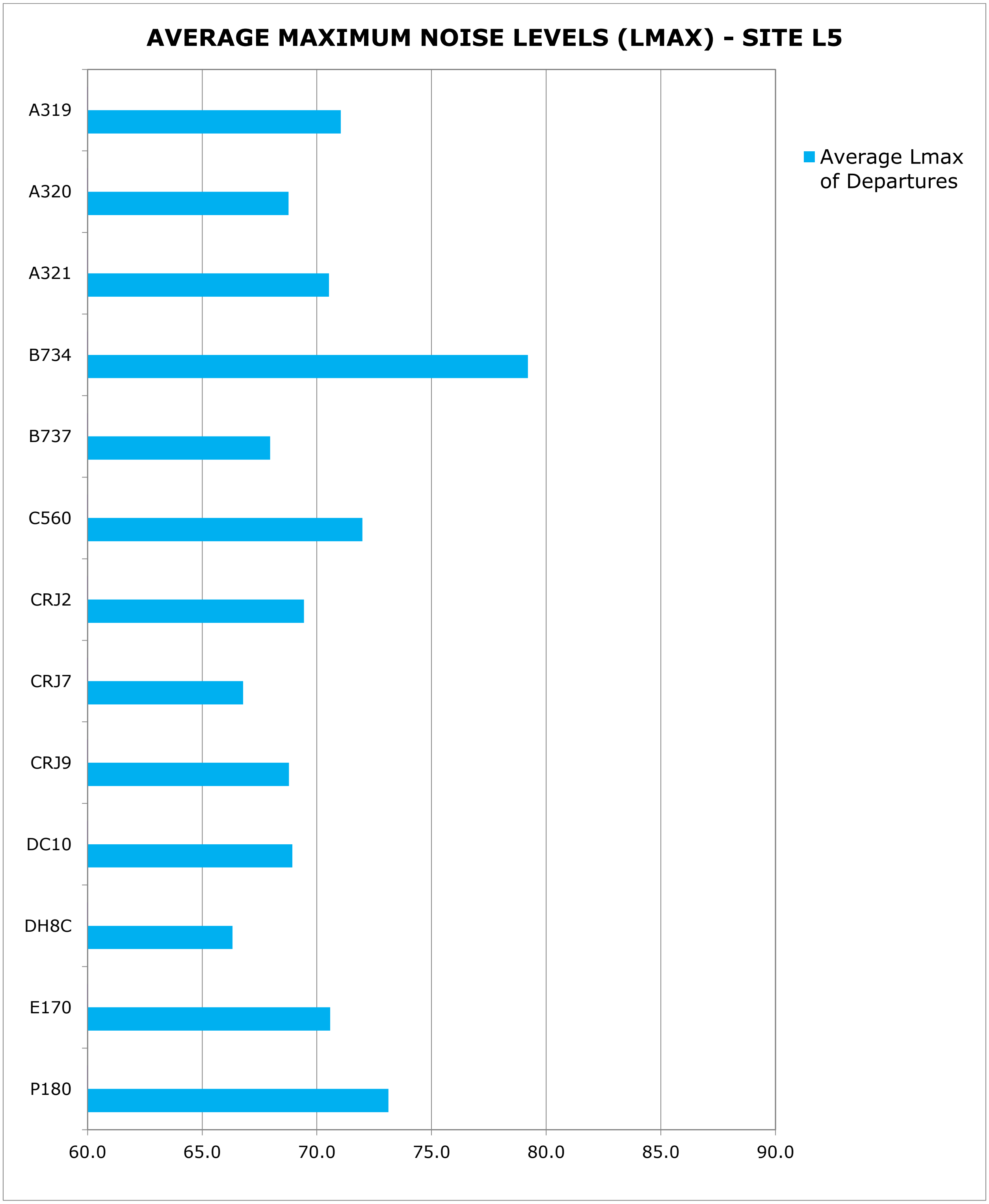


EXHIBIT B-7, MEASURED MAXIMUM NOISE LEVELS – SITE L6

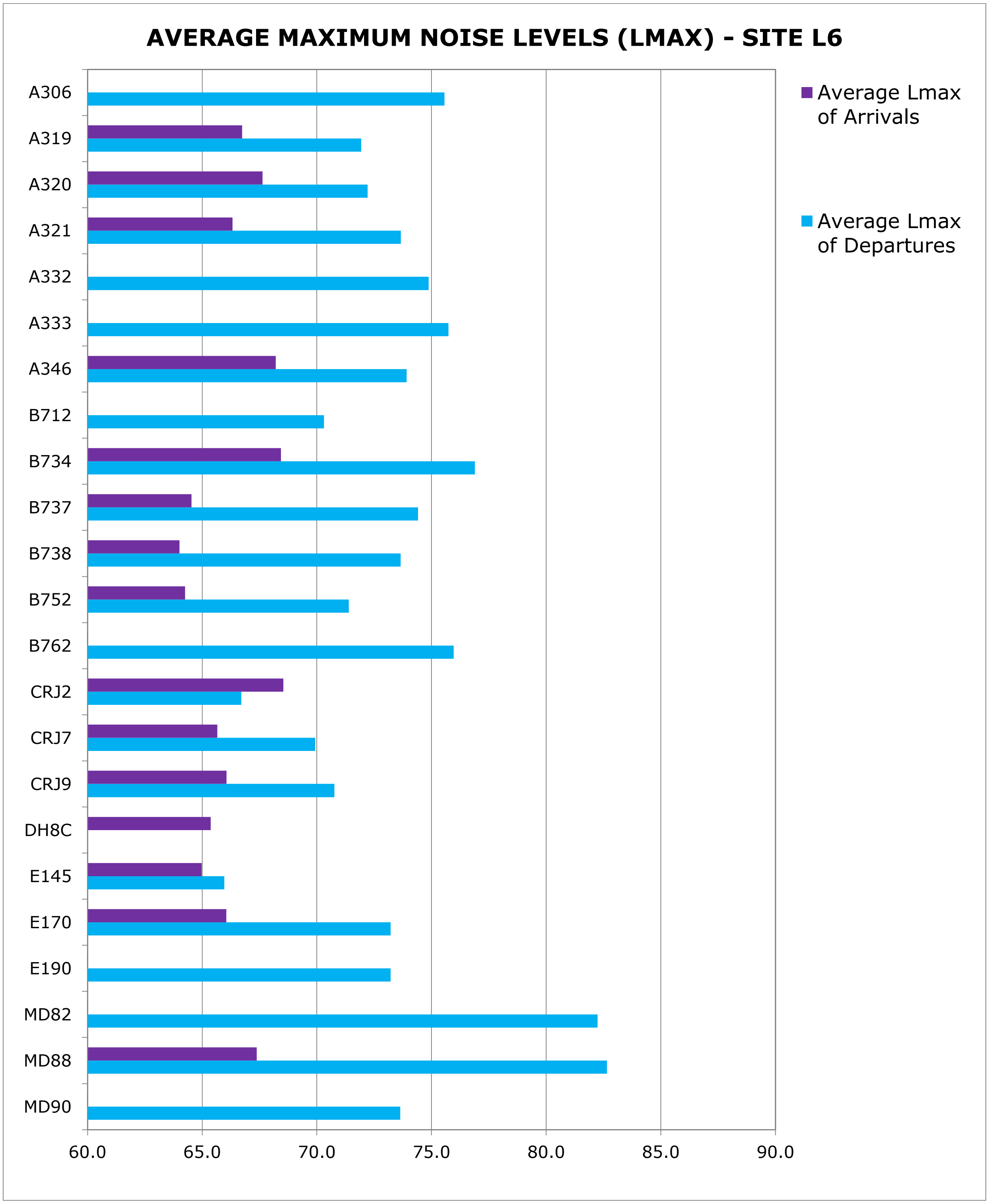


EXHIBIT B-8, MEASURED MAXIMUM NOISE LEVELS – SITE L7

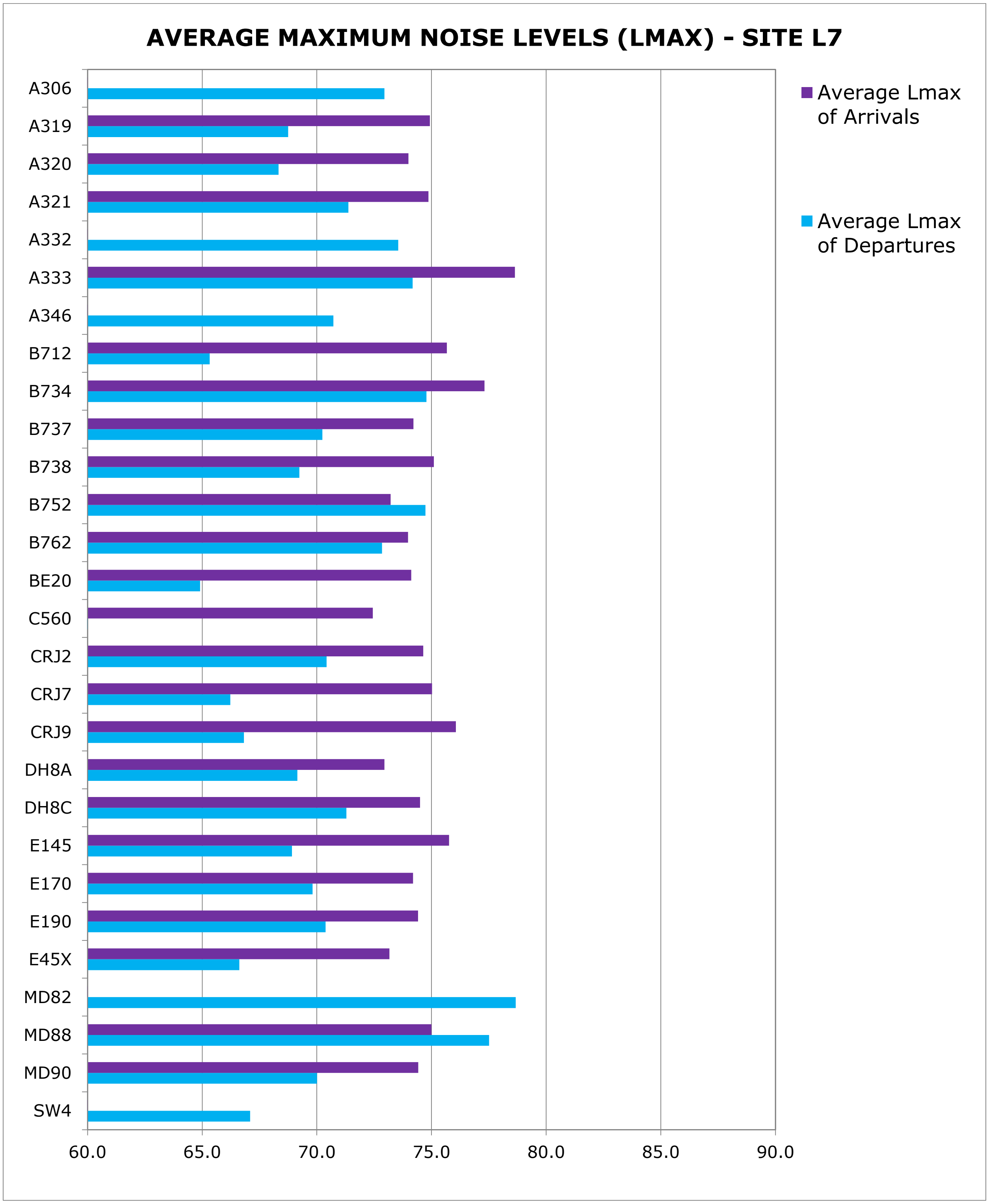
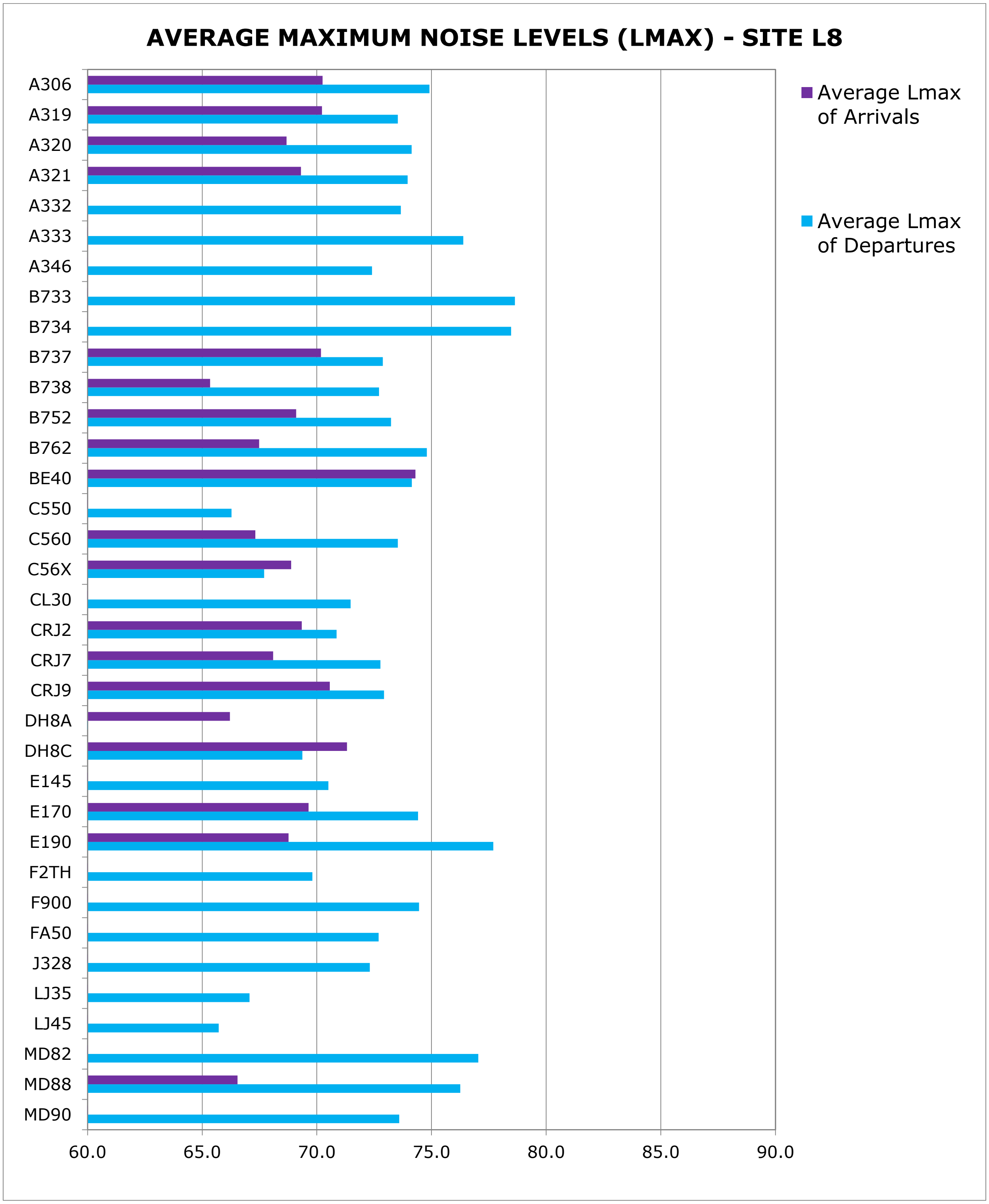


EXHIBIT B-9, MEASURED MAXIMUM NOISE LEVELS – SITE L8



Comparison to INM Databases

The primary purpose of the noise measurement program was to provide a sample of noise levels generated by individual aircraft events for comparison to the INM database. This effort was focused on the five most common aircraft that operate at CLT, which provided for the greatest sample size, and thus are those that have the greatest influence on the noise contours. For this analysis, data was obtained from permanent noise measurement sites L2, L3, L6, and L8 because these sites provided data for aircraft operations on Runway 18L/36R and Runway 18C/36C, which are the primary departure runways at CLT. This comparison was made using the SEL metric rather than the Lmax or maximum noise level.

A comparison of the average measured aircraft noise level and the average INM predicted aircraft noise level at these four sites is shown in **Table B-4**. As shown in Table B-4, the difference in average measured and modeled noise level for arrivals and departures of these five aircraft ranges between 0.0 and +/-3.6 dB; and in most cases, the difference is at the lower end of this range. Analytical models (such as the INM) often have a 95% confidence interval of ±3 dB to ±5 dB. Therefore a difference of 3 dB between an estimate from measurements and one from an analytical model may not be significant."[3]

Table B-4
AIRCRAFT NOISE SINGLE EVENT DATA
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	OPERATION TYPE	MEASURED NOISE LEVEL*	INM MODELED NOISE LEVEL	DIFFERENCE
Airbus A319-131	A319-131	Arrival	84.5	85.3	0.8
		Departure	85.1	84.0	-1.1
Airbus A320-211	A320-211	Arrival	84.5	85.7	1.2
		Departure	85.8	85.3	-0.6
Airbus A321-232	A321-232	Arrival	83.2	85.5	2.3
		Departure	86.9	87.2	0.4
Canadair CRJ900	CRJ9-ER	Arrival	83.3	83.3	0.0
		Departure	84.1	80.5	-3.6
Canadair Regional Jet CRJ-200	CL601	Arrival	82.0	80.1	-2.0
		Departure	79.4	80.0	0.6

Note: The measured noise level represents the average SEL noise levels for each aircraft type at long-term noise measurement sites L2, L3, L6, and L8.

The comparison of measured and modeled noise levels, both single event and cumulative, are within an acceptable range of tolerance. The results of the temporary noise measurement program identified no significant inconsistencies between measured noise levels and INM predicted noise levels. Therefore, no adjustments were made to the standard INM profiles for this NEM Update.

[3] Sec. 7.7.1, SAE ARP4721 – Part 1, *Monitoring Aircraft Noise and Operations in the Vicinity of Airports: System Description, Acquisition And Operation*, Issued 2006-08.

Appendix C

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APPENDIX C
NOISE MODELING METHODOLOGY

This appendix sets forth the background material necessary for the reader to understand the principles of noise, the preparation of noise contours and the development of estimates of noise impacts associated with those contours. The data is derived from a variety of sources including, but not limited to, records maintained by the Charlotte Douglas International Airport and the Federal Aviation Administration (FAA), and mapping available from local planning agencies.

Section C.1 provides background information necessary to understand the characteristics and properties of sound and noise, including how noise levels are measured and expressed mathematically.

Section C.2 includes basic information on the noise metric and computer model used to compute noise and a statement relative to the comparability of baseline information and the years indicated on the official noise mapping for the airport.

Section C.3 provides information on how humans respond to sound in different settings.

Section C.4 presents notable research on the health effects of noise, such as potential for sleep deprivation and hearing loss.

C.1 CHARACTERISTICS OF SOUND

Sound is created by a source that induces vibrations in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source like ripples on a pond. Sound waves dissipate with increasing distance from the source. Sound waves can also be reflected, diffracted, refracted, or scattered. When the source stops vibrating, the sound waves disappear almost instantly and the sound ceases.

Sound conveys information to listeners. It can be instructional, alarming, pleasant, relaxing, or annoying. Identical sounds can be characterized by different people or even by the same person at different times, as desirable or unwanted. Unwanted sound is commonly referred to as "noise."

Sound can be defined in terms of four components:

1. Level (amplitude)
2. Pitch (frequency)
3. Duration (time pattern)
4. Propagation (transmission and dissipation)

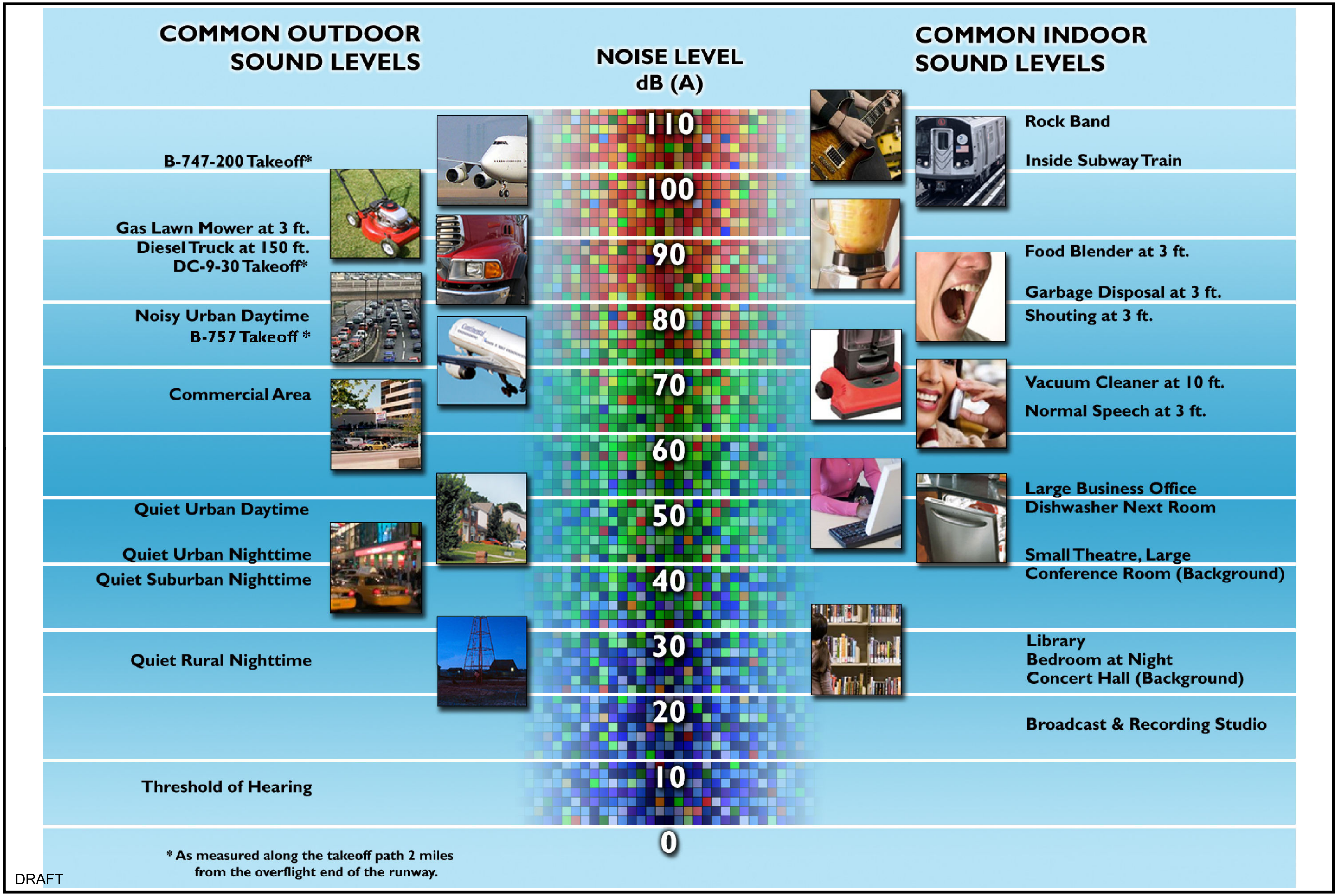
C.1.1 SOUND LEVEL

The level or amplitude of sound is measured by the difference between atmospheric pressure (without the sound) and the total pressure (with the sound). Amplitude of sound is like the relative height of the ripples caused by the stone thrown into the water. Although physicists typically measure pressure using the linear Pascal scale, sound is measured using the logarithmic decibel (dB) scale. This is because the range of sound pressures detectable by the human ear can vary from *1 to 100 trillion units*. A logarithmic scale allows us to discuss and analyze noise using more manageable numbers. The range of audible sound ranges from approximately 1 to 140 dB, although everyday sounds rarely rise above about 120 dB. The human ear is extremely sensitive to sound pressure fluctuations. A sound of 140 dB, which is sharply painful to humans, contains *100 trillion (10^{14}) times more* sound pressure than the least audible sound. **Exhibit C-1** shows a comparison of common sources of indoor and outdoor sounds measured on the dB scale.

By definition, a 10 dB increase in sound is equal to a tenfold (10^1) increase in the mean square sound pressure of the reference sound. A 20 dB increase is a 100-fold (10^2) increase in the mean square sound pressure of the reference sound. A 30 dB increase is a 1,000-fold (10^3) increase in mean square sound pressure.

A logarithmic scale requires different mathematics than used with linear scales. The sound pressures of two separate sounds, expressed in dB, are not arithmetically additive. For example, if a sound of 80 dB is added to another sound of 74 dB, the total is a 1 dB increase in the louder sound (81 dB), not the arithmetic sum of 154 dB (See **Exhibit C-2**). If two equally loud noise events occur simultaneously, the sound pressure level from the combined events is 3 dB higher than the level produced by either event alone.

Logarithmic averaging also yields results that are quite different from simple arithmetic averaging. Consider the example shown in **Exhibit C-3**. Two sound levels of equal duration are averaged. One has a maximum sound level (Lmax) of 100 dB, the other 50 dB. Using conventional arithmetic, the average would be 75 dB. The true result, using logarithmic math, is 97 dB. This is because 100 dB has far more energy than 50 dB (100,000 times as much!) and is overwhelmingly dominant in computing the average of the two sounds.



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Comparison of Different Types of Sound

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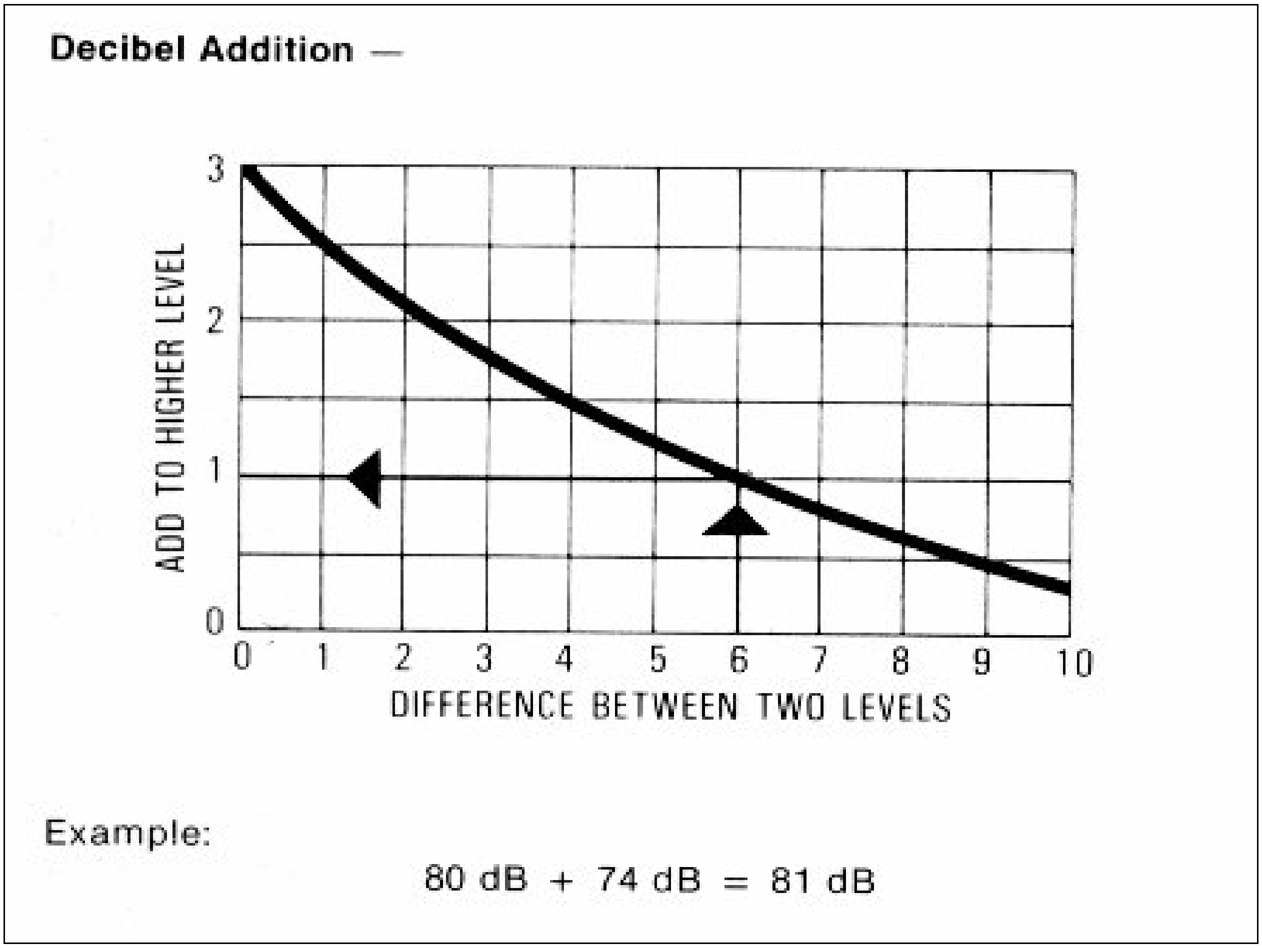
Exhibit C-2
EXAMPLE OF ADDITION OF TWO DECIBEL LEVELS



Source: *Information on Levels of Environmental Noise*. USEPA. March 1974.

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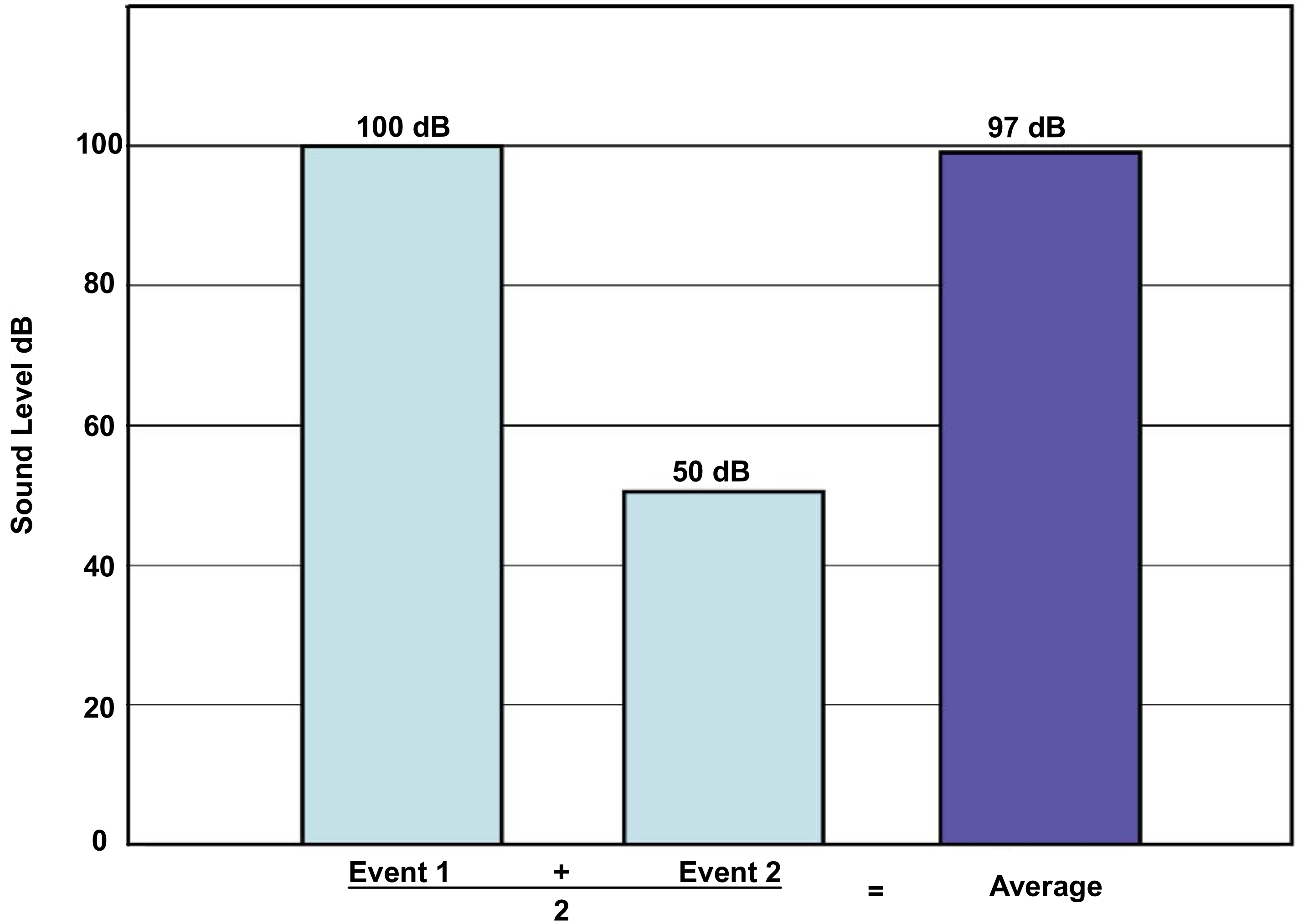
Assume two sound levels of equal duration....
What is the average level?



(100dB + 50dB) / 2 = 97dB

The decibel (dB) scale is logarithmic -
100dB is 100,000 times more energy than 50dB

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Charlotte·Douglas INTERNATIONAL AIRPORT	*Noise Exposure Map Update* *CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT*	Example of Sound Level Averaging	EXHIBIT: **C-3**

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Human perceptions of changes in sound pressure are less sensitive than a sound level meter. People typically perceive a tenfold increase in sound pressure, a 10 dB increase, as a doubling of loudness. Conversely, a 10 dB decrease in sound pressure is normally perceived as half as loud. In community settings, most people perceive a 3 dB increase in sound pressure (a doubling of the sound pressure or energy) as just noticeable. (In laboratory settings, people with good hearing are able to detect changes in sounds of as little as 1 dB.)

C.1.2 SOUND FREQUENCY

The pitch (or frequency) of sound can vary greatly from a low-pitched rumble to a shrill whistle. If we consider the analogy of ripples in a pond, high frequency sounds are vibrations with tightly spaced ripples, while low rumbles are vibrations with widely spaced ripples. The rate at which a source vibrates determines the frequency. The rate of vibration is measured in units called "Hertz" -- the number of cycles, or waves, per second. One's ability to hear a sound depends greatly on the frequency composition. Humans hear sounds best at frequencies between 1,000 and 6,000 Hertz. Sound at frequencies above 10,000 Hertz (high-pitched hissing) and below 100 Hertz (low rumble) are much more difficult to hear.

When attempting to measure sound in a way that approximates what our ears hear, we must give more weight to sounds at the frequencies we hear well and less weight to sounds at frequencies we do not hear well. Acousticians have developed several weighting scales for measuring sound. The A-weighted scale was developed to correlate with the judgments people make about the loudness of sounds. The A-weighted decibel scale (dBA) is used in studies where audible sound is the focus of inquiry. **Exhibit C-4** shows the A, B, and C sound weighting scale. The U.S. Environmental Protection Agency (USEPA) has recommended the use of the A-weighted decibel scale in studies of environmental noise.[1] Its use is required by the Federal Aviation Administration (FAA) in airport noise studies.[2] For the purposes of this analysis, dBA was used as the noise metric and dB and dBA are used interchangeably.

C.1.3 DURATION OF SOUNDS

The duration of sounds – their patterns of loudness and pitch over time – can vary greatly. Sounds can be classified as *continuous* like a waterfall, *impulsive* like a firecracker, or *intermittent* like aircraft overflights. Intermittent sounds are produced for relatively short periods, with the instantaneous sound level during the event roughly appearing as a bell-shaped curve. An aircraft event is characterized by the period during which it rises above the background sound level, reaches its peak, and then recedes below the background level.

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1 Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.

2 "Airport Noise Compatibility Planning." 14 CFR Part 150, Sec. A150.3.

C.1.4 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 an homogeneous and undisturbed manner, the sound travels as spherical waves. As the sound wave travels away from the source, the sound energy is distributed over a greater area, dispersing the sound energy of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of 6 dB per doubling of the distance.

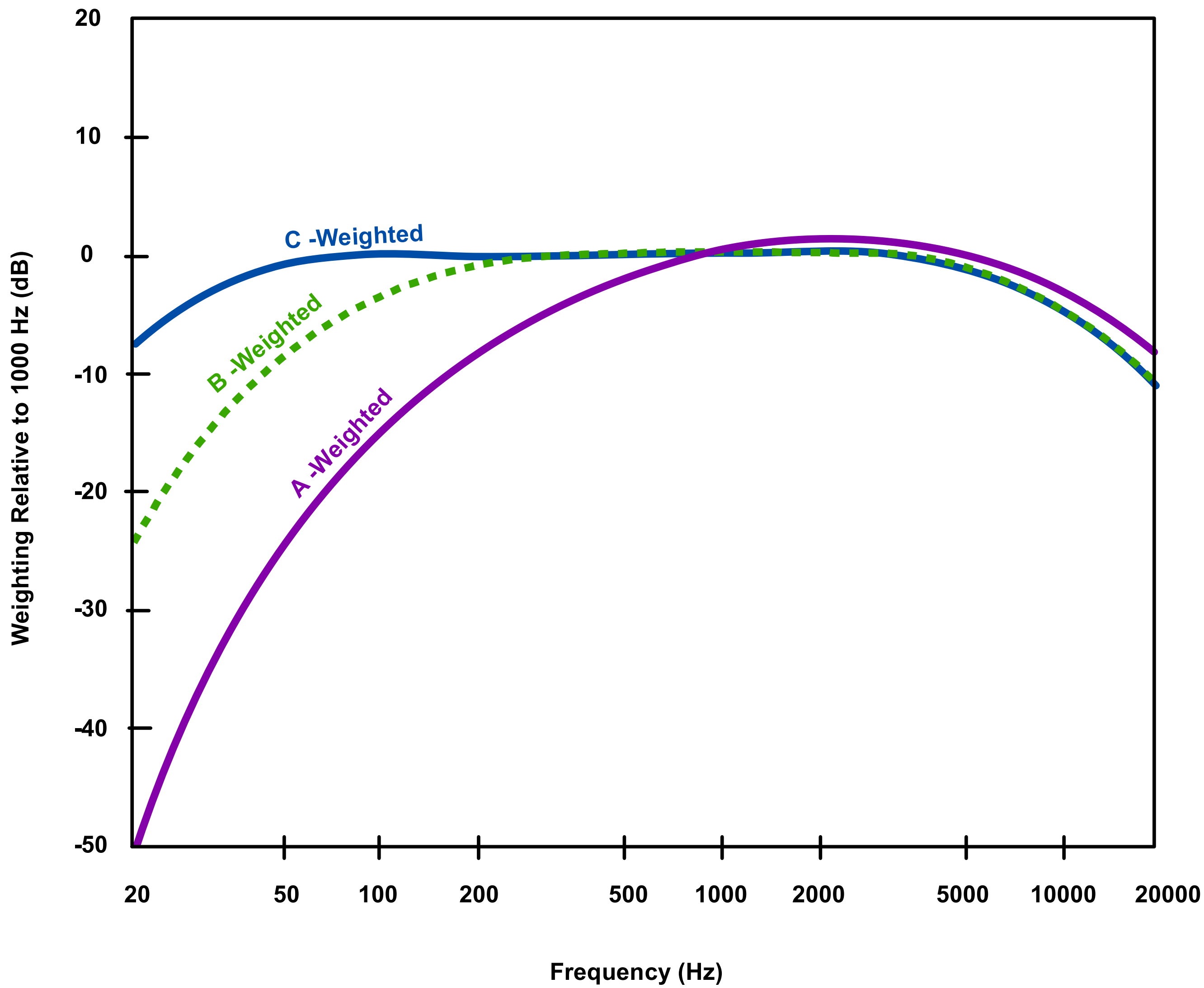
Atmospheric absorption also influences the levels that are received by the observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of absorption is a function of the frequency of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest at high humidity and higher temperatures. Sample atmospheric attenuation graphs are presented in **Exhibit C-5**. The graphs show noise absorption rates based on temperature, relative humidity, and distance at five different frequency ranges. For example, sounds at a frequency of 2,000 Hz, with a relative humidity of 10 percent and a temperature of 90^{O} Fahrenheit (32^{O} Celsius), will be dissipate by 10 dB per for every 1,000 feet (305 meters) from the source.

The rate of atmospheric absorption varies with sound 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.

Turbulence and gradients of wind, temperature, and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can also result in higher noise levels than would result from spherical spreading as a result of channeling or focusing the sound waves.

The effect of ground attenuation on noise propagation is a function of the height of the source and/or receiver and the characteristics of the terrain. The closer the source of 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. Ground attenuation is important for the study of noise from airfield operations (such as, thrust reversals) and in the design of noise berms or engine run-up facilities.

These factors are an important consideration for assessing in-flight and ground noise in the area around the Airport. Atmospheric conditions will play a significant role in affecting the sound levels on a daily basis and how these sounds are perceived by the population.



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Source: Federal Highway Administation

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Sound Frequency Weighting Curves

EXHIBIT:
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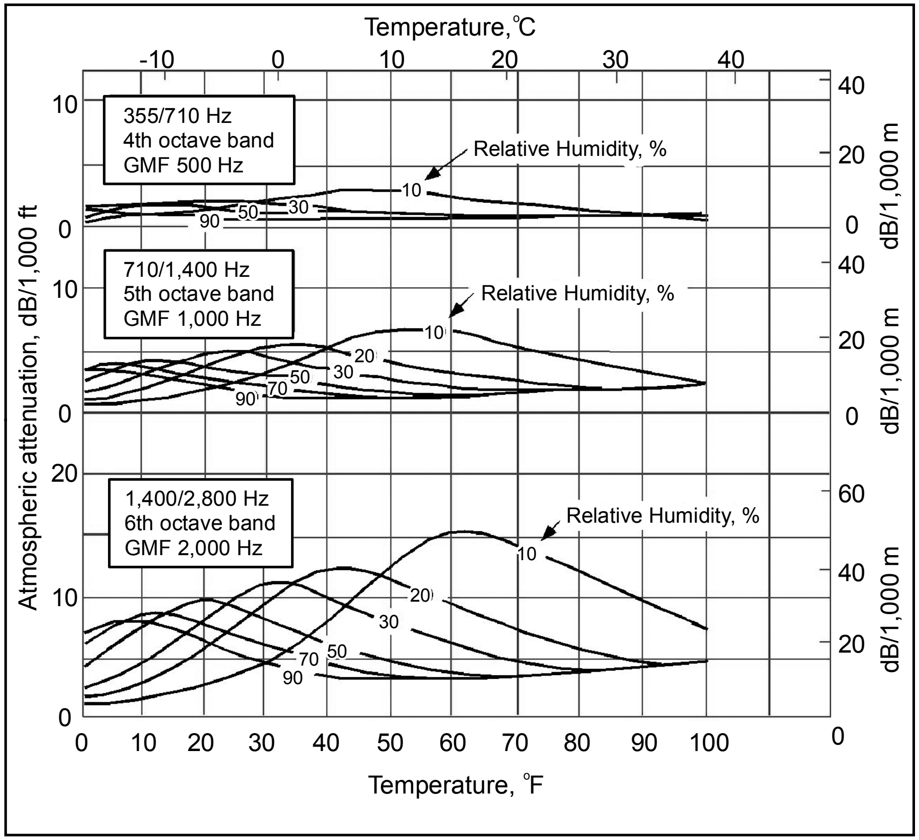

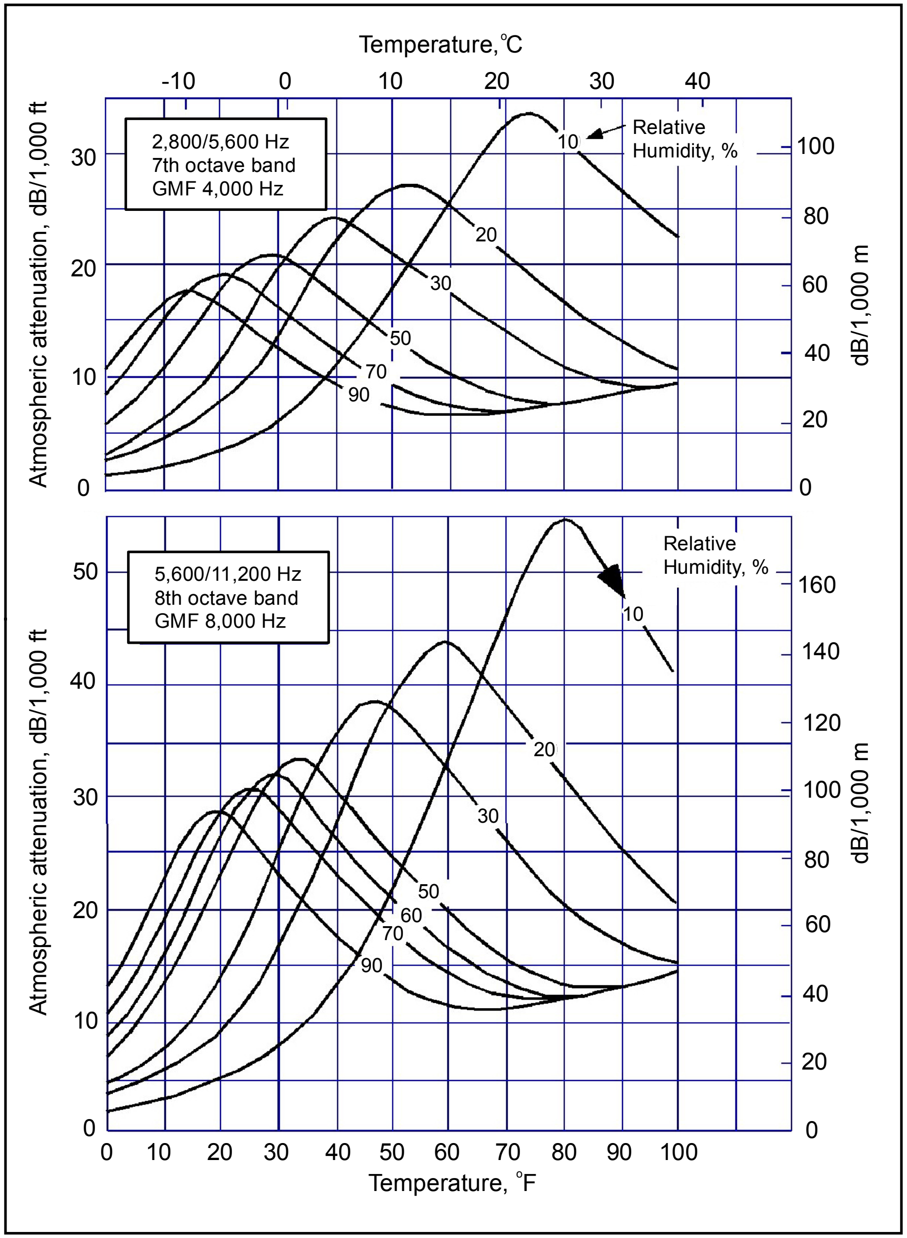

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SOURCE: Beranek, 1981

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Sound Attenuation Graphs

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C-5

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C.2 STANDARD NOISE DESCRIPTORS

Given the multiple dimensions of sound, a variety of descriptors, or metrics, have been developed for describing sound and noise. Some of the most commonly used metrics are discussed in this section. They include:

1. Maximum Level (Lmax)
2. Time Above Level (TA)
3. Number of Events Above Level (NA)
4. Sound Exposure Level (SEL)
5. Equivalent Sound Level (Leq)
6. Day-Night Average Sound Level (DNL)

C.2.1 MAXIMUM LEVEL (Lmax)

Lmax is simply the highest sound level recorded during an event or over a given period of time. It provides a simple and understandable way to describe a sound event and compare it with other events. In addition to describing the peak sound level, Lmax can be reported on an appropriate weighted decibel scale (A-weighted, for example) so that it can disclose information about the frequency range of the sound event in addition to the loudness.

Lmax, however, fails to provide any information about the duration of the sound event. This can be a critical shortcoming when comparing different sounds. Even if they have identical Lmax values, sounds of greater duration contain more sound energy than sounds of shorter duration. Research has demonstrated that for many kinds of sound effects, the total sound energy, not just the peak sound level, is a critical consideration.

C.2.2 TIME ABOVE LEVEL (TA)

The "time above," or TA, metric indicates the amount of time that sound at a particular location exceeds a given sound level threshold. TA is often expressed in terms of the total time per day that the threshold is exceeded. The TA metric explicitly provides information about the duration of sound events, although it conveys no information about the peak levels during the period of observation.

C.2.3 NUMBER OF EVENTS ABOVE LEVEL (NA)

Similar to TA, the Number of Events Above (NA) metric indicates the total number of aircraft events at particular location that exceed a given sound level threshold in dB. The NA metric explicitly provides information about the number of sound events, although it conveys no information about the duration of the event(s).

C.2.4 SOUND EXPOSURE LEVEL (SEL)

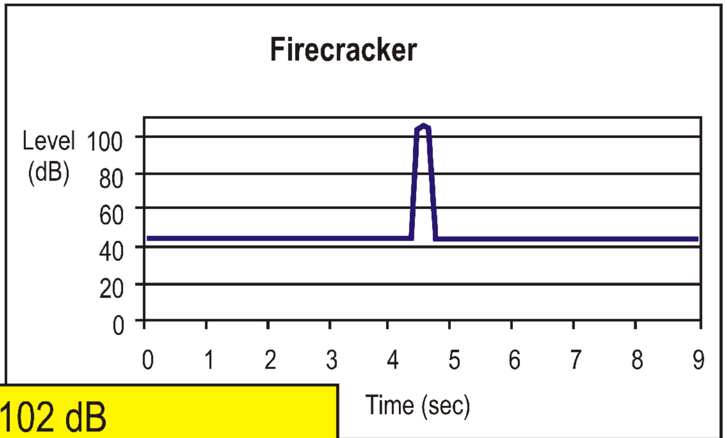
The sound exposure level, or SEL metric, provides a way of describing the total sound energy of a single event. In computing the SEL value, all sound energy occurring during the event, within 10 dB of the peak level (Lmax), is mathematically integrated over one second. (Very little information is lost by discarding the sound below the 10 dB cut-off, since the highest sound levels completely dominate the integration calculation.) Consequently, the SEL is always greater than the Lmax for events with a duration greater than one second. SELs for aircraft overflights typically range from five to 10 dB higher than the Lmax for the event.

Exhibit C-6 shows graphs of instantaneous sound levels for three different events: an aircraft flyover, steady roadway noise, and a firecracker. The Lmax and the duration of each event differ greatly. The pop of the firecracker is quite loud, 102 dB but lasts less than a second. The aircraft flyover has a considerably lower Lmax at 90 dB, but the event lasts for over a minute. The Lmax from the roadway noise is even quieter at only 72 dB, but it lasts for 15 minutes. By considering the loudness and the duration of these very different events simultaneously, the SEL metric reveals that the total sound energy of all three is identical. This can be a critical finding for studies where total noise dosage is the focus of study. As it happens, research has shown conclusively that noise dosage is crucial in understanding the effects of noise on animals and humans.

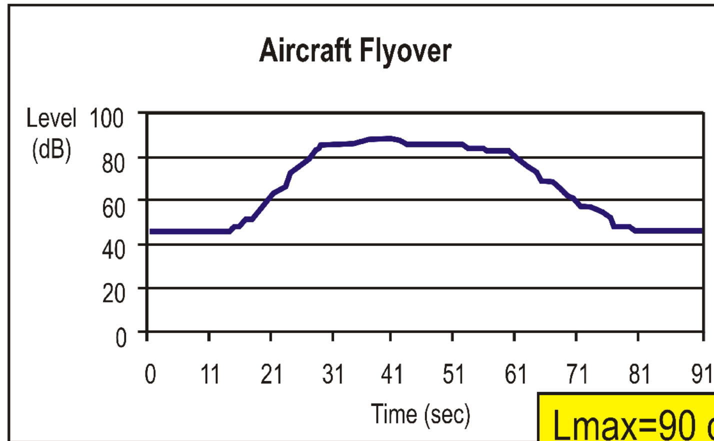
C.2.5 EQUIVALENT SOUND LEVEL (LEQ)

The equivalent sound level (Leq) metric may be used to define cumulative noise dosage, or noise exposure, over a period of time. In computing Leq, the total noise energy over a given period of time, during which numerous events may have occurred, is logarithmically averaged over the time period. The Leq represents the steady sound level that is equivalent to the varying sound levels actually occurring during the period of observation. For example, an 8-hour Leq of 67 dB indicates that the amount of sound energy in all the peaks and valleys that occurred in the 8-hour period is equivalent to the energy in a continuous sound level of 67 dB. Leq is typically computed for measurement periods of 1 hour, 8 hours, or 24 hours, although any time period can be specified.

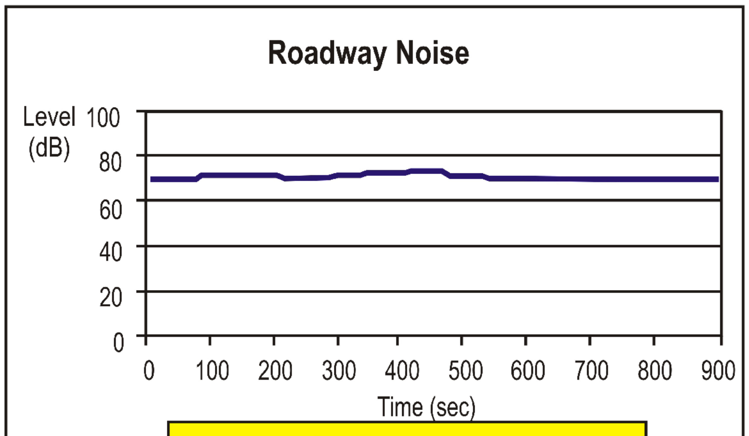
Exhibit C-7 shows the relationship of Leq to Lmax and SEL. In this example, a single aircraft event lasting 18 seconds is represented. The instantaneous noise levels for the event range from 64 to an Lmax of 101 dBA. The area under the curve represents the sound energy accumulated during the entire event. The compression of this energy into a single second results in an SEL of 105 dBA. The Leq average of the sound energy for each second during the event would be 93 dB. If this event were the only event to occur during an hour, the aircraft sound energy for the other 3,582 seconds would be considered to be zero. When converted to an hourly LEQ, the level would be nearly 70 dB of Leq. This again indicates the dominance of loud events in noise summation and averaging computations.



Lmax=102 dB
SEL=100 dB
Leq=105
Event Duration=0.3 seconds



Lmax=90 dB
SEL=100 dB
Leq=82
Event Duration=70 seconds



Lmax=72 dB
SEL=100 dB
Leq=71
Event Duration=900 seconds

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Measurement of Different Types of Sound

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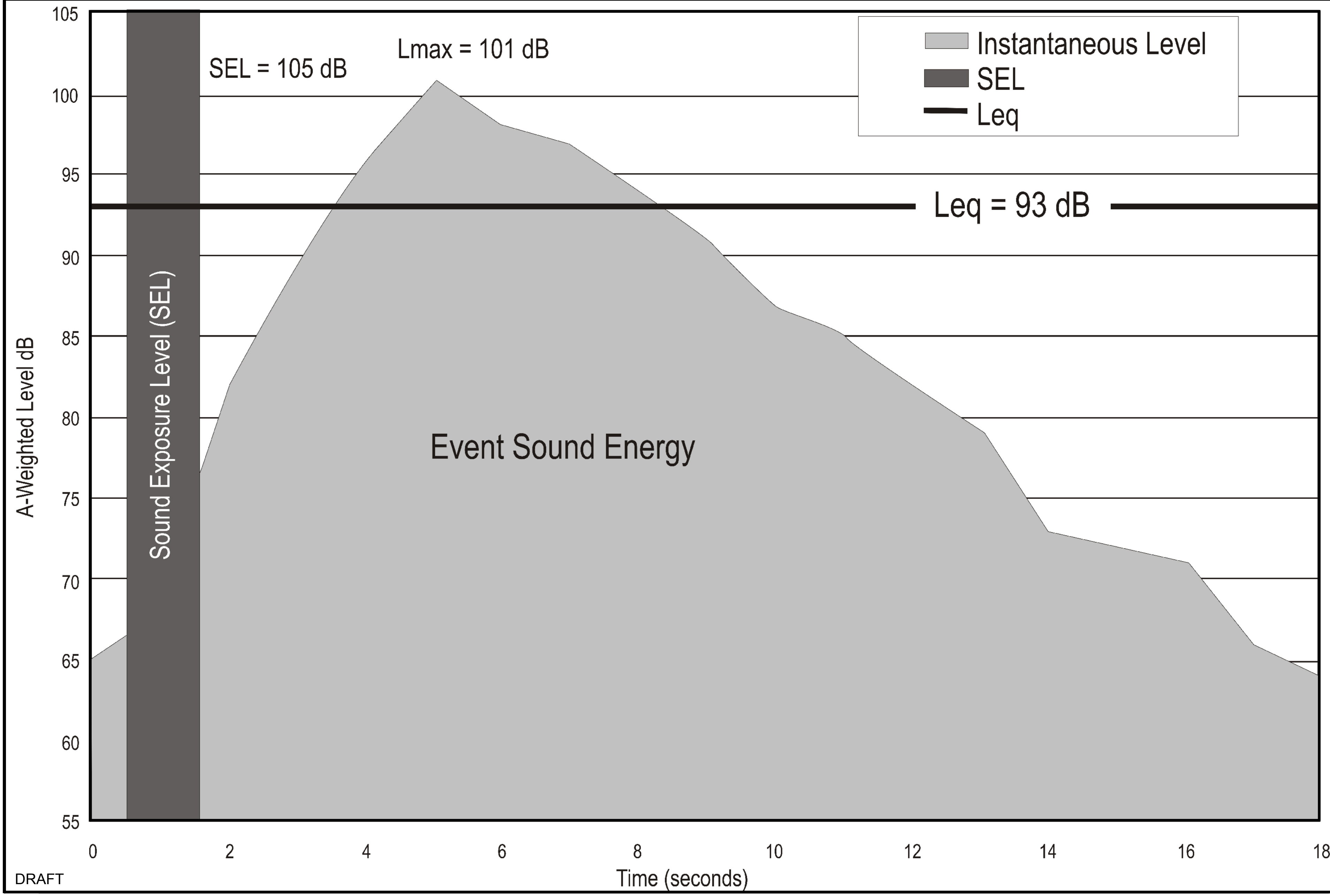

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Noise Exposure Map Update

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Relationship Among Sound Metrics

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Leq is a critical noise metric for many kinds of analysis where total noise dosage, or noise exposure, is under investigation. As already noted, noise dosage is important in understanding the effects of noise on both animals and people. Indeed, research has led to the formulation of the "equal energy rule." This rule states that it is the total acoustical energy to which people are exposed that explains the effects the noise will have on them. That is, a very loud noise with a short duration will have the same effect as a lesser noise with a longer duration if they have the same total sound energy.

C.2.6 DAY-NIGHT AVERAGE SOUND LEVEL (DNL)

The Day-Night Average Sound Level (DNL) metric is really a variation of the 24-hour Leq metric. Like Leq, the DNL metric describes the total noise exposure during a given period. Unlike Leq, however, DNL, by definition, can only be applied to a 24-hour period. In computing DNL, an extra weight of 10 dB is assigned to any sound levels occurring between the hours of 10:00 p.m. and 7:00 a.m. This is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Recalling the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as equivalent to 10 daytime events of the same magnitude.

As with Leq, DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, it would yield a DNL of 75 dB.

This example can be roughly equated to an airport noise environment. Recall that an SEL is the mathematical compression of a noise event into one second. Thus, 30 SELs of 100 dB during a 24-hour period would equal DNL 65 dB, or DNL 75 dB if they occurred at night. This situation could actually occur in places around a real airport. If the area experienced 30 overflights during the day, each of which produced an SEL of 100 dB, it would be exposed to DNL 65 dB. Recalling the relationship of SEL to the peak noise level (Lmax) of an aircraft overflight, the Lmax recorded for each of those overflights (the peak level a person would actually hear) would typically range from 90 to 95 dB.

C.3 FACTORS INFLUENCING HUMAN RESPONSE TO SOUND

Many factors influence how a sound is perceived and whether or not it is considered annoying to the listener. These factors include not only physical (acoustic) characteristics of the sound but also secondary (non-acoustic) factors, such as sociological and external factors.

Sound rating scales are developed to account for the factors that affect human response to sound. Nearly all of these factors are relevant in describing how sounds are perceived in the community. Many of the non-acoustic parameters play a prominent role in affecting individual response to noise. Background sound (ambient noise) is also important in describing sound in rural settings. Some non-acoustic factors that may influence an individual's response to aircraft noise include:

- Predictability of when the sound/noise will occur;
- How the noise affect certain activities;
- Fear of an aircraft crashing;
- Belief that aircraft noise could be prevented or reduced by aircraft designers, pilots, or authorities related to airlines or airports; and
- Sensitivity to noise in general.

Thus, it is important to recognize that non-acoustic factors such as those described above, as well as acoustic factors, contribute to human response to noise.

C.3.1 PERCEIVED NOISE LEVEL

Perceived noise level is another method of rating sound that was originally developed for the assessment of aircraft noise. Perceived noise level is the subjective measure of the degree to which noise is unwanted or causes annoyance to an individual. To determine perceived noise level, 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 inherently subjective and thus subject to greater variability. For example, two separate events of equal noise energy may be perceived differently if one sound is more annoying to the listener than the other; or the same noise event may be annoying to one individual yet not another.

C.4 HEALTH EFFECTS OF NOISE

A considerable amount of research has been conducted over the last 30 years to identify, measure, and quantify the potential effects of aviation noise on health. The various methods by which noise can be measured (e.g. single dose, long-term average, number of events above a certain level, etc.), and difficulties in separating other lifestyle factors from the analysis, increases the complexity of determining the health effects of noise, and has caused considerable variability in the results of past studies. The health effects of noise are often divided into the following topics: cardiovascular effects, hearing loss, sleep disturbance, and speech/communication interference.

C.4.1 CARDIOVASCULAR EFFECTS

Several studies have suggested that increased hypertension or other cardiovascular effects, such as increased blood pressure, and change in pulse rate, may be associated with long-term exposure to high levels of environmental noise. When conducting cross-sectional studies of environmental noise exposure, it is difficult to control for other important variables. Subsequent reviews of past research has pointed out that such studies "…are notoriously difficult to interpret. They often report conflicting results, generally do not identify a cause and effect relationship, and often do not report a dose-response relationship between the cause and effect."[3] Therefore, it is not known what, if any, cardiovascular effects are caused by aircraft noise exposure.

C.4.2 HEARING LOSS

The potential for noise-induced hearing loss is commonly associated with occupational noise exposure from working in a noisy work environment or recreational noise such as listening to loud music. Recent studies have concluded that "because environmental noise does not approximate occupational noise levels or recreational noise exposures…it does not have an effect on hearing threshold levels." Furthermore, "aviation noise does not pose a risk factor for child or adolescent hearing loss, but perhaps other noise sources (personal music devices, concerts, motorcycles, or night clubs) are a main risk factor."[4] Because aviation noise levels near airports does not approach levels of occupational or recreational noise exposures associated with hearing loss, hearing impairment is likely not caused by aircraft noise for populations living near an airport.

C.4.3 SLEEP DISTURBANCE

Sleep disturbance is a common complaint from people who live in the vicinity of an airport. A large amount of research has been published on the topic of sleep disturbance caused by environmental noise. This research has produced variable results due to differing definitions of sleep disturbance, different ways for

3 Airport Cooperative Research Program, Transportation Research Board, Effects of Aircraft Noise: Research Update on Selected Topics, 2008.
4 Ibid.

measuring sleep disturbance (behavioral awakenings or sleep interruption), and different settings in which to measure it (laboratory setting or field setting). In-home sleep disturbance studies clearly demonstrate that it requires more noise to cause awakenings than was previously theorized based on laboratory sleep disturbance studies.

In 1992, the Federal Interagency Committee on Noise (FICON) recommended an interim dose-response curve to predict the percent of the exposed population expected to be awakened (percent awakening) as a function of the exposure to single event noise levels expressed in terms of the Sound Exposure Level (SEL). This interim curve was based on statistical adjustment of previous analysis, and included data from both laboratory and field studies. In 1997, Federal Interagency Committee on Aviation Noise (FICAN) recommended a revised sleep disturbance relationship based on data and analysis from three field studies.[5]

Exhibit C-8 show the results of the 1992 and 1997 analyses. The top graph shows a comparison of the 1992 FICON and 1997 FICAN curves. The 1997 FICAN curve represents the upper limit of the observed field data, and should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened", or the "maximum percent awakened" for a given residential population.

In 2008, FICAN recommended the use of a revised method to predict sleep disturbance in terms of percent awakenings based on data published by the American National Standards Institute (ANSI) in 2008.[6] In contrast to the earlier FICAN recommendation, the 2008 ANSI standard indicates that the probability of awakening is lower for a single noise event in cases where the population is exposed to the given noise source for a long period of time (more than one year) compared to the probability of awakening for sound that is new to an area. In Exhibit C-8, the lower graph shows these two relationships, with Equation 1 (blue dotted line) representing percent awakenings from long-term noise and Equation B1 (pink dashed line) representing percent awakenings from a new noise source based on the 1997 FICAN results. As shown in this exhibit, at an indoor Sound Exposure Level (SEL) of 100 dB, the probability of awakenings would be expected to exceed 15 percent for a new noise source; yet for long-term noise sources, the probability of awakening is expected to be less than 10 percent.

No definitive conclusions have been drawn on the percent of a population that is estimated to be awakened by a certain level of aircraft noise and recent studies have cautioned about the over-interpretation of the data.

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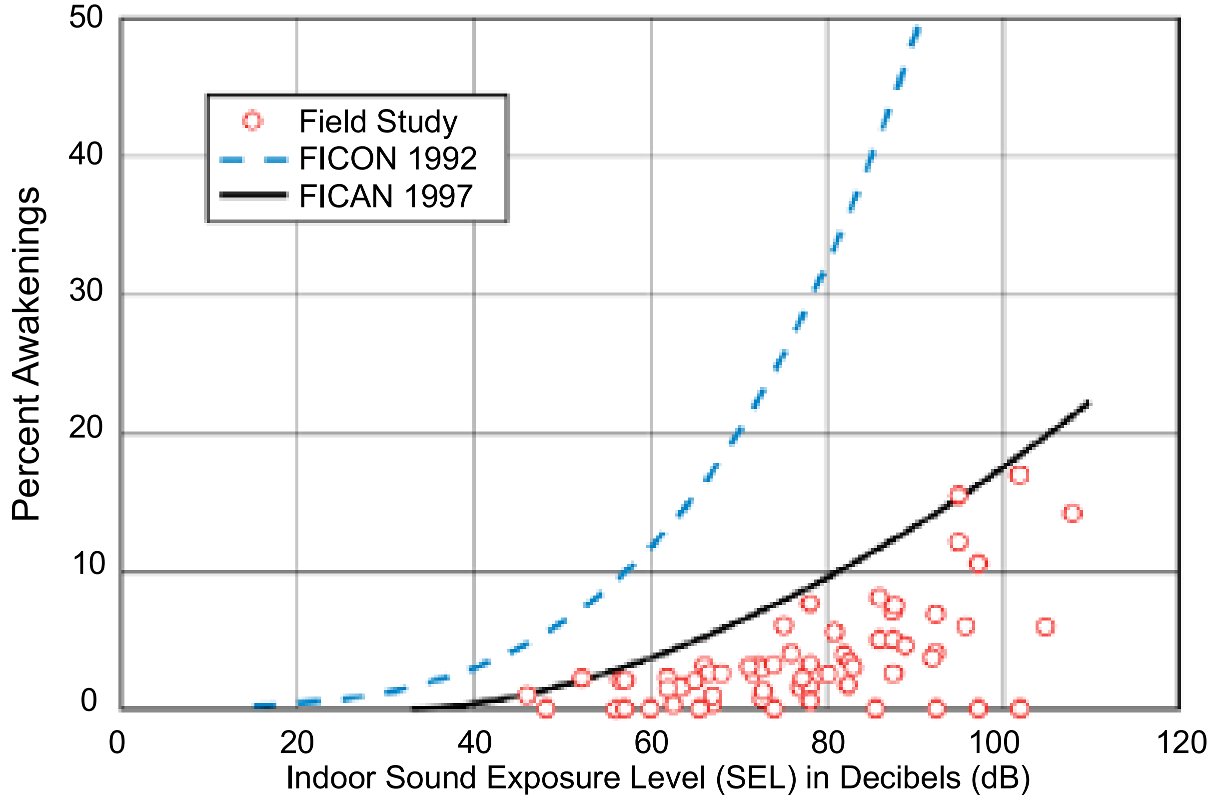
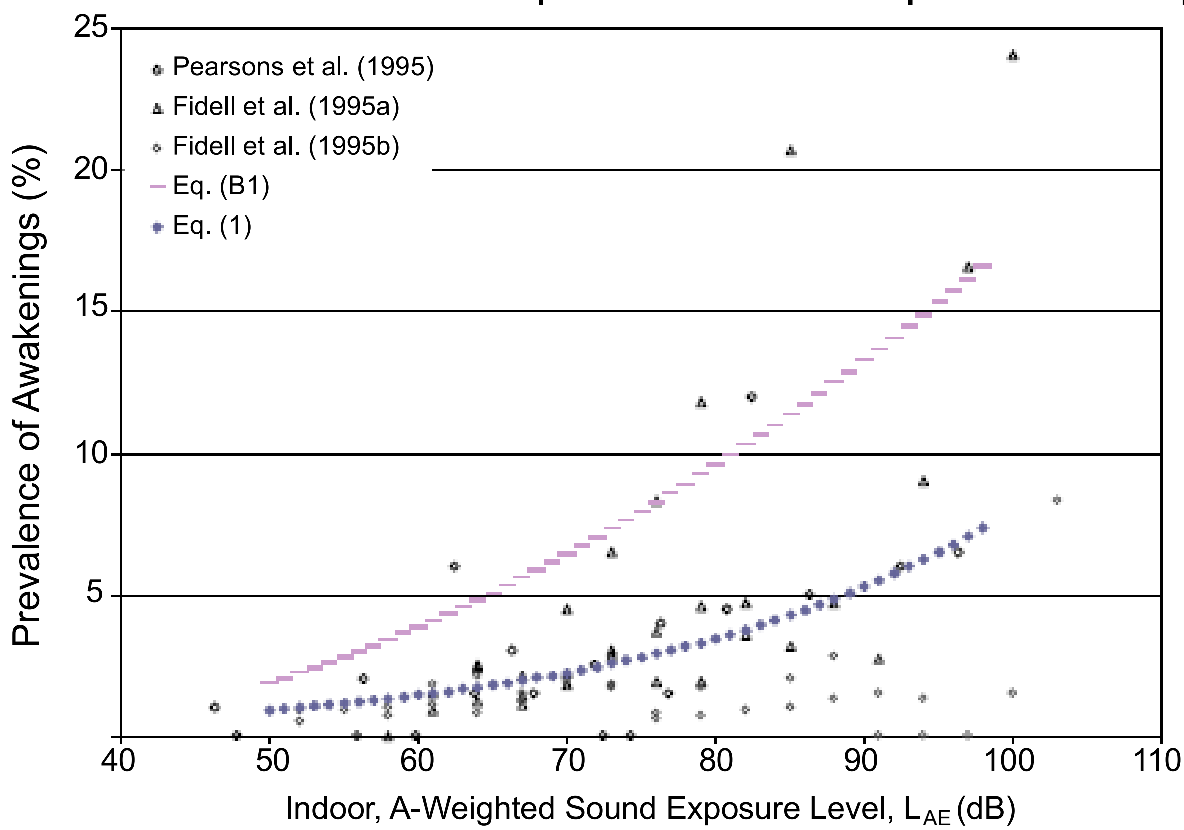
[5] See Appendix C, *FAA Policies, Guidance, and Regulations,* for more information about FICON and FICAN.

[6] ANSI S12.9-2008, Quantities and Procedures for Description and Measurement of Environmental Sound — Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes, 2008.

FICAN 1997 Recommended Sleep Disturbance Dose-Response Relationship



ANSI 2008 Recommended Sleep Disturbance Dose-Response Relationship



Sources: Federal Interagency Committee on Aviation Noise (FICAN), June 1997; American National Standards Institute, 2008.

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Sleep Disturbance Dose-Response Curves

EXHIBIT: **C-8**

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C.4.4 COMMUNICATION INTERFERENCE

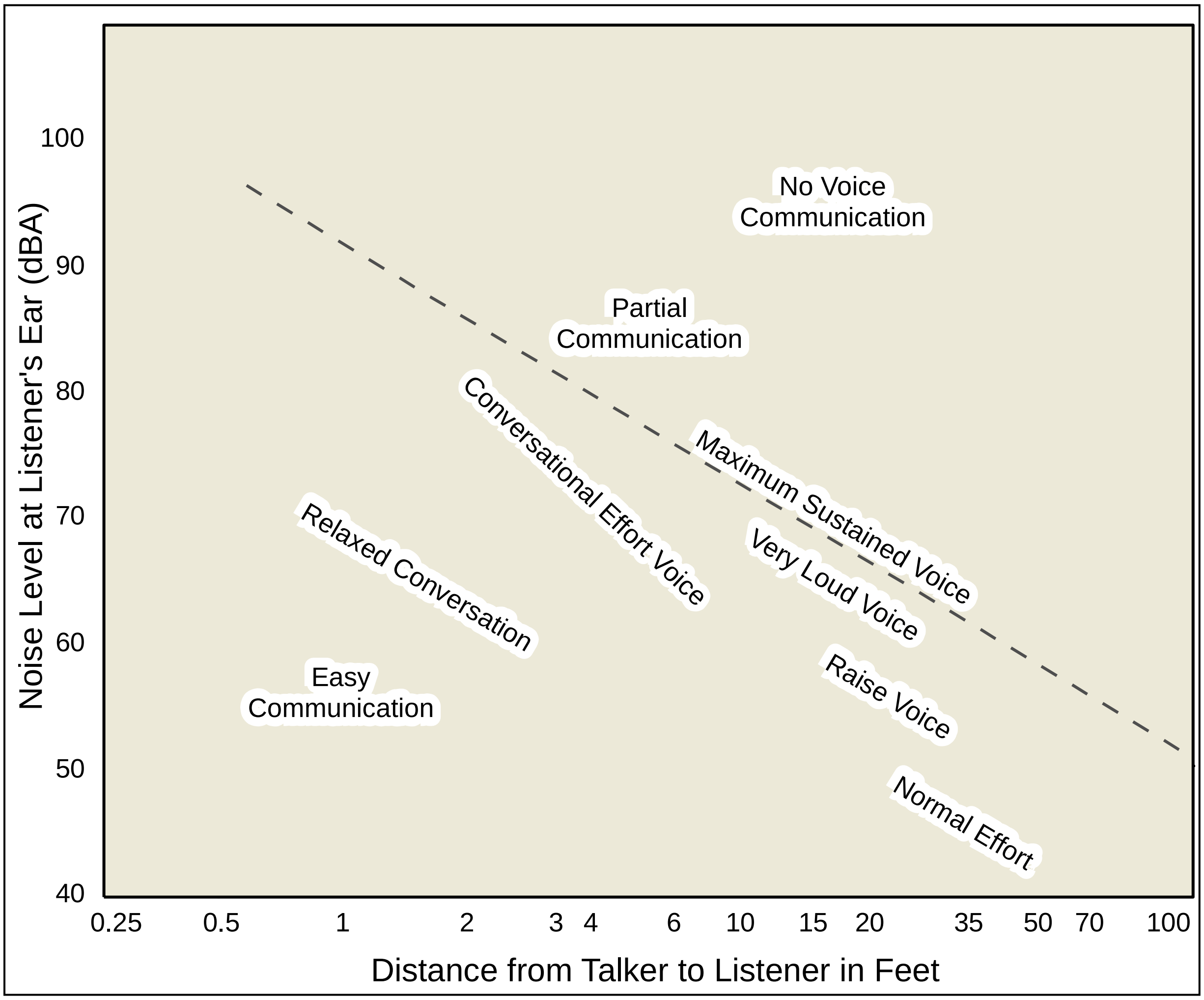
Communication interference can impact activities such as personal conversations, classroom learning, and listening to radio and television. Most studies have focused on communication interference due to continual noise sources. In 1974, the USEPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, which is one of the few studies to focus on intermittent noise. The study concluded that for voice communication, an indoor Leq of 45 dB allows normal conversation at distances up to 2 meters with 95 percent sentence intelligibility. **Exhibit C-9** shows the required distance between talker and listener based on the type of speech communication (normal voice, loud voice, etc.) and the environmental noise level from the 1974 USEPA report.

Noise can also impact communication between student and teacher necessary for learning in a classroom setting. It is usually accepted that noise levels above a certain Leq may affect a child's learning experiences. Research has shown a "decline in reading when outdoor noise levels equal or exceed Leq of 65 dBA."[7] Furthermore, a study conducted by FICAN in 2007 found: "(1) a substantial association between noise reduction and decreased failure (worst-score) rates for high-school students, and (2) significant association between noise reduction and increased average test scores for student/test subgroups. In general, the study found little dependence upon student group and upon test type."[8]

7 Airport Cooperative Research Program, Transportation Research Board, Effects of Aircraft Noise: Research Update on Selected Topics, 2008.

8 Federal Interagency Committee on Aviation Noise (FICAN), Findings of the FICAN Pilot Study on the Relationship between Aircraft Noise Reduction and Changes in Standardized Test Scores, July 2007.

Exhibit C-9
NOISE EFFECTS ON DISTANCE NECESSARY FOR SPEECH COMMUNICATION



Source: FICON, 1992; from USEPA, 1974.

C.5 NOISE MODELING METHODOLOGY

The following sections summarize the methodology, assumptions, and input data for the noise contour modeling for this NEM Update.

C.5.1 NOISE MODEL

The analysis of noise exposure around CLT was prepared using the latest version of the *Integrated Noise Model (INM)*, Version 7.0d. Inputs to the INM include runway definition, number of aircraft operations during the time period evaluated, the types of aircraft flown, the time of day when they are flown, how frequently each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, and ground run-up activity. The INM calculates noise exposure for the area around the airport and outputs contours of equal noise exposure using the Day-Night Average Sound Level (DNL) metric. For this NEM Update, equal noise exposure contours for the levels of 65, 70, and 75 DNL were calculated and represent average-annual day conditions.

C.5.2 EXISTING (2015) NOISE CONTOUR MODELING INPUT DATA

Runway Definition

The Airport currently has four runways: three parallel runways (18L/36R, 18C/36C, and 18R/36L), and a crosswind runway (05/23). The current airfield layout at CLT is shown on **Exhibit 10**. Field elevation at CLT is 748 feet above Mean Sea Level (MSL). Information for the runways at CLT is listed below:

Runway	Length (feet)	Runway Elevation (MSL)	Approach Threshold Displacements	Departure Threshold Displacements	Glide Slope (degrees)
05/23	7,502	705.9/746.7	None	None	3.0/3.0
18L/36R	8,676	745.8/723.5	None	None	3.0/3.0
18C/36C	10,000	741.9/692.2	None	None	3.0/3.0
18R/36L	9,000	743.9/743.9	None	None	3.0/3.0

Rotary aircraft (helicopter) operations occur at CLT and primarily operate at two locations on the airfield, a helipad located approximately 1,300 feet east of Runway 18L/36R south of the general aviation ramp, and at the fixed-base operator (FBO) facility as shown on Exhibit C-10.

Average Weather

The noise contours are representative of annual weather conditions at the Airport, including temperature and wind speed. Average temperature used for INM modeling was 59.9 Degrees Fahrenheit, which was obtained from the 1981-2010 Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days published by the National Climatic Data Center. Average wind speed was based on the standard INM input of an eight knot headwind.

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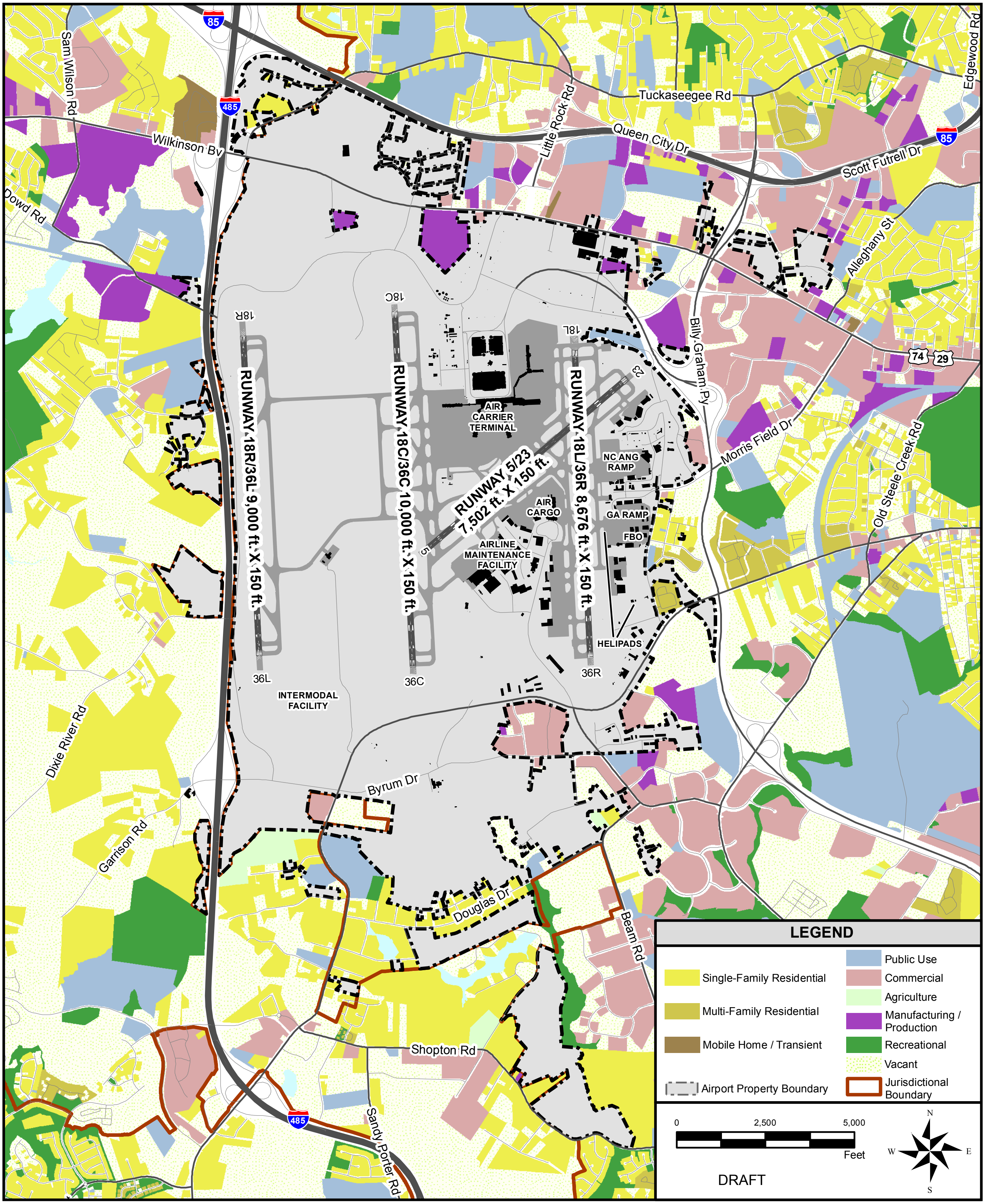

Charlotte·Douglas INTERNATIONAL AIRPORT

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Existing Airport Layout

EXHIBIT: **C-10**

9/2/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\C-10_ Existing Airport Layout.mxd

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Number of Operations and Fleet Mix

The number of annual operations modeled for the Existing (2015) Noise Contour at CLT was based on Air Traffic Control Tower (ATCT) counts for the period from March 2013 through February 2014, which was the most recent twelve months of data available when the noise modeling began. During that twelve-month period, 553,854 operations occurred at CLT, which results in 1,517.4 average-annual day operations. Specific aircraft types and times of operation for commercial aircraft were developed from Official Airline Guide (OAG) data and landing fee reports from CLT for the period from March 2013 through February 2014. Aircraft types modeled for non-commercial (general aviation) activity was based on representative aircraft derived from the flight information included in the Airport's flight tracking system data from March 2013 through February 2014. **Table C-1** provides a summary of the average daily operations and fleet mix at CLT, organized by aircraft type, operation type, and time of day.

Table C-1
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
HEAVY PASSENGER JETS						
Boeing 767-300	767300	0.0	0.0	0.0	0.0	0.1
Airbus A330-300	A330-301	2.9	0.2	2.7	0.3	6.0
Airbus A330-300	A330-343	2.7	0.1	2.5	0.3	5.7
Airbus A340-200	A340-211	0.1	0.0	0.1	0.0	0.2
Airbus A340-600	A340-642	0.4	0.0	0.4	0.1	0.9
Subtotal		*6.1*	*0.3*	*5.8*	*0.7*	*12.9*
CARGO JETS						
Boeing 727-200 (hushkitted)	727EM2	0.4	0.1	0.3	0.1	0.9
Boeing 767-200	767CF6	3.7	0.7	3.3	1.1	8.8
Airbus A300-600	A300-622R	2.2	0.4	2.0	0.6	5.3
Airbus A310-300	A310-304	0.0	0.0	0.0	0.0	0.1
Douglas DC10-10	DC1010	0.2	0.0	0.2	0.1	0.5
Douglas DC10-30	DC1030	0.0	0.0	0.0	0.0	0.0
Subtotal		*6.5*	*1.2*	*5.9*	*1.9*	*15.6*

Table C-1, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
LARGE PASSENGER JETS						
Boeing 717-200	717200	0.7	0.1	0.7	0.1	1.5
Boeing 737-300	737300	0.8	0.1	0.7	0.1	1.7
Boeing 737-400	737400	34.7	3.4	33.5	4.6	76.2
Boeing 737-700	737700	4.1	0.4	4.0	0.5	9.1
Boeing 737-800	737800	0.5	0.1	0.5	0.1	1.1
Boeing 737-900	737900	0.1	0.0	0.1	0.0	0.2
Boeing 757-200	757PW	0.1	0.0	0.1	0.0	0.3
Boeing 757-200	757RR	7.7	1.5	7.0	2.2	18.4
Airbus A319-100	A319-131	78.1	7.7	75.5	10.3	171.7
Airbus A320-200	A320-211	9.8	1.0	9.5	1.3	21.6
Airbus A320-200	A320-232	29.5	2.9	28.5	3.9	64.8
Airbus A321-200	A321-232	86.1	8.5	83.3	11.4	189.2
Canadair CRJ701	CRJ701	58.9	5.8	57.0	7.8	129.5
Canadair CRJ900	CRJ9-ER	75.2	7.4	72.8	9.9	165.3
Douglas DC9-30 (hushkitted)	DC93LW	0.0	0.0	0.0	0.0	0.1
Douglas DC9-50 (hushkitted)	DC95HW	0.6	0.1	0.6	0.1	1.4
Embraer EMB-170	EMB170	4.4	0.4	4.3	0.6	9.8
Embraer EMB-175	EMB175	23.1	2.3	22.3	3.0	50.8
Embraer EMB-190	EMB190	4.7	0.5	4.5	0.6	10.3
McDonnell-Douglas MD82	MD82	3.4	0.3	3.3	0.4	7.4
McDonnell-Douglas MD83	MD83	1.0	0.1	1.0	0.1	2.3
McDonnell-Douglas MD88	MD88	5.0	0.5	4.9	0.7	11.0
McDonnell-Douglas MD90	MD9025	3.2	0.3	3.1	0.4	7.1
Subtotal		*431.9*	*43.4*	*417.2*	*58.2*	*950.7*

Table C-1, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
REGIONAL / BUSINESS JETS						
Business Jet	CIT3	0.3	0.0	0.3	0.0	0.6
Business Jet	CL600	1.7	0.2	1.7	0.3	3.9
Business Jet	CL601	1.2	0.2	1.1	0.2	2.6
Canadair Regional Jet CRJ-200	CLREGJ	113.8	15.5	111.2	18.1	258.6
Business Jet	CNA500	1.0	0.1	1.0	0.2	2.3
Business Jet	CNA510	0.6	0.1	0.5	0.1	1.3
Business Jet	CNA55B	0.7	0.1	0.7	0.1	1.6
Business Jet	CNA750	0.6	0.1	0.6	0.1	1.3
Embraer EMB-140	EMB140	0.4	0.1	0.4	0.1	1.0
Embraer EMB-145	EMB145	25.2	3.4	24.6	4.0	57.2
Embraer EMB-145	EMB14L	9.5	1.3	9.3	1.5	21.6
Business Jet	FAL20	1.7	0.2	1.7	0.3	3.9
Business Jet	GIV	1.8	0.2	1.7	0.3	4.0
Business Jet	GV	1.2	0.2	1.1	0.2	2.6
Business Jet	LEAR35	5.7	0.8	5.6	0.9	13.0
Business Jet	MU3001	5.3	0.7	5.1	0.8	12.0
Subtotal		*170.6*	*23.3*	*166.7*	*27.1*	*387.8*
PROPELLER AIRCRAFT						
Twin-Engine Piston	BEC58P	2.2	0.2	2.2	0.3	4.8
Single-Engine Piston	CNA172	0.2	0.0	0.2	0.0	0.4
Single-Engine Piston	CNA206	0.2	0.0	0.2	0.0	0.5
Single-Engine Piston	CNA208	0.9	0.1	0.8	0.1	1.9
Single-Engine Piston	CNA210	0.4	0.0	0.4	0.0	0.8
Twin-Engine Turboprop	CNA441	1.2	0.1	1.2	0.1	2.7
DASH 6	DHC6	1.9	0.2	1.9	0.2	4.2
DASH 8-100	DHC8	18.6	1.6	18.0	2.2	40.5
DASH 8-300/400	DHC830	35.8	3.1	34.6	4.3	77.8
Single-Engine Piston	GASEPF	3.0	0.3	2.9	0.4	6.6
Single-Engine Piston	GASEPV	2.1	0.2	2.0	0.3	4.6
Twin-Engine Piston	PA31	0.5	0.0	0.5	0.1	1.1
Subtotal		*67.1*	*5.8*	*64.9*	*8.0*	*145.9*

Table C-1, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
MILITARY AIRCRAFT						
Lockheed C130 Hercules	C130HP	1.2	0.0	1.2	0.0	2.5
Subtotal		*1.2*	*0.0*	*1.2*	*0.0*	*2.5*
HELICOPTERS						
Augusta A-109	A109	0.8	0.1	0.8	0.1	1.7
Bell 407 Jet Ranger	B407	0.1	0.0	0.1	0.0	0.3
Subtotal		*0.9*	*0.1*	*0.9*	*0.1*	*2.0*
Grand Total		**684.5**	**74.2**	**662.7**	**96.0**	**1,517.4**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.

Source: OAG, Landing Fee Reports, FAA Operations Network (OPSNET) data, CLT Flight Tracking System Data, Landrum & Brown, 2015.

Runway End Utilization

Average-annual day runway end utilization was derived primarily from analysis of radar data from the Airport's flight tracking system for the period from March 2013 through August 2014 and a review of previous noise analysis at CLT. **Table C-2** summarizes the percentage of use by each aircraft category on each of the runways at CLT during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.). There are two primary runway use configurations at CLT; north flow, in which aircraft arrive from the south and depart to the north; and south flow, in which aircraft arrive from the north and depart to the south. During the period from March 2013 through February 2014, CLT operated in north flow approximately 45 percent of the time and in south flow approximately 55 percent of the time.

Table C-2
RUNWAY END UTILIZATION - EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

DAYTIME ARRIVALS								
	05	**23**	**18L**	**36R**	**18C**	**36C**	**18R**	**36L**
Heavy Jets	0.0%	3.2%	10.9%	22.8%	37.6%	15.6%	5.6%	4.3%
Large Cargo Jets	0.0%	37.1%	12.5%	17.7%	10.7%	8.8%	6.1%	7.1%
Large Passenger Jets	0.0%	23.1%	7.9%	11.8%	6.9%	6.1%	23.2%	21.0%
Regional / Business Jets	0.0%	22.0%	9.4%	13.2%	8.8%	6.7%	20.9%	19.0%
Propeller Aircraft	0.0%	36.5%	14.5%	20.4%	4.5%	2.6%	11.8%	9.7%
Military Aircraft	0.0%	13.0%	36.0%	43.0%	5.0%	3.0%	0.0%	0.0%
Total	0.0%	24.2%	9.1%	13.3%	7.5%	6.0%	20.9%	18.9%
NIGHTTIME ARRIVALS								
	05	**23**	**18L**	**36R**	**18C**	**36C**	**18R**	**36L**
Heavy Jets	1.1%	6.7%	6.1%	28.9%	27.6%	23.0%	3.2%	3.4%
Large Cargo Jets	14.6%	20.5%	10.3%	10.0%	19.5%	15.5%	5.8%	3.8%
Large Passenger Jets	8.1%	26.7%	7.2%	10.9%	17.2%	14.5%	7.8%	7.6%
Regional / Business Jets	14.1%	32.2%	7.9%	11.0%	11.5%	9.4%	6.9%	7.0%
Propeller Aircraft	8.5%	39.4%	1.0%	19.0%	19.5%	7.5%	1.0%	4.1%
Military Aircraft	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	10.2%	29.1%	7.0%	11.6%	15.7%	12.4%	6.9%	7.0%
DAYTIME DEPARTURES								
	05	**23**	**18L**	**36R**	**18C**	**36C**	**18R**	**36L**
Heavy Jets	0.1%	0.2%	36.2%	25.5%	12.1%	25.9%	0.0%	0.0%
Large Cargo Jets	0.0%	0.0%	37.0%	30.3%	17.0%	15.7%	0.0%	0.0%
Large Passenger Jets	0.1%	0.0%	26.5%	19.2%	29.4%	24.8%	0.0%	0.0%
Regional / Business Jets	0.1%	0.0%	28.8%	17.6%	27.9%	25.6%	0.0%	0.0%
Propeller Aircraft	0.1%	7.0%	42.7%	25.0%	10.3%	14.9%	0.0%	0.0%
Military Aircraft	0.0%	3.0%	35.0%	47.0%	5.0%	10.0%	0.0%	0.0%
Total	0.1%	0.7%	29.0%	19.7%	26.7%	23.8%	0.0%	0.0%
NIGHTTIME DEPARTURES								
	05	**23**	**18L**	**36R**	**18C**	**36C**	**18R**	**36L**
Heavy Jets	0.7%	1.4%	30.5%	28.2%	14.8%	24.5%	0.0%	0.0%
Large Cargo Jets	3.6%	6.0%	19.9%	18.7%	30.5%	21.3%	0.0%	0.0%
Large Passenger Jets	4.2%	8.0%	26.1%	17.0%	25.2%	19.5%	0.0%	0.0%
Regional / Business Jets	9.6%	14.0%	19.8%	13.3%	22.9%	20.4%	0.0%	0.0%
Propeller Aircraft	0.1%	8.0%	40.2%	30.7%	7.6%	13.4%	0.0%	0.0%
Military Aircraft	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	5.3%	9.6%	25.3%	17.3%	23.2%	19.4%	0.0%	0.0%

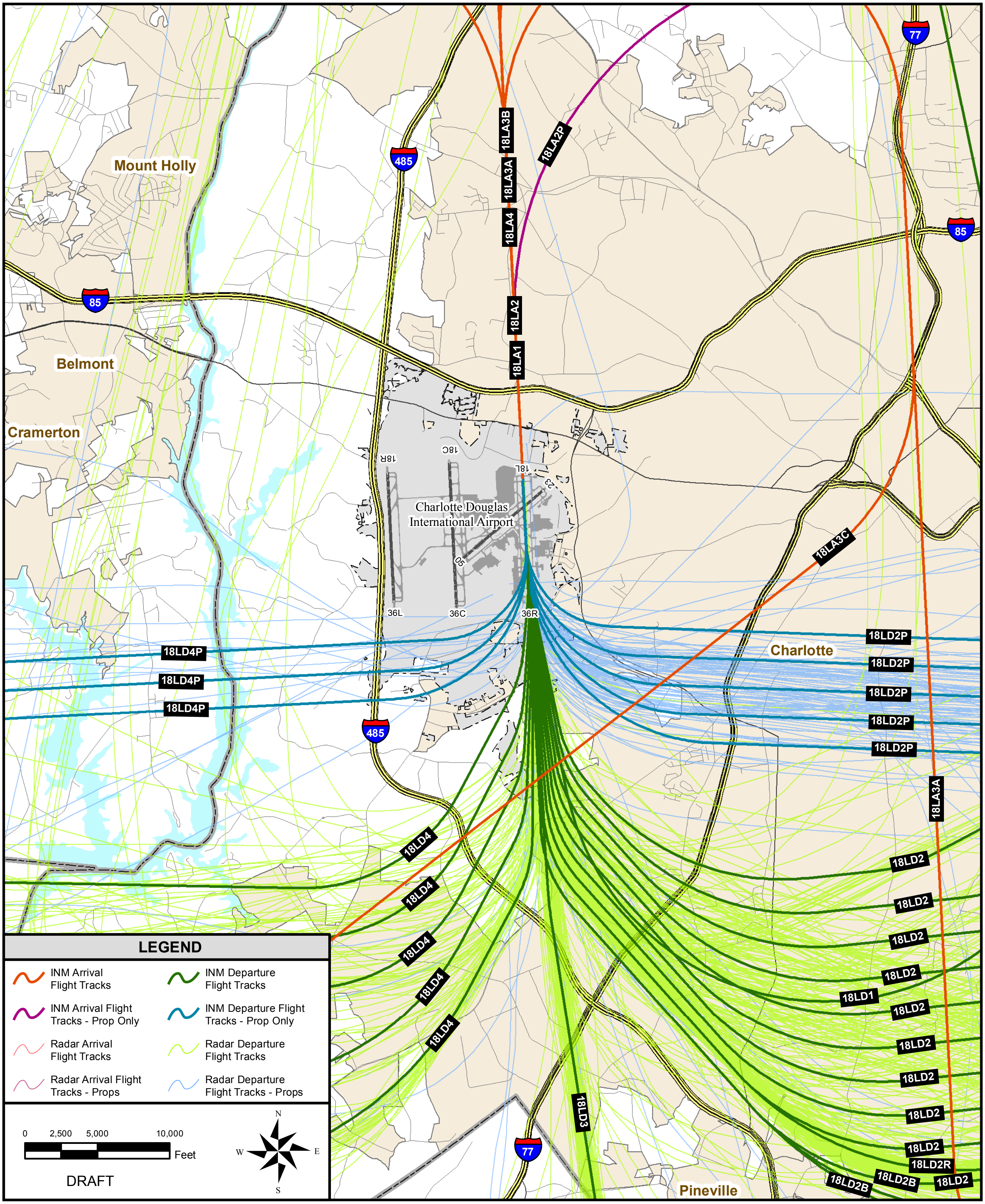
Notes: Daytime = 7:00 a.m. – 9:59 p.m.
Nighttime = 10:00 p.m. – 6:59 a.m.
Source: FAA radar data, Landrum & Brown analysis, 2015.

Flight Tracks

Radar data was gathered for selected periods from January 2013 through March 2014[9] and analyzed to verify the location, density, and width of existing flight corridors. Consolidated flight tracks were developed from this radar data and used in the INM to model the flight corridors present around the Airport. The INM flight tracks modeled for the Existing (2015) and the Future (2020) Noise Contours are shown on **Exhibit C-11** through **Exhibit C-19**. The exhibits show a comparison of INM flight tracks to the radar flight tracks. INM flight tracks have been created for propeller aircraft to account for propeller aircraft that turn sooner upon departure and turn onto their final approach closer to the runway threshold than other aircraft. These tracks that are only used for modeled propeller aircraft are identified in the flight track exhibits. Helicopter operations were modeled at the helipads located to the east of Runway 18L/36R with the aircraft departing to the east/southeast and arriving from the east/southeast as shown in Exhibit 10.

Table C-3 shows arrival flight track utilization percentages and **Table C-4** shows departure flight track utilization percentages for the 2015 conditions. Each flight track is identified by a track ID that corresponds to the label in the flight track exhibits.

[9] Radar flight track data was obtained from specific days in January, February, May, August, October, and November 2013, and March 2014 to provide a sample of data from different seasons and days in which CLT was operating in north and south flow under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions.



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Runway 18L Flight Tracks

EXHIBIT:
C-11

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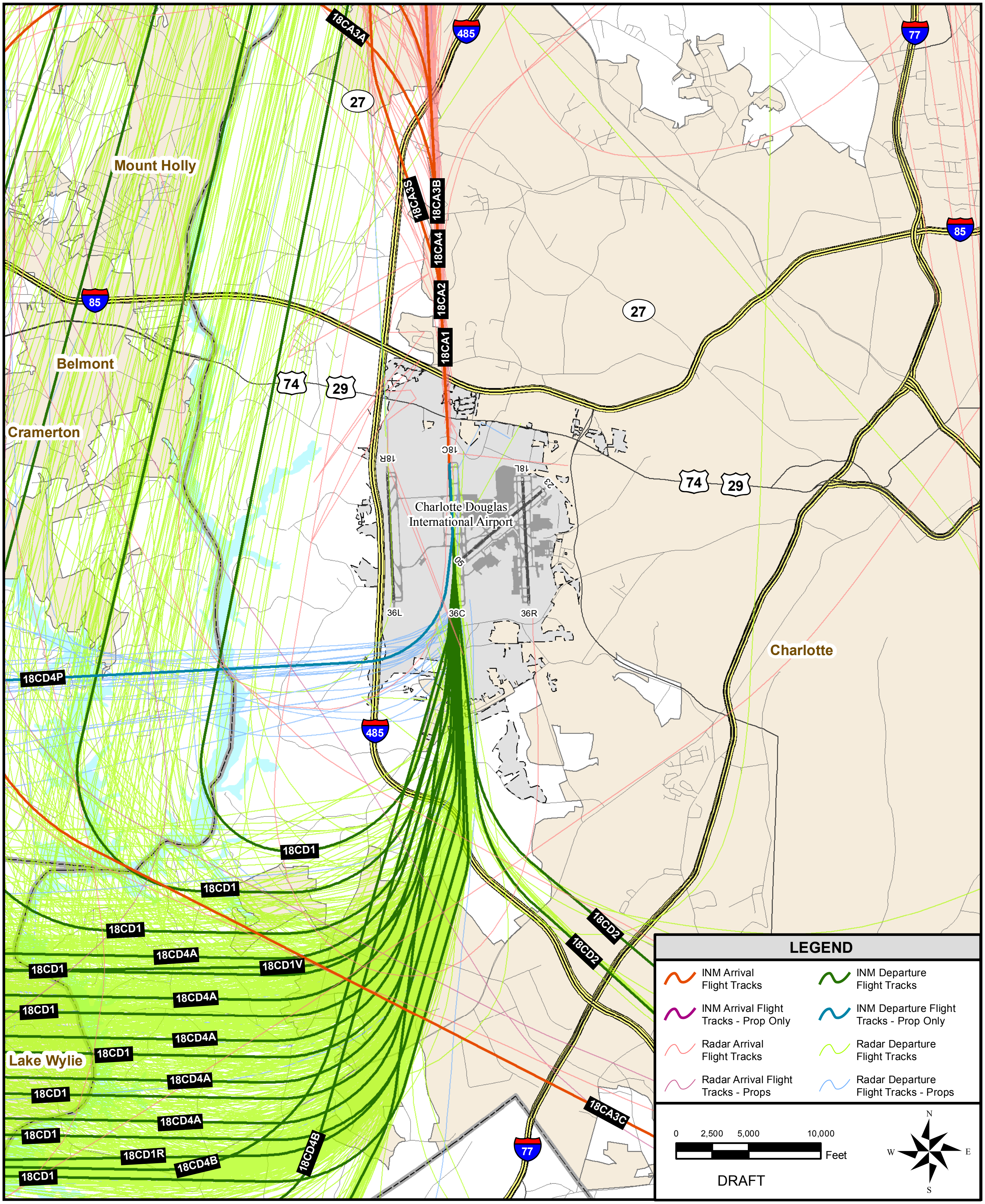

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Runway 18C Flight Tracks

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C-12

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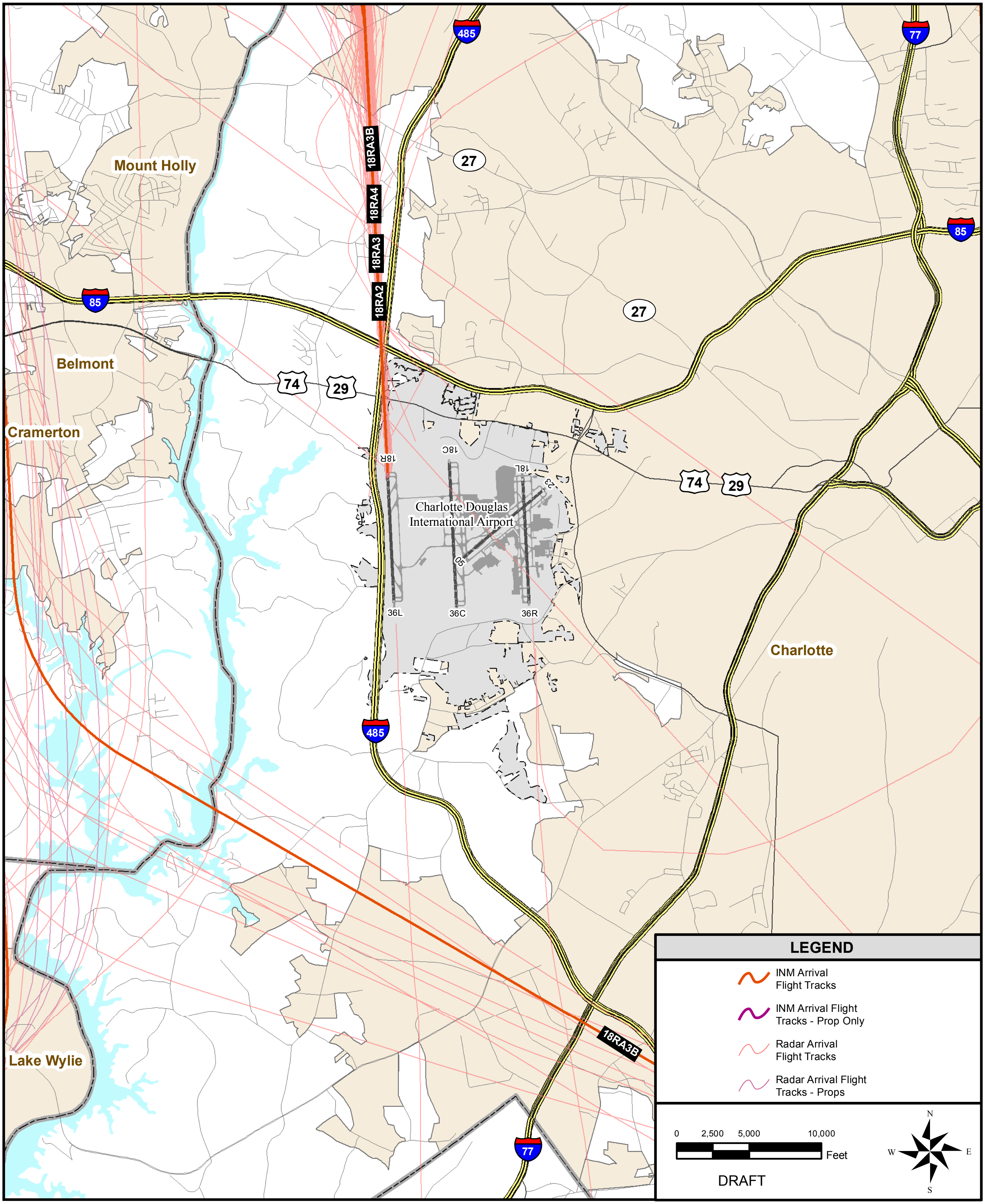

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Runway 18R Flight Tracks

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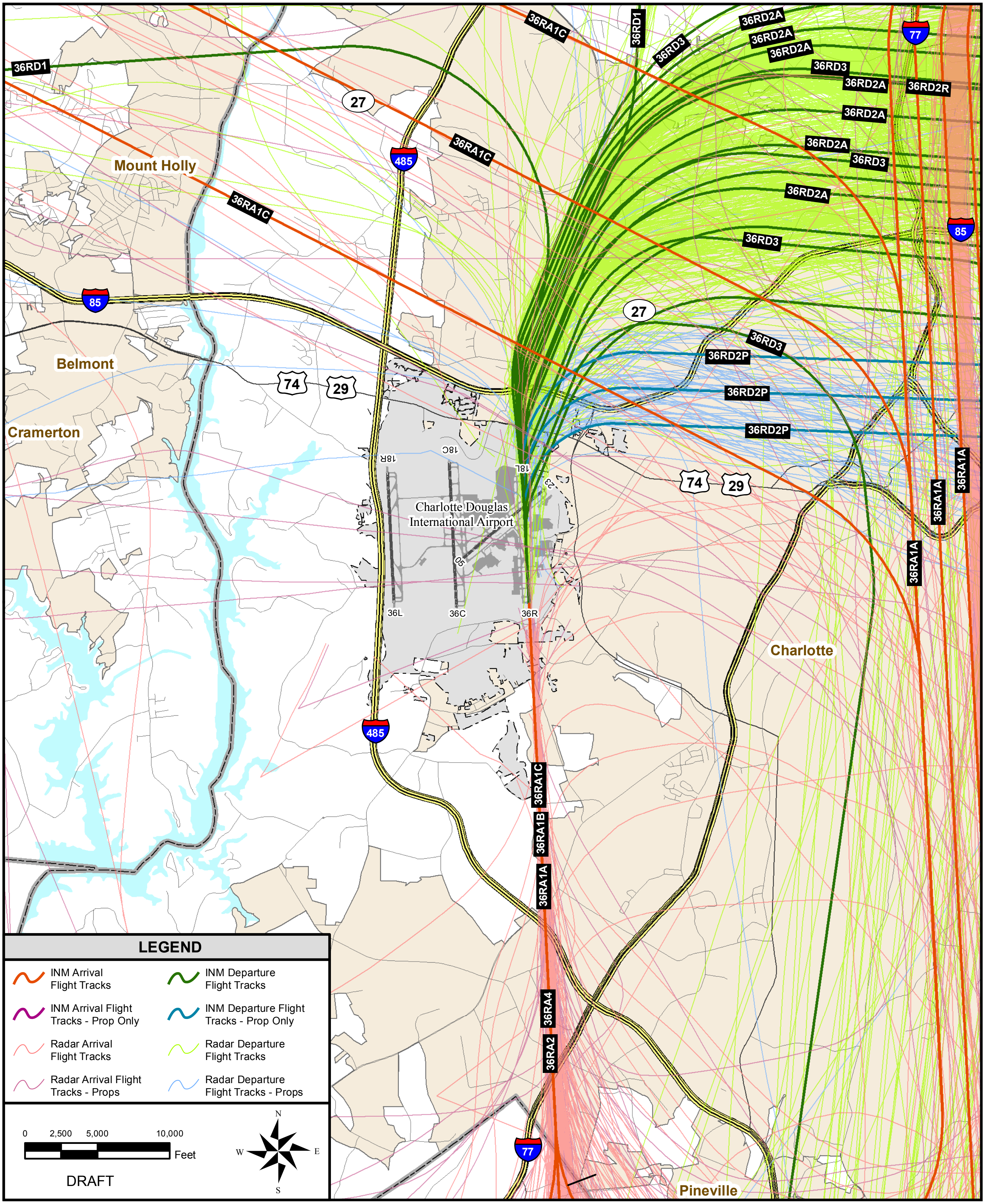

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Runway 36R Flight Tracks

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C-14

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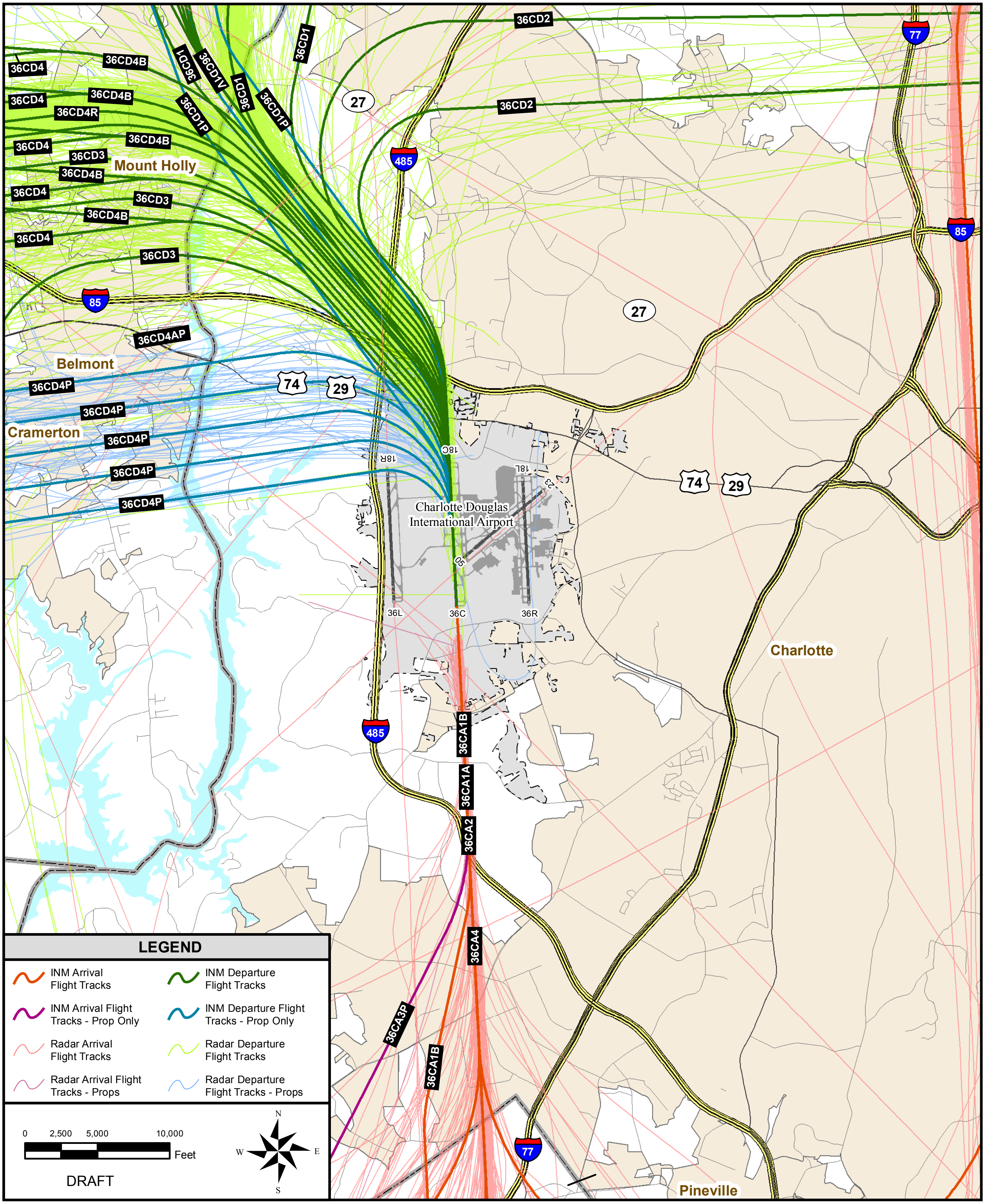

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Runway 36C Flight Tracks

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C-15

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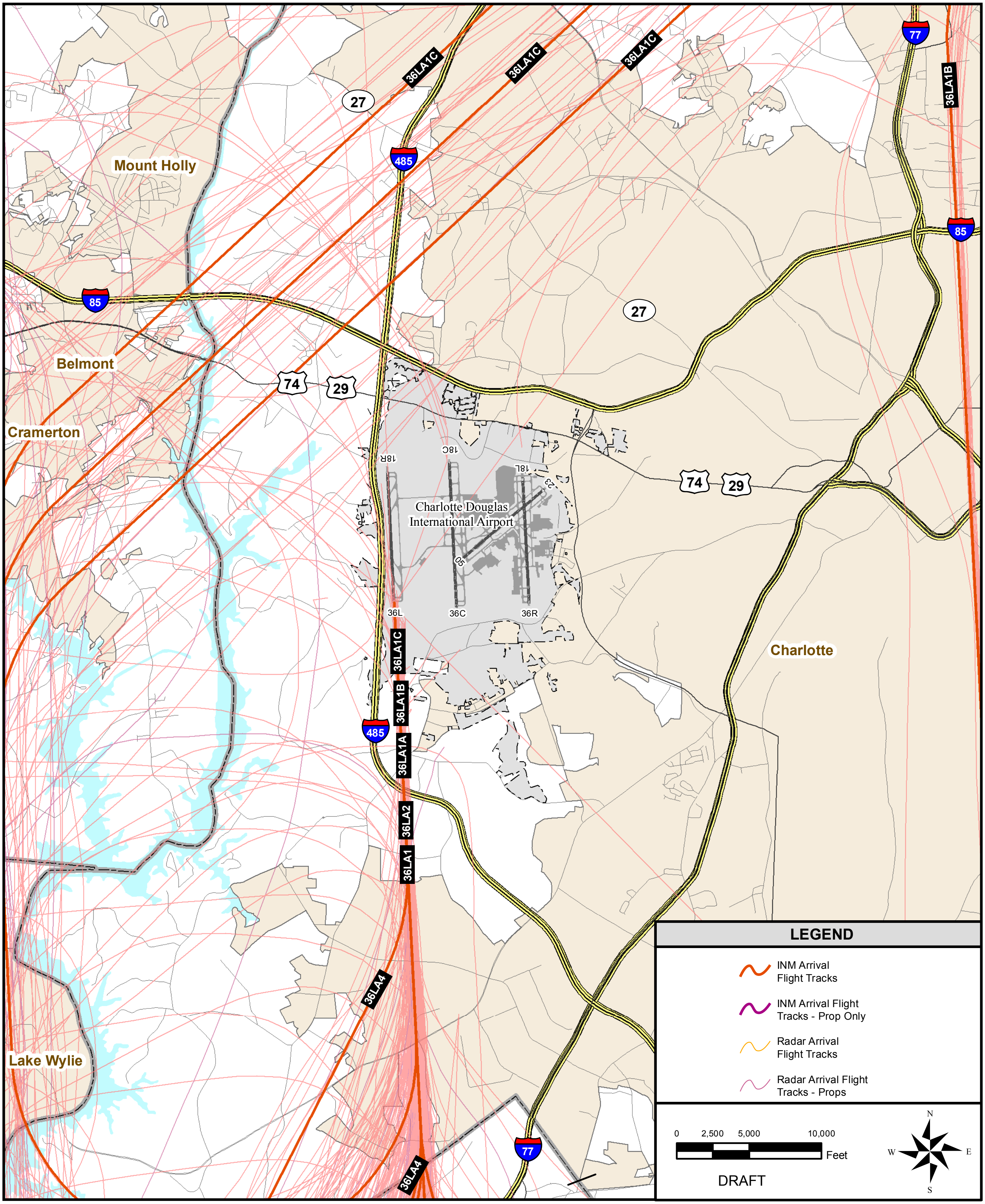

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Runway 36L Flight Tracks

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C-16

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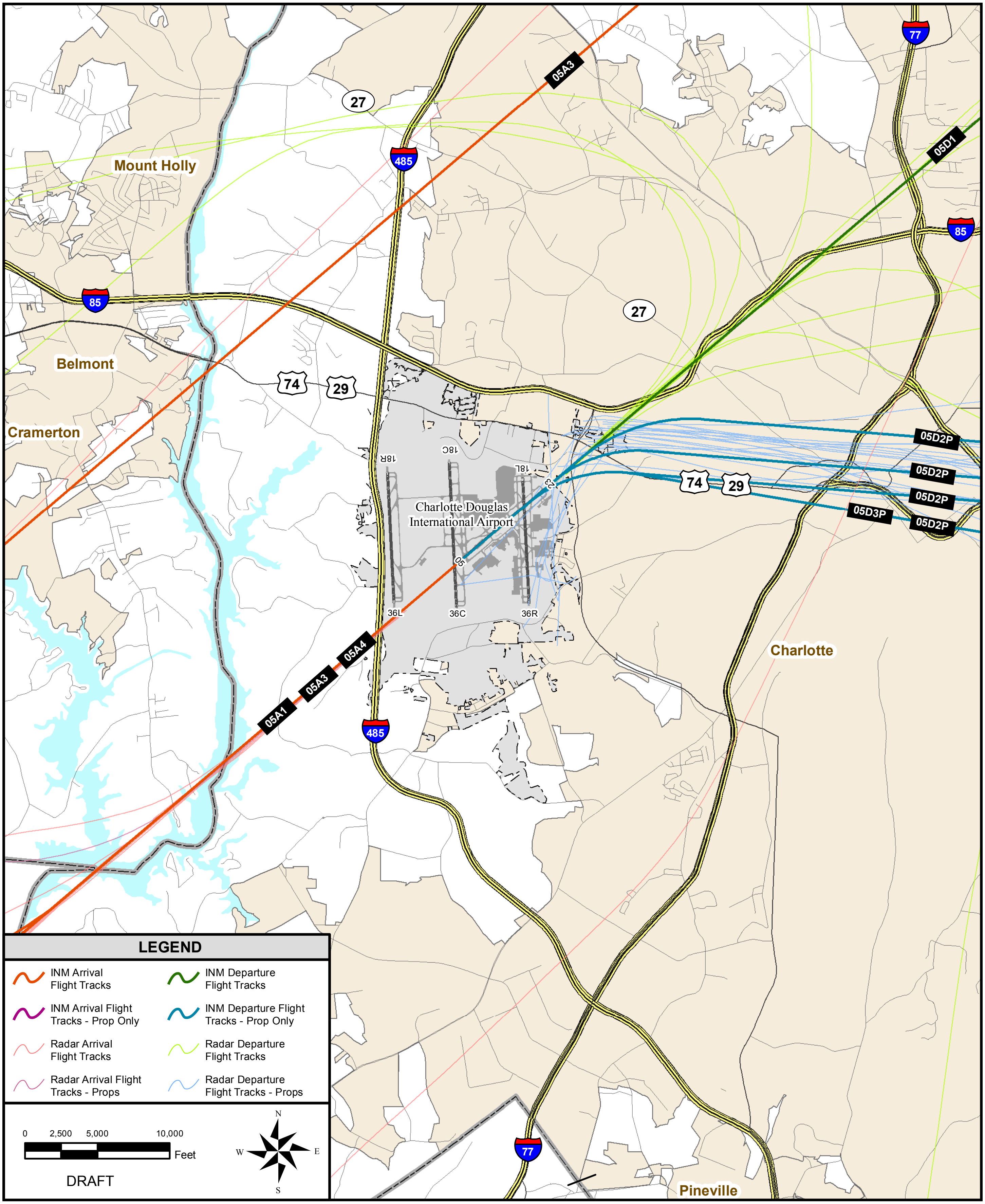

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Runway 05 Flight Tracks

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C-17

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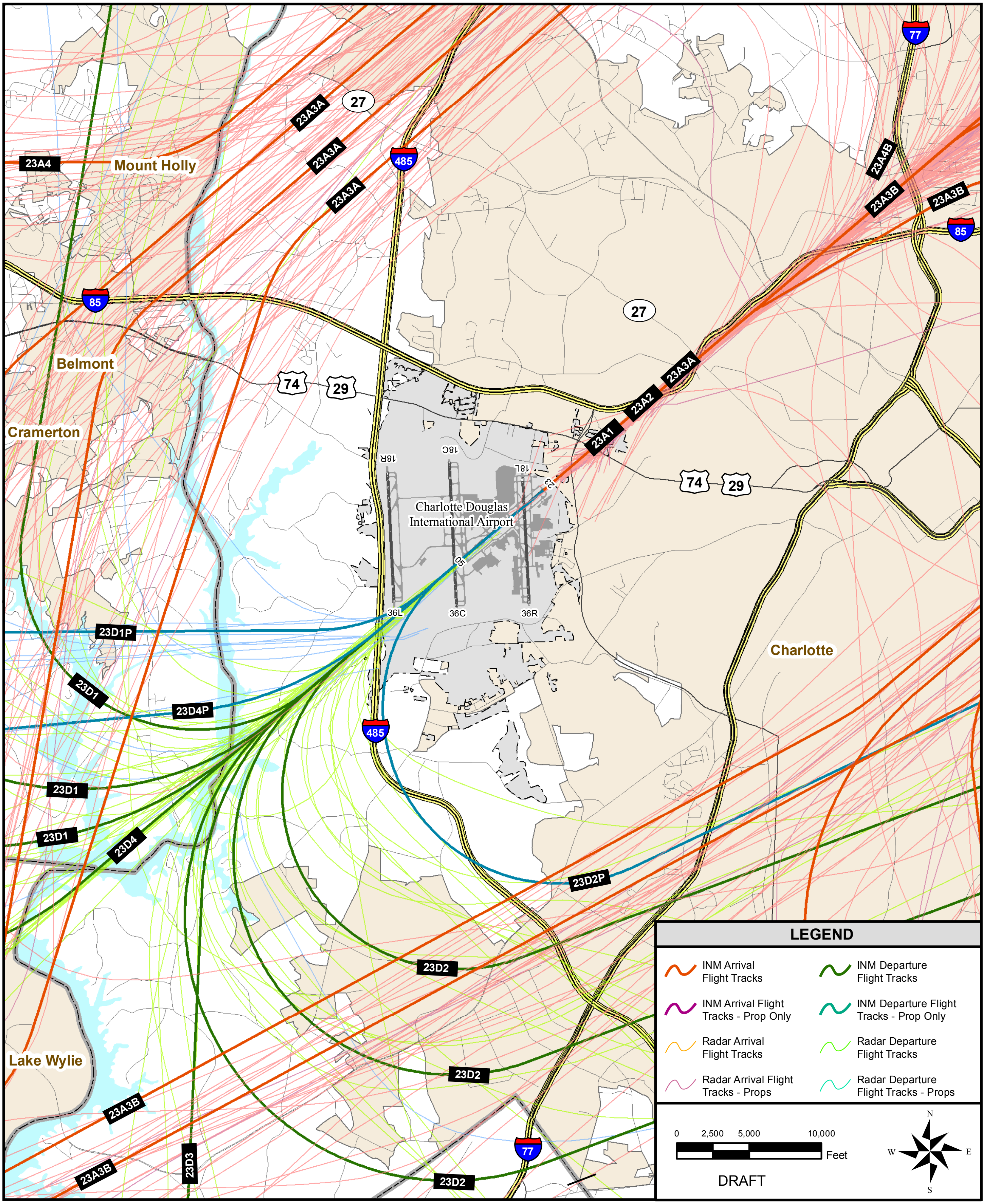

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Runway 23 Flight Tracks

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C-18

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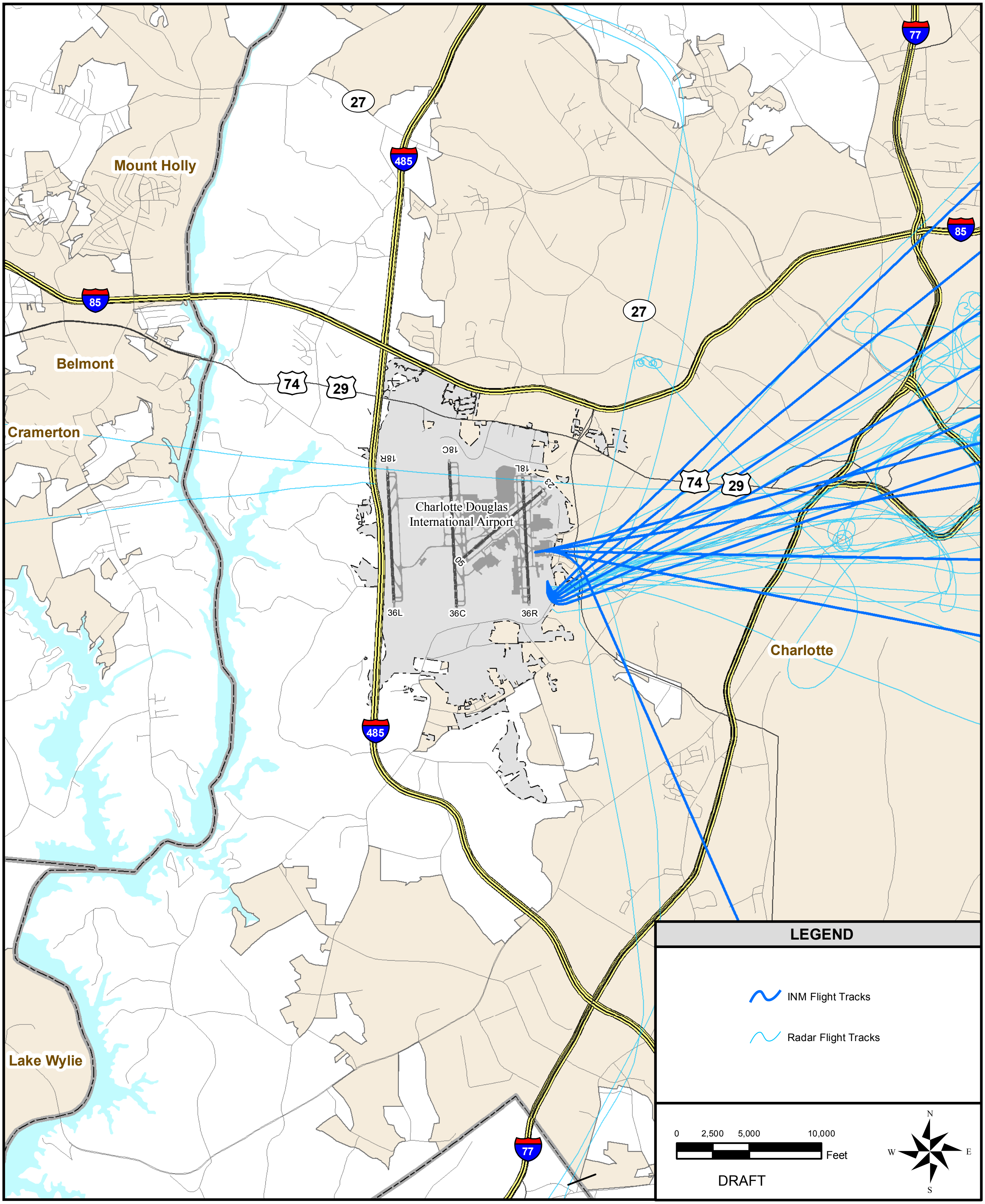

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Helicopter Flight Tracks

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C-19

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Table C-3
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING (2015) AND FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

RUNWAY END	TRACK ID	LARGE CARGO JETS	HEAVY JETS	LARGE PASSENGER JETS	MILITARY AIRCRAFT	PROPELLER AIRCRAFT	REGIONAL / BUSINESS JETS
18L	18LA1	4.1%	3.6%	2.7%	12.2%	4.6%	3.1%
	18LA2	4.9%	4.3%	3.1%	14.4%	4.0%	3.7%
	18LA2P	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%
	18LA3A	0.5%	0.4%	0.3%	1.4%	0.5%	0.4%
	18LA3B	1.1%	1.0%	0.7%	3.2%	1.2%	0.8%
	18LA4	0.5%	0.4%	0.3%	1.4%	0.5%	0.4%
	18LA3C	1.1%	1.0%	0.7%	3.2%	1.2%	0.8%
36R	36RA1A	10.5%	14.8%	7.5%	27.5%	13.0%	8.3%
	36RA1B	0.7%	0.9%	0.5%	1.7%	0.8%	0.5%
	36RA1C	0.5%	0.7%	0.4%	1.3%	0.6%	0.4%
	36RA2	4.0%	5.5%	2.8%	10.3%	4.9%	3.1%
	36RA4	0.8%	1.2%	0.6%	2.1%	1.0%	0.6%
18C	18CA1	1.7%	5.2%	1.1%	0.7%	0.8%	1.3%
	18CA2	2.1%	6.3%	1.3%	0.8%	1.0%	1.6%
	18CA3A	2.4%	7.4%	1.6%	1.0%	1.1%	1.8%
	18CA3B	0.5%	1.5%	0.3%	0.2%	0.2%	0.4%
	18CA4	5.3%	16.3%	3.2%	2.2%	2.5%	3.7%
	18CA4S	0.0%	0.0%	0.2%	0.0%	0.0%	0.3%
	18CA3C	0.1%	0.4%	0.1%	0.0%	0.1%	0.1%
36C	36CA1A	3.8%	6.1%	2.6%	1.1%	1.1%	2.5%
	36CA1B	2.4%	3.8%	1.6%	0.7%	0.7%	1.5%
	36CA2	1.4%	2.2%	1.0%	0.4%	0.4%	0.8%
	36CA3P	0.0%	0.0%	0.0%	0.0%	0.3%	0.6%
	36CA4	2.4%	3.8%	1.6%	0.7%	0.6%	1.5%
	36CA4S	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%
18R	18RA2	1.0%	0.9%	3.7%	0.0%	1.9%	3.3%
	18RA3	1.0%	0.9%	3.5%	0.0%	1.7%	3.1%
	18RA3B	1.4%	1.3%	5.0%	0.0%	2.5%	4.4%
	18RA4	2.2%	2.0%	7.9%	0.0%	3.9%	6.9%
	18RA3C	0.5%	0.4%	1.7%	0.0%	0.9%	1.5%
36L	36LA1A	2.5%	1.6%	7.5%	0.0%	3.5%	6.7%
	36LA1B	0.5%	0.3%	1.4%	0.0%	0.6%	1.2%
	36LA1C	0.4%	0.3%	1.2%	0.0%	0.6%	1.1%
	36LA2	0.5%	0.3%	1.6%	0.0%	0.7%	1.4%
	36LA4	2.7%	1.7%	8.1%	0.0%	3.8%	7.2%

Table C-3 *(continued)*
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING (2015) AND FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

RUNWAY END	TRACK ID	LARGE CARGO JETS	HEAVY JETS	LARGE PASSENGER JETS	MILITARY AIRCRAFT	PROPELLER AIRCRAFT	REGIONAL / BUSINESS JETS
05	05A1	0.5%	0.0%	0.1%	0.0%	0.1%	0.3%
	05A3	0.9%	0.0%	0.3%	0.0%	0.3%	0.7%
	05A4	0.9%	0.0%	0.3%	0.0%	0.3%	0.7%
23	23A1	16.2%	1.6%	11.0%	6.1%	17.3%	10.9%
	23A2	7.9%	0.8%	5.4%	3.0%	8.4%	5.3%
	23A3A	3.8%	0.4%	2.6%	1.4%	4.0%	2.6%
	23A3B	3.8%	0.4%	2.6%	1.4%	4.0%	2.6%
	23A4	2.8%	0.3%	1.9%	1.0%	2.9%	1.9%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2015.

Table C-4
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING (2015) AND FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

RUNWAY END	TRACK ID	LARGE CARGO JETS	HEAVY JETS	LARGE PASSENGER JETS	MILITARY AIRCRAFT	PROPELLER AIRCRAFT	REGIONAL / BUSINESS JETS
18L	18LD1	13.8%	15.0%	11.1%	14.7%	0.8%	11.6%
	18LD2	6.6%	3.6%	2.6%	7.0%	0.8%	5.5%
	18LD2B	2.0%	2.1%	1.6%	2.1%	0.0%	1.7%
	18LD2P	0.0%	0.0%	0.0%	0.0%	27.2%	0.0%
	18LD3	7.6%	8.2%	6.1%	8.1%	9.8%	6.3%
	18LD4	3.0%	3.2%	2.4%	3.2%	0.4%	2.5%
	18LD4P	0.0%	0.0%	0.0%	0.0%	3.4%	0.0%
	18LD2R	0.0%	3.6%	2.6%	0.0%	0.0%	0.0%
36R	36RD1	0.8%	0.8%	0.6%	1.4%	0.3%	0.5%
	36RD2A	15.1%	9.0%	6.6%	25.9%	0.1%	9.0%
	36RD2B	2.2%	2.1%	1.5%	3.8%	0.1%	1.4%
	36RD2P	0.0%	0.0%	0.0%	0.0%	24.3%	0.3%
	36RD3	8.8%	8.3%	6.1%	15.0%	0.6%	5.4%
	36RD4	0.5%	0.5%	0.4%	0.9%	0.1%	0.3%
	36RD2R	0.0%	5.2%	3.8%	0.0%	0.0%	0.0%
18C	18CD1	5.9%	2.4%	5.5%	1.4%	2.9%	7.9%
	18CD1V	1.8%	1.1%	2.6%	0.5%	0.9%	2.4%
	18CD2	0.2%	0.1%	0.3%	0.0%	0.1%	0.3%
	18CD3	1.0%	0.6%	1.4%	0.2%	0.5%	1.4%
	18CD4A	5.7%	3.5%	8.1%	1.4%	1.1%	7.6%
	18CD4B	5.7%	3.5%	8.1%	1.4%	1.1%	7.6%
	18CD4P	0.0%	0.0%	0.0%	0.0%	3.4%	0.0%
	18CD1R	0.0%	1.2%	2.9%	0.0%	0.0%	0.0%
36C	36CD1	5.5%	8.2%	7.7%	3.2%	0.7%	8.0%
	36CD1P	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%
	36CD1V	1.5%	2.3%	2.2%	0.9%	1.3%	2.2%
	36CD2	0.2%	0.3%	0.2%	0.1%	0.1%	0.2%
	36CD3	1.4%	2.1%	1.9%	0.8%	1.2%	2.0%
	36CD4	6.0%	5.2%	4.8%	3.5%	0.1%	8.7%
	36CD4A	0.3%	0.5%	0.5%	0.2%	0.1%	0.5%
	36CD4B	2.2%	3.3%	3.1%	1.3%	0.1%	3.0%
	36CD4P	0.0%	0.0%	0.0%	0.0%	9.4%	0.2%
	36CD4R	0.0%	3.9%	3.6%	0.0%	0.0%	0.0%

Table C-4 *(continued)*
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING (2015) AND FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

RUNWAY END	TRACK ID	LARGE CARGO JETS	HEAVY JETS	LARGE PASSENGER JETS	MILITARY AIRCRAFT	PROPELLER AIRCRAFT	REGIONAL / BUSINESS JETS
05	05D1	0.9%	0.2%	0.6%	0.0%	0.0%	1.4%
	05D2P	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	05D3P	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	23D1	0.5%	0.1%	0.3%	1.0%	0.3%	0.7%
	23D1P	0.0%	0.0%	0.0%	0.0%	2.1%	0.0%
	23D2	0.1%	0.0%	0.1%	0.2%	0.1%	0.0%
	23D2P	0.0%	0.0%	0.0%	0.0%	0.4%	0.1%
	23D3	0.4%	0.1%	0.3%	0.9%	2.1%	0.6%
	23D4	0.4%	0.1%	0.3%	0.9%	0.3%	0.6%
	23D4P	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2015.

Aircraft Weight and Trip Length

Aircraft weight upon departure is a factor in the dispersion of noise because it impacts the rate at which an aircraft is able to climb. Generally, heavier aircraft have a slower rate of climb and a wider dispersion of noise along their flight routes. Where specific aircraft weights are unknown, the INM uses the distance flown to the first stop as a surrogate for the weight, by assuming that the weight has a direct relationship with the fuel load necessary to reach the first destination. The INM groups trip lengths into nine stage categories and assigns standard aircraft weights to each stage category. These categories are:

Stage Category	Stage Length
1	0-500 nautical miles
2	500-1000 nautical miles
3	1000-1500 nautical miles
4	1500-2500 nautical miles
5	2500-3500 nautical miles
6	3500-4500 nautical miles
7	4500-5500 nautical miles
8	5500-6500 nautical miles
9	6500+ nautical miles

The trip lengths modeled for the Existing (2015) Noise Contour at CLT are based upon a review of aircraft departures from March 2013 through February 2014. **Table C-5** indicates the proportion of the operations that fell within each of the nine trip length categories during this time period. For the 2015 conditions, 16 percent of all heavy jet departures, 63 percent of all large cargo jet departures, 62 percent of large passenger jet departures, 89 percent regional/business jet departures, and 100 percent of all propeller and military aircraft departures operated to destinations with a stage length of one (0 to 500 nautical miles).

Table C-5
DEPARTURE TRIP LENGTH DISTRIBUTION
EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

STAGE LENGTH CATEGORY	HEAVY JETS	LARGE CARGO JETS	LARGE PASSENGER JETS	REGIONAL / BUSINESS JETS	PROPELLER AIRCRAFT	MILITARY AIRCRAFT
1	16%	63%	62%	89%	100%	100%
2	9%	13%	28%	11%	0%	0%
3	7%	10%	3%	0%	0%	0%
4	1%	4%	7%	0%	0%	0%
5	13%	0%	0%	0%	0%	0%
6	54%	6%	0%	0%	0%	0%
7	0%	5%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Source: FAA radar data, Landrum & Brown analysis, 2015.

Aircraft Profiles

Aircraft departure profiles for the Existing (2015) Noise Contour are based on the INM standard profiles for the above described distance to weight relationship. Arrival profiles were modeled using INM standard profiles.

Noise Measurement Program

A noise measurement program was conducted at CLT in August 2014. The program was focused on obtaining noise and operational data on single aircraft events for comparison to the INM database to determine if the default method of assigning noise profiles in the INM matched actual conditions. The noise measurement data was correlated to radar data and it was determined that no adjustments to the standard INM aircraft noise profiles was warranted.

Ground Run-up Noise

Engine run-ups are conducted at CLT for maintenance purposes on civil and military aircraft at aircraft maintenance ramps or on the taxiways at CLT. Civil engine run-up locations on the taxiways are identified in the FAA Tower Order (Order CTL 1050.1j). Civil run-ups typically occur at one of five locations on the airfield at CLT as listed below and shown on **Exhibit C-20**:

- Airline Maintenance Facility
- Taxiway C near runway intersection C2,
- Taxiway D near the intersection with Taxiway M,
- Taxiway E near runway intersection E2, and
- Taxiway E near runway intersection E9.

Military run-ups occur at the North Carolina Air National Guard (NCANG) ramp. Engine run-ups activity was modeled based on estimates of run-up activity provided by airline and NCANG personnel, as well as a review of run-up activity data at other typical hub airports. On average, it is estimated that approximately 11 run-ups per day occur at CLT, or 77 run-ups per week. It was assumed that each civil run-up is conducted at low power (50% thrust) for up to 20 minutes, and at high power (100% thrust) for up to three additional minutes, for a total duration of 23 minutes per run-up. In addition, it was estimated that military run-ups occur at high power for 35 minutes per run-up.

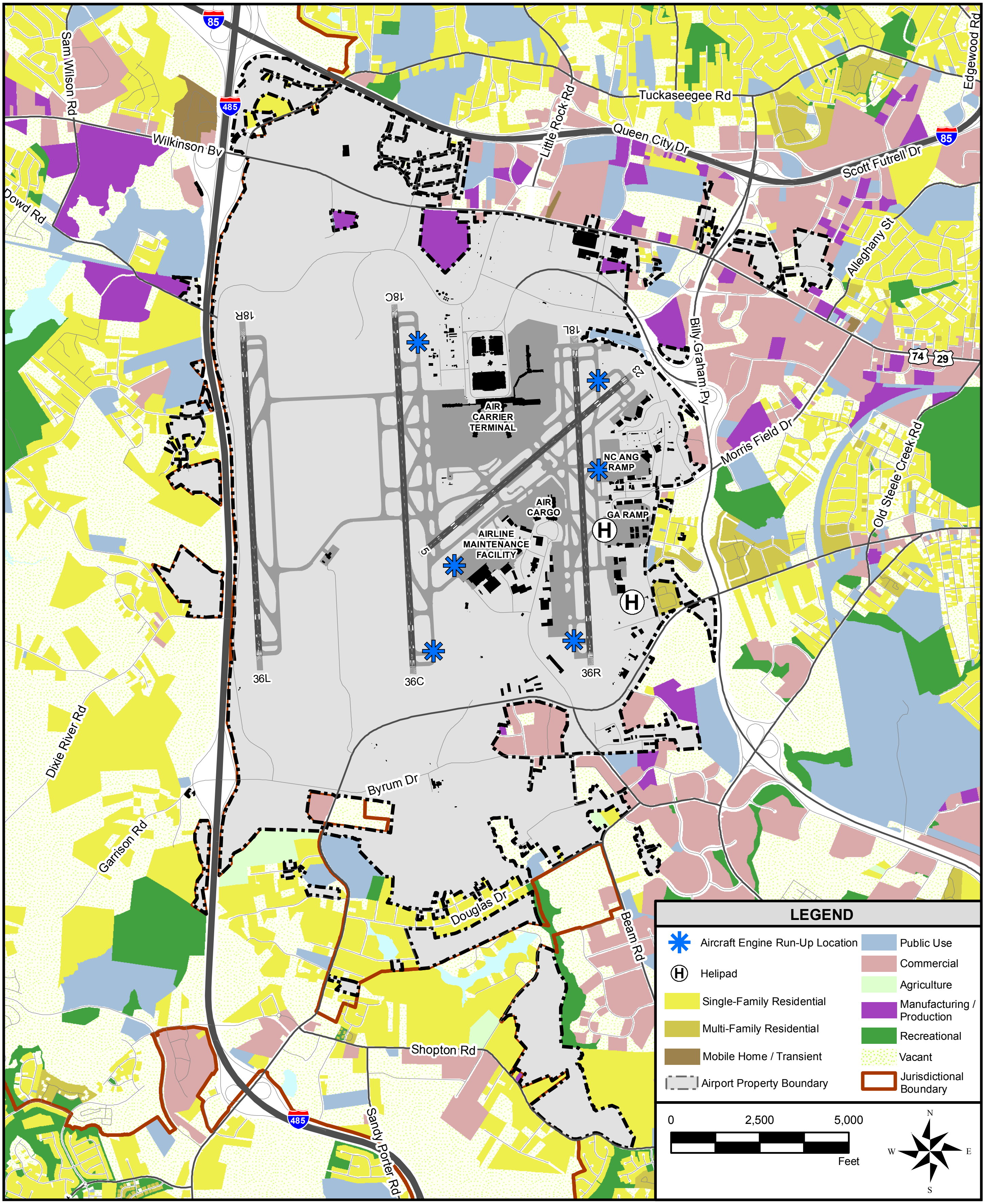
It was assumed that approximately 60 percent of all civil run-ups and 100 percent of all military run-ups occur during the daytime (7:00 am to 9:59 pm). It was also assumed that 80 percent of civil run-up activity occurs at the airline maintenance facility and the other 20 percent is divided evenly among the other four run-up locations on Taxiways C, D, and E as shown in Exhibit 11. Aircraft types for which run-ups were modeled represent the most common aircraft that are operated at CLT by civil and military operators. **Table C-6** shows the number, types, durations and times of day of engine run-ups that were modeled for the Existing (2015) Noise Contour.

Table C-6
AIRCRAFT ENGINE RUN-UPS - EXISTING (2015) CONDITIONS
Charlotte Douglas International Airport

INM AIRCRAFT ID	MODELED RUN-UPS PER DAY			
	DAYTIME	NIGHTTIME	TOTAL RUN-UPS	TOTAL DURATION *(H:MM:SS)*
CIVIL RUN-UPS				
A319-131	1.0	0.7	1.7	0:39:13
A320-211	0.5	0.3	0.8	0:17:46
A321-232	1.1	0.8	1.9	0:43:13
CLREGJ	1.5	1.0	2.6	0:59:04
CRJ9-ER	1.8	1.2	2.9	1:07:21
DHC830	0.4	0.3	0.6	0:14:48
EMB170	0.3	0.2	0.5	0:11:36
Subtotal	*6.6*	*4.4*	*11.0*	*4:13:00*
MILITARY RUN-UPS				
C130HP	0.4	0.0	0.4	0:15:00
Subtotal	*0.4*	*0.0*	*0.4*	*0:15:00*
Total	**7.0**	**4.4**	**11.4**	**4:28:00**

Source: FAA Order CLT 7110.65 Change 2, discussion with airline and NCANG personnel, and Landrum & Brown analysis, 2015.

The results of the Existing (2015) Noise Contour modeling are included in Chapter Three. The official NEMs are included in a pocket inside the back cover of this document.



Charlotte·Douglas INTERNATIONAL AIRPORT

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Aircraft Run-Up Locations

EXHIBIT: **C-20**

Date: 9/3/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\C-20_Runup Locations.mxd

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C.5.3 FUTURE (2020) NOISE CONTOUR MODELING INPUT DATA

Runway Definition

No changes to runway configuration are expected at CLT by 2020; therefore the runway layout discussed for the 2015 condition was also used to model the Future (2020) Noise Contour.

Number of Operations and Fleet Mix

The Future (2020) Noise Contour operating levels are based upon the FAA-approved forecast prepared for this NEM Update Study. The forecast is based upon aviation industry trends and specific airline activity at CLT. The Future (2020) conditions include 686,030 annual operations or 1,879.5 average-annual day operations, an increase of 24 percent from the Existing (2015) Noise Contour operating levels. **Table C-7** provides a summary of the average daily operations and fleet mix at CLT, organized by aircraft category, operation type, and time of day.

Table C-7
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT TYPE
FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
HEAVY JETS						
Boeing 767-300	767300	1.4	0.1	1.3	0.2	3.0
Airbus A330-300	A330-301	3.6	0.2	3.3	0.4	7.5
Airbus A330-300	A330-343	3.5	0.2	3.3	0.4	7.4
Airbus A340-200	A340-211	0.1	0.0	0.1	0.0	0.3
Airbus A340-600	A340-642	0.6	0.0	0.5	0.1	1.2
Airbus A350	7773ER	2.9	0.2	2.8	0.3	6.2
Subtotal		*12.2*	*0.6*	*11.4*	*1.4*	*25.6*
Large Cargo Jets						
Boeing 727-200 (hushkitted)	727EM2	0.0	0.0	0.0	0.0	0.0
Boeing 767-200	767CF6	1.5	0.3	1.4	0.4	3.7
Airbus A300-600	A300-622R	2.2	0.4	2.0	0.6	5.2
Airbus A310-300	A310-304	0.0	0.0	0.0	0.0	0.0
Douglas DC10-10	DC1010	0.0	0.0	0.0	0.0	0.0
Douglas DC10-30	DC1030	0.0	0.0	0.0	0.0	0.0
Subtotal		*3.7*	*0.7*	*3.4*	*1.1*	*8.8*

Table C-7 *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT TYPE
FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
LARGE PASSENGER JETS						
Boeing 717-200	717200	1.6	0.2	1.5	0.2	3.4
Boeing 737-300	737300	0.3	0.0	0.3	0.0	0.6
Boeing 737-400	737400	0.0	0.0	0.0	0.0	0.0
Boeing 737-700	737700	4.8	0.5	4.7	0.6	10.6
Boeing 737-800	737800	4.8	0.5	4.6	0.6	10.5
Boeing 737-900	737900	0.1	0.0	0.1	0.0	0.2
Boeing 757-200	757PW	5.3	1.0	4.8	1.5	12.6
Boeing 757-200	757RR	3.5	0.7	3.1	1.0	8.3
Boeing 757-300	757300	0.0	0.0	0.0	0.0	0.1
Airbus A319-100	A319-131	94.2	9.3	91.1	12.4	207.1
Airbus A320-200	A320-211	12.5	1.2	12.1	1.7	27.6
Airbus A320-200	A320-232	37.6	3.7	36.4	5.0	82.7
Airbus A321-200	A321-232	158.5	15.7	153.2	20.9	348.2
Canadair CRJ701	CRJ701	77.3	7.6	74.7	10.2	169.8
Canadair CRJ900	CRJ9-ER	125.8	12.4	121.7	16.6	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.0	0.0	0.0	0.0	0.0
Douglas DC9-50 (hushkitted)	DC95HW	0.4	0.0	0.3	0.0	0.8
Embraer EMB-170	EMB170	2.8	0.3	2.7	0.4	6.1
Embraer EMB-175	EMB175	42.0	4.2	40.6	5.5	92.3
Embraer EMB-190	EMB190	5.4	0.5	5.2	0.7	11.9
McDonnell-Douglas MD82	MD82	0.0	0.0	0.0	0.0	0.0
McDonnell-Douglas MD83	MD83	0.2	0.0	0.2	0.0	0.4
McDonnell-Douglas MD88	MD88	2.0	0.2	1.9	0.3	4.4
McDonnell-Douglas MD90	MD9025	7.0	0.7	6.8	0.9	15.4
Subtotal		*585.9*	*58.7*	*566.0*	*78.6*	*1,289.3*

Table C-7 *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT TYPE
FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
REGIONAL / BUSINESS JETS						
Business Jet	CIT3	0.4	0.1	0.4	0.1	0.9
Business Jet	CL600	2.5	0.3	2.5	0.4	5.7
Business Jet	CL601	1.7	0.2	1.7	0.3	3.9
Canadair Regional Jet CRJ-200	CLREGJ	116.0	15.8	113.3	18.4	263.5
Business Jet	CNA500	1.5	0.2	1.5	0.2	3.4
Business Jet	CNA510	0.8	0.1	0.8	0.1	1.8
Business Jet	CNA55B	1.1	0.1	1.0	0.2	2.4
Business Jet	CNA750	0.9	0.1	0.8	0.1	1.9
Dornier 328 Jet	D328J	0.5	0.1	0.5	0.1	1.1
Embraer EMB-140	EMB140	9.6	1.3	9.4	1.5	21.9
Embraer EMB-145	EMB145	18.4	2.5	18.0	2.9	41.8
Embraer EMB-145	EMB14L	0.0	0.0	0.0	0.0	0.0
Business Jet	FAL20	2.5	0.3	2.5	0.4	5.7
Business Jet	GIV	2.6	0.4	2.6	0.4	6.0
Business Jet	GV	1.7	0.2	1.7	0.3	3.9
Business Jet	LEAR35	8.8	1.2	8.6	1.4	20.0
Business Jet	MU3001	7.4	1.0	7.3	1.2	16.9
Subtotal		*176.4*	*24.1*	*172.4*	*28.1*	*400.9*
PROPELLER AIRCRAFT						
Twin-Engine Piston	BEC58P	2.2	0.2	2.1	0.3	4.7
Single-Engine Piston	CNA172	0.1	0.0	0.1	0.0	0.3
Single-Engine Piston	CNA206	0.1	0.0	0.1	0.0	0.3
Single-Engine Piston	CNA208	0.4	0.0	0.4	0.1	0.9
Single-Engine Piston	CNA210	0.6	0.1	0.6	0.1	1.3
Twin-Engine Turboprop	CNA441	1.2	0.1	1.2	0.1	2.6
DASH 6	DHC6	1.9	0.2	1.8	0.2	4.1
DASH 8-100	DHC8	19.3	1.7	18.7	2.3	42.0
DASH 8-300/400	DHC830	39.2	3.4	37.9	4.7	85.2
Single-Engine Piston	GASEPF	1.9	0.2	1.8	0.2	4.1
Single-Engine Piston	GASEPV	1.3	0.1	1.3	0.2	2.9
Twin-Engine Piston	PA31	0.3	0.0	0.3	0.0	0.6
Subtotal		*68.5*	*6.0*	*66.3*	*8.2*	*149.0*

Table C-7 *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT TYPE
FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

AIRCRAFT TYPE	INM ID	ARRIVALS		DEPARTURES		TOTAL
		DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME	
MILITARY AIRCRAFT						
Lockheed C130 Hercules	C130HP	1.9	0.0	1.9	0.0	3.8
Subtotal		*1.9*	*0.0*	*1.9*	*0.0*	*3.8*
HELICOPTERS						
Augusta A-109	A109	0.8	0.1	0.8	0.1	1.7
Bell 407 Jet Ranger	B407	0.1	0.0	0.1	0.0	0.3
Subtotal		*0.9*	*0.9*	*0.1*	*0.9*	*0.1*
Grand Total		**849.5**	**90.2**	**822.3**	**117.5**	**1,879.5**

Note: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Source: Forecast of Aviation Activity, CLT Flight Tracking System Data, Landrum & Brown, 2015.

Runway End Utilization:

Average-annual day runway end utilization in 2020 is expected to remain similar to 2015 conditions. Therefore, runway end utilization percentages modeled for the Future (2020) conditions are the same as the Existing (2015) conditions as shown in Table C-2.

Flight Tracks

No changes to flight tracks locations or utilization percentages are expected to occur by 2020, therefore flight track locations modeled for the Existing (2015) Noise Contour, and shown in Exhibits C-11 through C-19, remain the same for the Future (2020) Noise Contour modeling. Similarly, flight track percentages modeled for the Future (2015) Noise Contour, shown in Table C-3 and Table- 4, remain the same for the Future (2020) Noise Contour modeling.

Aircraft Weight and Trip Length

The trip lengths flown from CLT are based upon projected operations for the future conditions. There are expected to be no significant changes in the destinations served by airlines from CLT, however changes in the number of operations and fleet mix results in small variations in the departure trip length distributions for the 2020 conditions as shown in **Table C-8**. For the 2020 conditions, 22 percent of all heavy jet departures, 65 percent of all large cargo jet departures, 63 percent of all large passenger jet departures, 92 percent of all regional jet departures, and 100 percent of all propeller and military aircraft departures were modeled with a stage length of one (0 to 500 nautical miles).

Table C-8
DEPARTURE TRIP LENGTH DISTRIBUTION - FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

STAGE LENGTH CATEGORY	HEAVY PASSENGER JETS	CARGO JETS	LARGE PASSENGER JETS	REGIONAL / BUSINESS JETS	PROPELLER AIRCRAFT	MILITARY AIRCRAFT
1	22%	65%	63%	91%	100%	100%
2	10%	11%	25%	9%	0%	0%
3	7%	12%	4%	0%	0%	0%
4	2%	4%	8%	0%	0%	0%
5	12%	0%	0%	0%	0%	0%
6	47%	3%	0%	0%	0%	0%
7	0%	6%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Source: Official Airline Guide, Landrum & Brown, 2015.

Aircraft Profiles

Aircraft departure profiles for the Future (2020) Noise Contour are based on the INM standard profiles for the above described distance to weight relationship. Arrival profiles were modeled using INM standard profiles.

Ground Run-up Noise

Engine run-up activity was projected for the 2020 conditions based upon the forecast increase in operations of civil and military aircraft at CLT. On average, approximately 14.3 run-ups are expected to occur per day at CLT in 2020, or approximately 100 run-ups per week. Estimates of run-up times, durations and locations remained the same as described for the 2015 conditions. The number, types, durations and times of day of engine run-ups that were modeled for the Future (2020) Noise Contour are shown in **Table C-9**.

The results of the Future (2020) Noise Contour modeling are included in Chapter 4. The official NEMs are included in a pocket inside the back cover of this document.

Table C-9
GROUND RUN-UP OPERATIONS - FUTURE (2020) CONDITIONS
Charlotte Douglas International Airport

INM AIRCRAFT ID	**MODELED RUN-UPS PER DAY**			
	DAYTIME	**NIGHTTIME**	**TOTAL**	**TOTAL DURATION *(H:MM:SS)***
CIVIL RUN-UPS				
A319-131	1.3	0.8	2.1	0:48:34
A320-211	0.6	0.4	1.0	0:22:00
A321-232	1.4	0.9	2.3	0:53:32
CLREGJ	1.9	1.3	3.2	1:13:10
CRJ9-ER	2.2	1.5	3.6	1:23:25
DHC830	0.5	0.3	0.8	0:18:20
EMB170	0.4	0.2	0.6	0:14:22
Subtotal	*8.2*	*5.4*	*13.6*	*5:13:22*
MILITARY RUN-UPS				
C130HP	0.7	0.0	0.7	0:23:17
Subtotal	*0.7*	*0.0*	*0.7*	*0:23:17*
Total	**8.8**	**5.4**	**14.3**	**5:36:39**

Source: FAA Order CLT 7110.65 Change 2, Landrum & Brown analysis, 2015.

C.6 COMPARABILITY OF CONDITIONS

C.6.1 EXISTING (2015) NEM

Total operations used for modeling the Existing (2015) Noise Contour was based on ATCT counts for the period from March 2013 through February 2014, which was the most recent twelve months of data available when the noise modeling began. During that twelve-month period, 553,854 operations occurred at CLT. Specific aircraft types, times of operation, runway use, and flight tracks were developed from airport operations monitoring system data from that same time period. This data included the number of arrival and departure operations by individual types of aircraft during daytime and nighttime periods, the distribution of aircraft activities among the runway ends, and the distribution of aircraft along the flight paths leading to or from each runway. Additional flight tracking data from March 2014 through August 2014 was reviewed to ensure runway use and flight track data was up-to-date.[10]

[10] In July 2013, FAA suspended converging arrivals to Runway 23 and Runways 18L and 18R while new ATCT safety procedures were developed. During that time, a greater percentage of arrivals occurred on Runways 18L and 18R and less occurred on Runway 23. In March 2014, ATCT began to implement new arrival procedures that once again allowed converging arrivals to Runway 23. A review of radar data from March 2014 through August 2014 shows that the implementation of this procedure has increased the occurrence of arrivals to Runway 23. Therefore, runway end utilization percentages were adjusted for the Existing (2015) and Future (2020) noise exposure

The FAA's Terminal Area Forecast (TAF), issued in January 2015, forecasts 543,148 total annual operations in fiscal year 2015 at CLT. The difference between the operating levels used to prepare the Existing (2015) Noise Contour and the forecasted operating levels for fiscal year 2015 from the latest TAF is less than two percent. No significant changes in fleet mix, the ratio of daytime to nighttime operations, runway use patterns, or flight corridors have occurred at CLT since the Existing (2015) Noise Contour was prepared.

C.6.2 FUTURE (2020) NEM

The Future (2020) Noise Contour operating levels are based upon the FAA-approved forecast prepared for planning studies at CLT. This forecast was approved by the FAA in April 2014. The forecast is based upon aviation industry trends and specific airline activity at CLT and was developed in consultation with airline representatives from the major carriers at CLT. The Future (2020) conditions include 686,030 annual operations, which was within ten percent of the FAA's 2013 TAF which was issued in January 2014. Subsequent to that, the FAA issued the 2014 TAF in January 2015. The difference between the operating levels used to prepare the Future (2020) Noise Contour and the forecasted operating levels in fiscal year 2020 from the 2014 TAF is greater than ten percent. The largest difference in the two forecasts is within the commercial (air carrier and air taxi) operations. However, in June 2015, the City of Charlotte and airline representatives reconfirmed that the forecasted operating levels used to prepare the Future (2020) NEM are reasonable and reflect anticipated conditions at CLT in 2020. Therefore, the Future (2020) Noise Contour is based on a reasonable forecast of aviation activity within the next five years.

Contours to reflect the increase in arrivals to Runway 23 and a decrease in arrivals to Runways 18L and 18R.

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Appendix D

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APPENDIX D
LAND USE ASSESSMENT METHODOLOGY

Identifying and evaluating land uses within the airport environs is an important step in the Part 150 process. This evaluation is necessary to identify residential and other noise-sensitive land uses within the airport environs. The land use assessment includes examining land use classifications, zoning codes, and development trends within the airport environs; and applying the Federal Aviation Administration (FAA) Part 150 guidelines for land use compatibility and previous land use mitigation efforts conducted by the Charlotte Douglas International Airport (CLT). A Geographic Information System (GIS) land use database was developed to facilitate the identification of land uses that are incompatible with airport operations.

D.1 AIRPORT ENVIRONS

The Airport Environs refers to the regional area that experiences most of the aircraft overflights from an airport. The Airport Environs for CLT is shown in Chapter Two in Exhibit 2-1, *Airport Environs*, and includes portions of the City of Charlotte and unincorporated Mecklenburg County. The Airport Environs, shown on Exhibit 2-1, encompasses an area of approximately 60 square miles. The map includes jurisdictional boundaries, local roads and major highways, Airport property, and significant geographical features. The Airport Environs was delineated based upon previous noise exposure contours as well as radar data showing existing flight tracks. The Airport Environs map extends to the north by approximately 2.2 miles from runway end 18C, to the east by approximately 3.0 miles east of Runway end 23, to the south by approximately 4.4 miles south of Runway end 36C, and approximately 2.0 miles to the west of Runway 18R/36L.

D.1.1 LAND USE MAPPING

Land use data was collected and incorporated into a GIS database that includes jurisdictional boundaries, roads, bodies of water, and other physical features. The database was used to identify existing land use conditions within the airport environs and to identify areas impacted by noise per FAA guidelines. This section describes the methodology for collecting and analyzing land use data.

D.1.2 LAND USE CLASSIFICATIONS

Existing land use data was collected from the local governments within the Airport Environs, including the City of Charlotte and Mecklenburg County. Land uses shown on the exhibits were categorized in terms of the general land use classifications presented in 14 CFR Part 150, which include residential (single, multi-family, and mobile homes), commercial, manufacturing and production, public uses, recreational, and vacant/open space. These land uses were identified based on Mecklenburg County's GIS database and supplemented by aerial photography and field verification. **Table D-1** shows the generalized land use categories and the specific land uses from the Mecklenburg County GIS database that were grouped into these general land use categories. The existing land use patterns within the *Airport Environs* is shown in Exhibit 2-2, Generalized *Existing Land Use* in Chapter Two, *Affected Environment*.

Table D-1
GENERALIZED LAND USE CLASSIFICATIONS
Charlotte Douglas International Airport

GENERALIZED LAND USE CATEGORIES	MECKLENBURG COUNTY GIS LAND USE CATEGORIES
Residential	
Single-Family Residential	Single-Family Detached Housing Single-Family Attached Housing Large Lot Residential
Multi-Family Residential	Multi-Family Housing
Manufactured / Mobile Home	Horizontal Mixed Use – Residential / Non-Residential
Public Use	Civic / Institutional
Commercial	Horizontal Mixed Use Non-Residential
	Office
	Retail
	Warehouse / Distribution
Manufacturing and Production	Industrial
Recreational	Open Space / Recreation
Agricultural[1]	Agriculture
Vacant/Open Space[2]	Vacant

Notes:
1 Agricultural uses are classified as Manufacturing and Production under 14 C.F.R. Part 150 Guidelines but are identified separately for this NEM Update for ease of understanding the land uses neat the Airport.
2 Vacant/Open Space is not an identified use under 14 C.F.R. Part 150 Guidelines but is identified separately for this NEM Update for ease of understanding the land uses near the Airport.
Source: Landrum & Brown, 2015.

D.1.2.1 Land Use Data Compilation

Base mapping information; including roads, county and municipal boundaries, and land use; were compiled using ArcMap, version 10.1. ArcMap is an analytical software program that allows manipulation and analysis of spatial data from a variety of sources.

The base map information was then compared to flight tracks and noise contours generated by the Integrated Noise Model (INM), version 7.0d. Digital road files were obtained from the Mecklenburg County GIS records.

Land parcel data was obtained from Mecklenburg County to identify land uses that would be considered noise-sensitive land per FAA guidelines. The 2010 U.S. Census data, at the tract and block level, was combined with the parcel data to calculate total population based on average household size. An estimated ratio of persons per household was determined based using census data and that ratio was applied to each parcel and the number of dwelling units per parcel. The housing and population incompatibilities within each of the noise contours were determined by overlaying the noise contour and the parcel data using GIS software. The number of residential parcels/structures and population within each DNL noise contour level were then determined by an automated count using the GIS software's built-in capabilities.

D.1.2.2 Noise-Sensitive Public Facilities

Land uses that could be considered incompatible with airport operations include more than just residential uses. FAA guidelines define certain public facilities as noise-sensitive: places of worship, schools (and daycare facilities at which licensed education occurs), nursing homes, libraries, and hospitals. Detailed information on noise-sensitive facilities was collected within the vicinity of CLT. A variety of sources were used to obtain GIS data showing the locations of noise-sensitive public facilities within the airport environs, including Mecklenburg County, ESRI, and past studies at CLT. This data was verified using aerial imagery and field verification. Within this area there are 29 schools, 74 places of worship, three daycare facilities, [1] and one library as shown on Exhibit D-1, Existing Noise-Sensitive Public Facilities, which identifies each noise-sensitive facility by a unique alpha-numeric "Map ID" and Table D-1 which lists the facilities by name and corresponding Map ID.

D.1.2.3 Existing Historic Properties

Per FAA guidance, historic properties in the vicinity of CLT have been identified and displayed on the NEMs. Historic properties include those properties that are listed on the National Register of Historic Places (NRHP) and properties that are listed with the North Carolina State Historic Preservation Office that have been surveyed and determined to be potentially-eligible for inclusion on the NRHP. There are two properties listed on the NRHP within this area,[2] and twenty-two properties which are potentially eligible or determined eligible as shown on **Exhibit D-2** and listed in **Table D-2**.

[1] Includes daycare facilities were licensed education occurs as listed by Mecklenburg County.

[2] U.S. National Park Service, National Register of Historic Places Database. Online at: http://gis.ncdcr.gov/hpoweb/. 2014.

Table D-1
NOISE-SENSITIVE PUBLIC FACILITIES
Charlotte Douglas International Airport

MAP ID	NAME
SCHOOLS	
S-1	Amay James Pre-K
S-2	Angels Christian Academy
S-3	Ashley Park Elementary
S-4	Barringer Academic Center Elementary
S-5	Berewick Elementary
S-6	Berryhill Elementary School
S-7	Bishop Spaugh Community Academy Middle
S-8	Character Builders Christian Academy
S-9	E. E. Waddell Academy
S-10	Harding University High
S-11	Kennedy Middle School
S-12	Liberty Baptist Academy
S-13	Nations Ford Christian Academy
S-14	Olympic High School - Biotechnology Health and Public Administration
S-15	Olympic High School - International Business and Communication
S-16	Olympic High School - International Studies and Global Economic
S-17	Olympic High School - Math Engineering And Sciences High
S-18	Olympic High School - Renaissance High
S-19	Paw Creek Christian Academy
S-20	Phillip O. Barry School of Technology
S-21	Preschool
S-22	Reid Park Elementary
S-23	Rod Of God Christian
S-24	Steele Creek Elementary School
S-25	Thomasboro Elementary School
S-26	Tuckaseegee Elementary
S-27	West Mecklenburg High
S-28	Westerly Hills Elementary
S-29	Wilson Middle
LIBRARY	
L-1	West Boulevard
PLACES OF WORSHIP	
W-1	Abandonment Building
W-2	Aldersgate Methodist Church
W-3	Berryhill Baptist Church
W-4	Bethany Missionary Baptist Church
W-5	Bethel Baptist Church
W-6	Big Springs Methodist Church

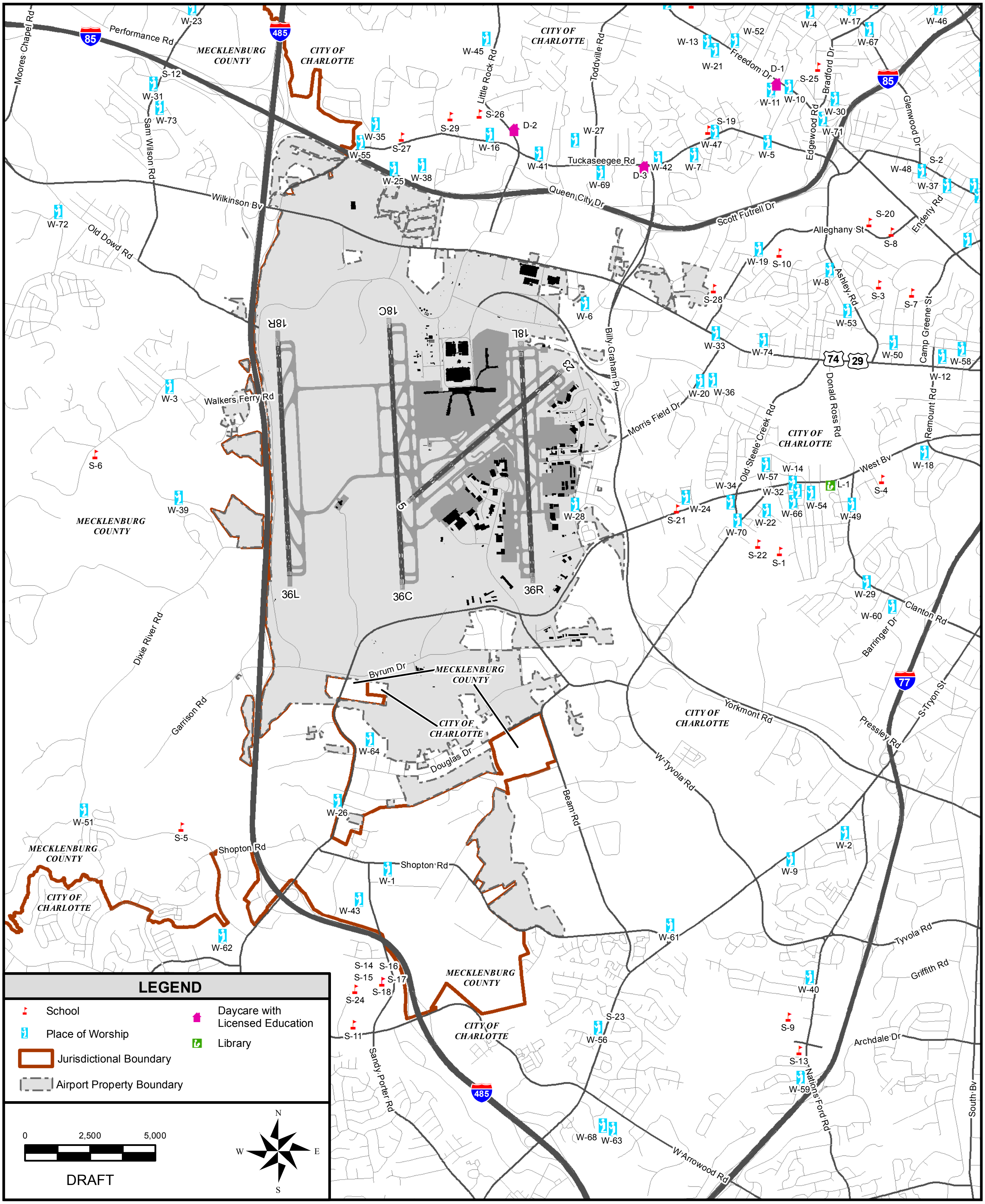
Table D-1, *(continued)*
NOISE-SENSITIVE PUBLIC FACILITIES
Charlotte Douglas International Airport

MAP ID	NAME
W-7	Blessed Assurance Community Church
W-8	Calvary Baptist Church of Charlotte
W-9	Charlotte Church of Christ
W-10	Charlotte Freedom Christian Center
W-11	Charlotte Hmong Alliance Church
W-12	Christ Presbyterian Church
W-13	Christ Resurrection Church
W-14	Christian Mission Baptist Church
W-15	Church of The Lord Jesus Christ
W-16	Covenant United Methodist Church
W-17	Cross Roads Church
W-18	First Mt Zion Baptist
W-19	First Wesleyan Methodist Church
W-20	Firstborn Church Of Jesus Christ
W-21	Forest Lawn West
W-22	Galilee Baptist Church
W-23	Garden Memorial Presbyterian Church
W-24	Greater Hughes and Highways Evangelical Church
W-25	Harvest Church Of Charlotte
W-26	Horizon Christian Fellowship Church
W-27	Iglesia Nuestra Senora de Gualaloupe
W-28	Jackson Park Ministry
W-29	Jehovah's Witness South Unit
W-30	Lao Thai Baptist Church
W-31	Liberty Baptist Church
W-32	Love Divine Church
W-33	Love of God Ministry
W-34	Metropolitan United
W-35	Montagnard Alliance Church
W-36	Moore Sanctuary AME Zion Church
W-37	Mt. Carmel Baptist Church
W-38	Mt. Carmel Church
W-39	Mt. Olive United Presbyterian Church
W-40	Mt. Zion Pentecostal Holiness Church
W-41	Mulberry Baptist
W-42	Mulberry Presbyterian Church
W-43	Nah Tho Thahn St Joseph's Vietnamese Catholic
W-44	Nazareth Outreach Baptist
W-45	New Bethel Church Ministries
W-46	New Outreach Christian Center

Table D-1, *(continued)*
NOISE-SENSITIVE PUBLIC FACILITIES
Charlotte Douglas International Airport

MAP ID	NAME
W-47	Paw Creek Ministries
W-48	Prayer & Deliverance Ministries
W-49	Progressive Baptist Church
W-50	Purcell Methodist Church
W-51	Ramoth A M E Zion Church
W-52	Ranch Road Church of God
W-53	Redeemer Evangelical
W-54	Revelation Pentecostal Holiness Church
W-55	Ridgeview Baptist Church
W-56	Rod of God Center Inc.
W-57	Shiloh Baptist Church
W-58	Shiloh Institutional Baptist Church
W-59	Southview Baptist Church
W-60	St Marks Methodist Church
W-61	Steele Creek A M E Church
W-62	Steele Creek Baptist Church
W-63	Steele Creek Church Of Charlotte
W-64	Steele Creek Presbyterian Church
W-65	Temple Church
W-66	The Church of God Of Prophecy
W-67	The Temple of The Living Word
W-68	Trinity Baptist Church
W-69	Trinity Church of The Nazareth
W-70	University Memorial Baptist Church
W-71	Victory Missionary Church
W-72	West Mecklenburg Baptist Church
W-73	Westmoreland Baptist Church of Charlotte Inc
W-74	Westview Baptist Church
DAYCARES (WITH LICENSED EDUCATION PROGRAM)	
D-1	Absolute Child Care
D-2	Beginning Years Daycare
D-3	Humpty Dumpty Child Care Academy

Source: Mecklenburg County, Landrum & Brown, 2014.



Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Existing Noise-Sensitive Facilities

EXHIBIT:
D-1

Charlotte·Douglas International Airport

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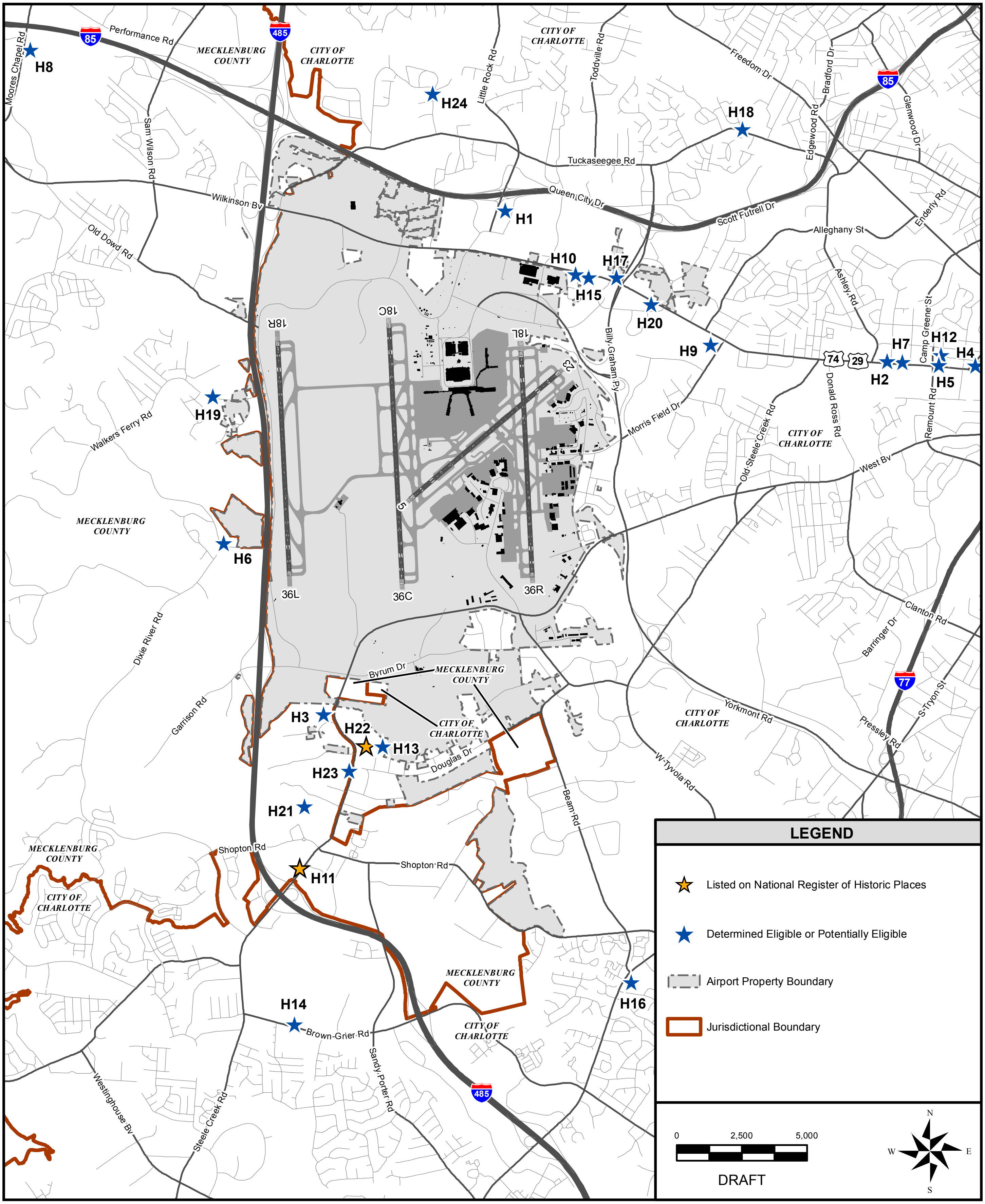

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Historic Resources

EXHIBIT:
D-2

Date: 9/2/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\D-2_Historic Resources.mxd

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Table D-2,
HISTORIC SITES
Charlotte Douglas International Airport

MAP ID	SITE NAME
H1	Akers Motor Lines Inc.
H2	Bar-B-Que King Drive In
H3	Byrum-Croft House
H4	C.W. Kirkland Company
H5	Camp Greene Memorial
H6	Cooper Log House
H7	Dairy Queen
H8	Dr. Sandifer House
H9	Ford Motor Company Automotive Parts Distribution Center (TICO Tire Company)
H10	Gas Station (Tudor Revival)
H11	Hayes-Bynum Store and Shopton Historic District
H12	James C. Dowd House
H13	John Douglas House
H14	John Grier House
H15	McCoy Service Station
H16	McDowell House
H17	Oakden Motel
H18	Richard Wearn House
H19	Rogers House
H20	Split Rail Lodge
H21	Spratt-Grier Farm
H22	Steele Creek Presbyterian Church
H23	Steele Creek Presbyterian Church Manse
H24	W. D. Beatty House

Source: U.S. National Park Service and North Carolina State Historic Preservation Office.

D.1.3 FUTURE LAND USE, ZONING, AND DEVELOPMENT

Identifying development trends and potential future land use is an important step in a noise compatibility assessment to determine the potential for new incompatible development that may occur. Future development trends are described in the following sections based on zoning and planned subdivision data from the Mecklenburg County GIS database[3].

[3] Mecklenburg County GIS Data, Available online at: http://maps.co.mecklenburg.nc.us/openmapping/data.html. Planned subdivision data includes parcel lines for preliminary plans, from digital submittals of subdivisions by surveying companies.

D.1.3.2 Future Land Use Planning

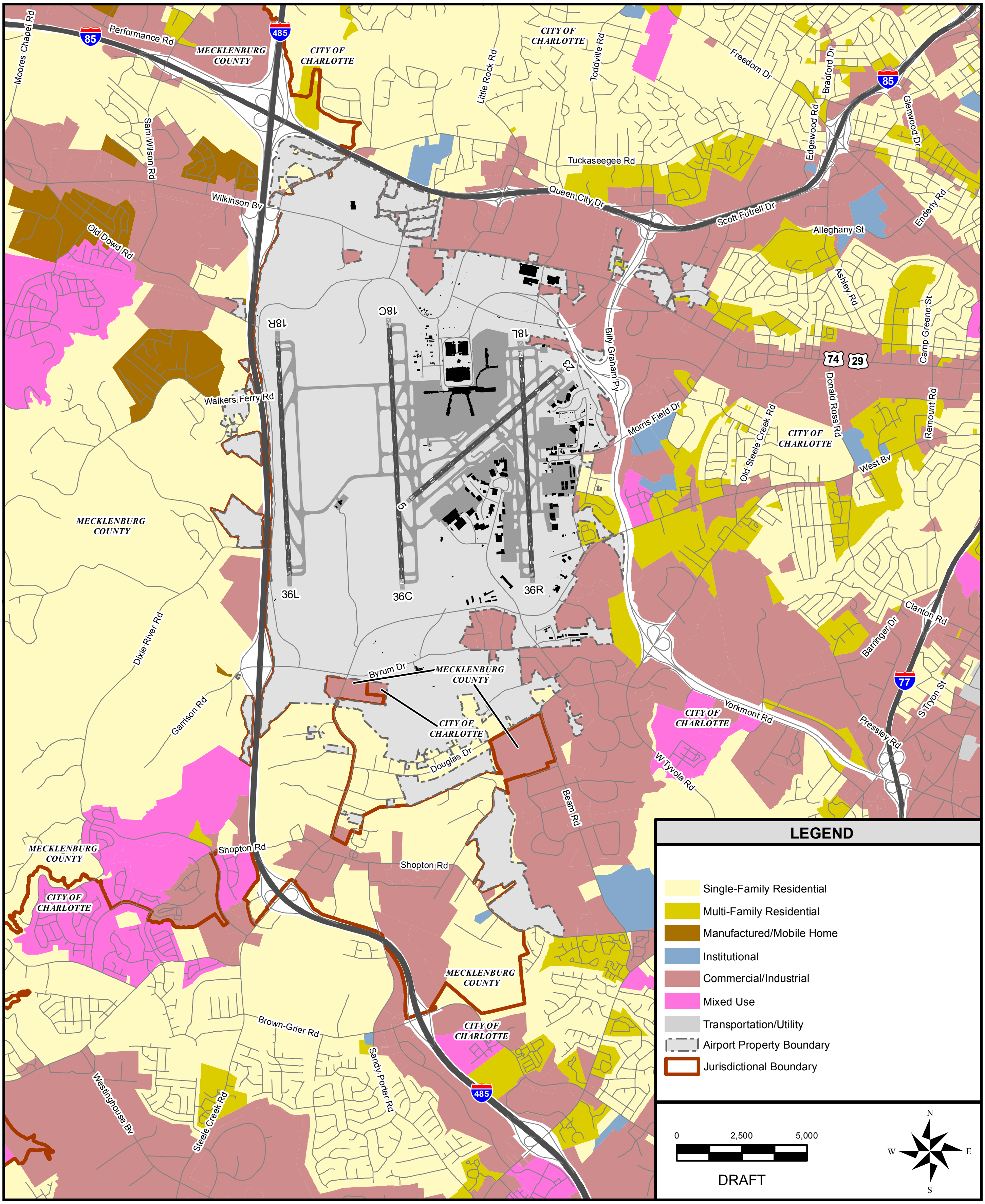
Future land use plans are policy documents to guide future zoning and land subdivision decisions. In Charlotte-Mecklenburg County, future land use planning policies are included in District and Area plans that identify policies and recommendations for specific areas of the City and County. Future land use planning serves as the guidance for local zoning and subdivision approvals.

D.1.3.2 Zoning

Zoning is one of the primary tools available to local communities to ensure land use compatibility. Zoning ordinances and regulations are intended to promote public health, safety, and welfare by regulating the use of the land within a jurisdiction based on factors such as land use compatibility and existing and expected socioeconomic conditions. Zoning designations are legal requirements, which determine how parcels of land may be used and are often a key part of implementing future land use plans. The Charlotte-Mecklenburg Planning Department maintains zoning maps and ordinances through which zoning is established within the Airport Environs. **Exhibit D-3** depicts the generalized future zoning within the Airport Environs. **Table D-3** lists the specific zoning classifications that fall within the general zoning categories shown in Exhibit D-3.

D.1.3.3 Land Subdivision / Future Development

In Charlotte and Mecklenburg County a proposal to subdivide land must be approved by the Planning Department before the actual dividing of land and constructing of improvements can begin. The Charlotte-Mecklenburg Planning Department maintains a list and mapping information showing preliminary plans for new subdivisions. This data includes digital submittals of proposed subdivisions by surveying companies. **Exhibit D-4**, shows existing land use and areas of potential future residential development based on subdivision plans within the Airport Environs. As shown, there are several areas of planned residential development within the Airport Environs, including planned subdivisions to the south, west, and southwest of CLT; although there are no mapped planned subdivisions within the 65 DNL of either the Existing (2015) or Future (2020) Noise Exposure Contours.



Charlotte·Douglas INTERNATIONAL AIRPORT

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Current Zoning

EXHIBIT: **D-3**

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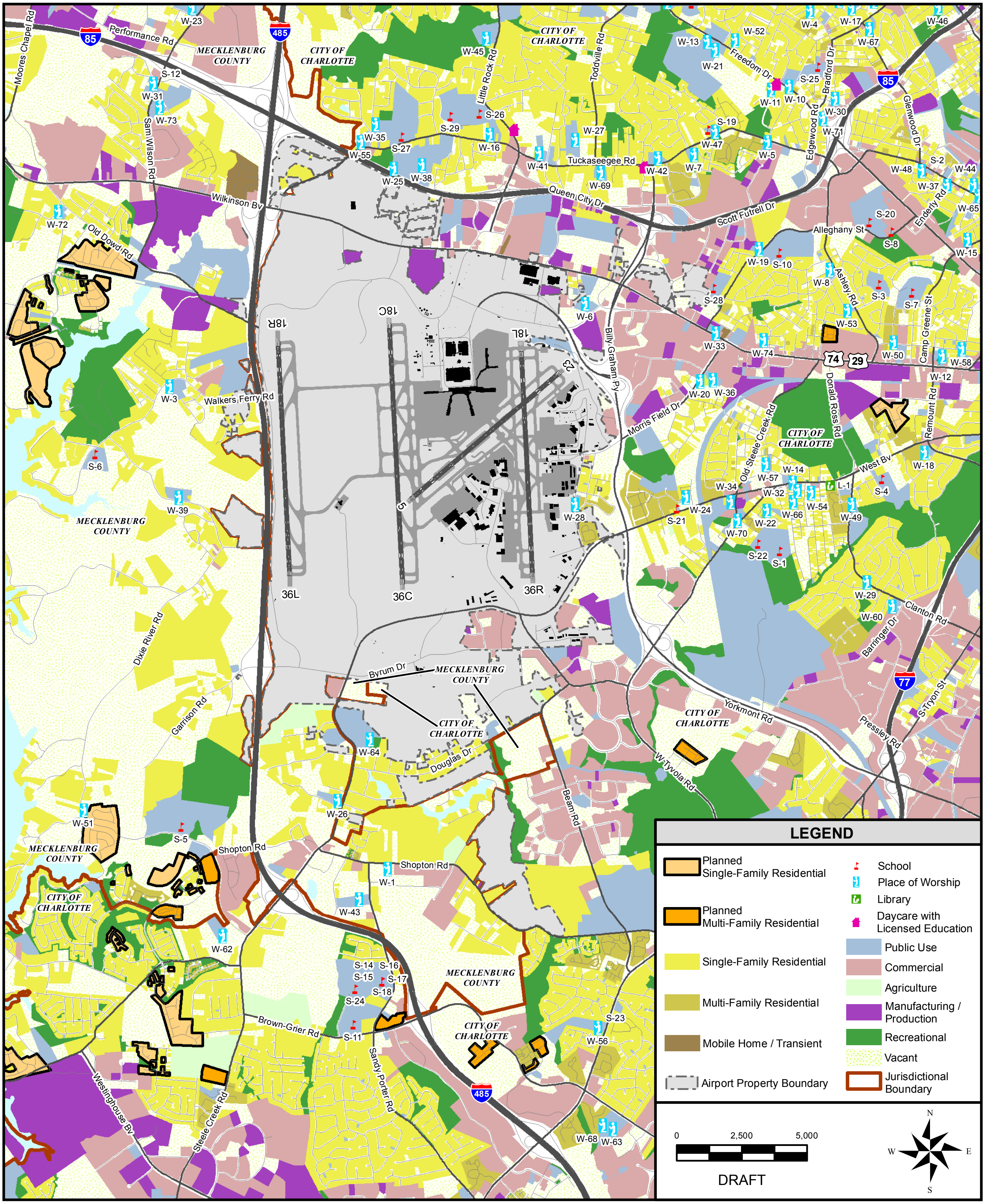

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Future Land Use

EXHIBIT:
D-4

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Table D-3,
GENERALIZED ZONING CLASSIFICATIONS
Charlotte Douglas International Airport

GENERALIZED ZONING	ZONE CODE	ZONE DESCRIPTION
Commercial/Industrial	B-1	Business
	B-1(CD)	Business
	B-1(CD)PED-O	Business
	B-1(PED)	Business
	B-1(PED-O)	Business
	B-1SCD	Commercial Center
	B-2	Business
	B-2(CD)	Business
	B-2(PED)	Business
	B-2(PED-O)	Business
	B-D	Business-Distribution
	B-D(CD)	Business-Distribution
	B-D(CD)PED-O	Business-Distribution
	BP	Business Park
	BP(CD)	Business Park
	CC	Commercial Center
	I-1	Light Industrial
	I-1(CD)	Light Industrial
	I-1(TS)	Light Industrial
	I-2	Heavy Industrial
	I-2(CD)	Heavy Industrial
	I-2(CD)(TS)	Heavy Industrial
	NS	Business
	O-1	Office
	O-1(CD)	Office
	O-1(CD)(PED-O)	Office
	O-15(CD)	Office
	O-2	Office
	O-2(CD)	Office
	O-3	Office
	O-3(CD)	Office
	O-6(CD)	Office
	O-9(CD)	Office
	RE-1	Research
	RE-1(CD)	Research
	RE-2	Research
	RE-2(CD)	Research
	RE-3	Research
	RE-3(CD)	Research
	RE-3(O)	Research
	UR-C	Business
	UR-C(CD)	Business

Table D-3, *(Continued)*
GENERALIZED ZONING CLASSIFICATIONS
Charlotte Douglas International Airport

GENERALIZED ZONING	ZONE CODE	ZONE DESCRIPTION
Institutional	INST	Institutional
	INST(CD)	Institutional
	R-I	Institutional
Mixed Use	MUDD	Mixed Use
	MUDD(CD)	Mixed Use
	MUDD-O	Mixed Use
	MUDD-O(CD)	Mixed Use
	MX-1	Mixed Use Residential
	MX-1(INNOV)	Mixed Use Residential
	MX-2	Mixed Use Residential
	MX-2(INNOV)	Mixed Use Residential
	MX-3	Mixed Use Residential
	MX-3(INNOV)	Mixed Use Residential
	R-12PUD	Mixed Use Residential
	R-15PUD	Mixed Use Residential
	R-6PUD	Mixed Use Residential
	R-9PUD	Mixed Use Residential
	R-RPUD	Mixed Use Residential
	UMUD	Uptown Mixed Use
	UMUD(CD)	Uptown Mixed Use
	UMUD-O	Uptown Mixed Use
Multi-Family Residential	R-12MF	Multi-Family
	R-12MF(CD)	Multi-Family
	R-15MF(CD)	Multi-Family
	R-17MF	Multi-Family
	R-17MF(CD)	Multi-Family
	R-20MF	Multi-Family
	R-22MF	Multi-Family
	R-22MF(CD)	Multi-Family
	R-22MF(PED-O)	Multi-Family
	R-43MF	Multi-Family
	R-43MF(CD)	Multi-Family
	R-6MF(CD)	Multi-Family
	R-6MFH(CD)	Multi-Family
	R-8MF	Multi-Family
	R-8MF(CD)	Multi-Family
	R-9MF(CD)	Multi-Family
	UR-2	Urban Residential
	UR-2(CD)	Urban Residential
	UR-3	Urban Residential
	UR-3(CD)	Urban Residential
	UR-3(CD)PED-O	Urban Residential

Table D-3, *(Continued)*
GENERALIZED ZONING CLASSIFICATIONS
Charlotte Douglas International Airport

GENERALIZED ZONING	ZONE CODE	ZONE DESCRIPTION
Manufactured Home	MH-O	Manufactured Home
	R-5MH-O	Manufactured Home
	R-MH	Manufactured Home
Single-Family Residential	R-12(CD)	Single Family
	R-15(CD)	Single Family
	R-3	Single Family
	R-3(CD)	Single Family
	R-4	Single Family
	R-4(CD)	Single Family
	R-5	Single Family
	R-5(CD)	Single Family
	R-6	Single Family
	R-6(CD)	Single Family
	R-8	Single Family
	R-8(CD)	Single Family
	R-9(CD)	Single Family
	RU(CD)	Single Family
	UR-1	Single Family
	UR-1(CD)	Single Family
	UR-I(CD)	Single Family
Transportation Utility	TOD-M	Transit-Oriented
	TOD-M(CD)	Transit-Oriented
	TOD-MO	Transit-Oriented
	TOD-R	Transit-Oriented
	TOD-R(CD)	Transit-Oriented
	TOD-RO	Transit-Oriented

Source: Charlotte-Mecklenburg Planning, Landrum & Brown, 2015.

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Appendix E

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APPENDIX E
PUBLIC INVOLVEMENT

The process of providing opportunities for public review and comment during the development of this Noise Exposure Maps (NEM) includes three techniques: Technical Group Meetings, Public Information Meetings, and a formal Public Hearing. Each technique facilitates the active and direct participation of members of the public and the opportunity for them to submit comments to Charlotte Douglas International Airport (CLT or Airport) staff.

This appendix provides the information related to the public involvement process undertaken during the CLT Noise Exposure Map Update and is divided into the following sections:

- Discussion of the Technical Group membership and meetings
- Discussion of the Public Information Meetings
- Discussion of the Public Hearing
- Location of Study Documents for Public Review
- NEM Update Website

E.1 TECHNICAL GROUP MEETINGS

A Technical Group was established by CLT staff and was composed of representatives from CLT, the City of Charlotte, the Charlotte-Mecklenburg Planning Department, Charlotte Mecklenburg Schools, the FAA, airline personnel and local neighborhood associations. The Technical Group included participation from public and planning agency officials of the areas within the 65 DNL noise exposure contour per 14 CFR §150.21. The Technical Group provided feedback and advice to the consultant team on the contents and preparation of the NEM Update.

Two Technical Group meetings were conducted throughout the process. Presentations were made at each meetings followed by open discussion. Presentations, meeting materials, and summary meeting notes from each of the meetings are provided at the end of this appendix. The date, time, and location of each Technical Group meeting is provided below.

Meeting #1

July 30, 2014
3:00 p.m. – 4:00 p.m.
CLT-Center Charlotte Douglas International Airport

Meeting #2

December 3, 2014
3:00 p.m. – 4:00 p.m.
CLT-Center Charlotte Douglas International Airport

Table E-1 lists the individuals that were invited or participated in the Technical Group Meetings.

Table E-1
TECHNICAL GROUP MEMBERSHIP
Charlotte Douglas International Airport

NAME	REPRESENTING
LaWana Mayfield	City of Charlotte City Council
Prostell Thomas	FAA Air Traffic Manager
Pat Mumford	City of Charlotte Neighborhood and Business Services
Michael Jenkins	City of Charlotte Neighborhood and Business Services
Johnathon Wells	Charlotte-Mecklenburg Planning Department
Tim Stull	American Airlines
Tracy Montross	American Airlines
Elaine Relya	American Airlines
Bernie Davis	American Airlines
Dr. Heath Morrison	Charlotte-Mecklenburg Schools
Diana Kooser	Charlotte-Mecklenburg Schools
Francis Harkey	Wilkinson Boulevard Residents Association
Mary Vickers-Koch	Central Piedmont Community College
Michael Matlock	Central Piedmont Community College
Sue Friday	Berryhill / Dixie Community

E.2 PUBLIC INFORMATION MEETINGS

Four Public Information Meetings were held over the course of this Noise Exposure Map Update. Public Information Meetings provided the public with ample opportunity to participate in one-on-one discussions with Airport staff and the Airport consultants, and to review the maps, noise contours, flight tracks, and other study analysis. Newspaper notices for the Public Information Meetings were published in the Charlotte Observer and the Airport Neighborhood Update. Meeting announcements were also mailed to residential addresses within the sound insulation program area boundary from the 1996 Part 150 Noise Compatibility Program. Meeting dates and locations were also placed on the NEM website. Information regarding the Public Information Workshops is included later in this appendix.

Two sets of Public Information Meetings (five meetings total) were held over the course of this NEM Update during key milestones in the process and a third set of meetings is scheduled to occur concurrently with a Public Hearing. The meetings were conducted on multiple nights at different locations to make it convenient for the public to attend. Appendix E, *Public Involvement*, includes copies of meeting notices, sign-in sheets, comments received, and meeting handouts from these Public Information Meetings. The specific meetings dates, times, and locations are shown below:

Meetings 1 & 2

July 30, 2014
6:00 p.m. – 8:00 p.m.
Charlotte-Mecklenburg West Service Center, 4150 Wilkinson Boulevard

July 31, 2014
6:00 p.m. – 8:00 p.m.
Steele Creek Presbyterian Church
7407 Steele Creek Road

Meetings 3, 4, & 5

December 3, 2014
6:00 p.m. – 8:00 p.m.
West Mecklenburg High School
7400 Tuckaseegee Road

December 4, 2014
6:00 p.m. – 8:00 p.m.
Olympic High School
4301 Sandy Porter Road

February 5, 2015
6:00 p.m. – 8:00 p.m.
CLT Center
5601 Wilkinson Blvd.

Meetings 6 & 7 (*to be held*)

October 14, 2015
6:00 p.m. – 8:00 p.m.
Olympic High School
4301 Sandy Porter Rd
Charlotte, NC 28273

October 15, 2015
6:00 p.m. – 8:00 p.m.
Sheraton Hotel - Ballroom
3315 Scott Futrell Dr
Charlotte, NC 28208

E.3 PUBLIC HEARING

Public Hearings are scheduled to be held concurrently with the third set of Public Information Meeting to satisfy the requirement that the public be given an opportunity to comment on the NEMs prior to submission to the FAA as specified in 14 C.F.R. 150.21(b). A transcript of the oral testimony and the written comments received at the Public Hearing, as well as response to all comments, will be included in the final document. Comments will also be on file with the FAA Southern Region.

E.4 AVAILABILITY OF THE DOCUMENT FOR PUBLIC REVIEW

The Draft Noise Exposure Map Update document is available for public review from September 14, 2015 through October 30, 2015. Copies of the Draft Noise Exposure Map Update document are located in the locations listed below and newspaper notices were published announcing the availability of the document for review and comment prior to the Public Hearing.

LOCATIONS FOR DRAFT NEM UPDATE DOCUMENT REVIEW
Charlotte Mecklenburg Library – Main Branch
West Boulevard Branch Library
Mountain Island Lake Branch
Steele Creek Library Branch
Belmont Public Library
Charlotte International Airport - Aviation Department CLT Center 5601 Wilkinson Boulevard (accessed from Harlee Avenue)
CLT NEM Update Website: http://www.airportsites.net/CLT-NEM/documents.htm

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Technical Group Meeting #1
July 30, 2014

Meeting Invitations
Sign-in Sheet
Presentation

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Charlotte·Douglas®
INTERNATIONAL AIRPORT

June 23, 2014

LaWana Mayfield
600 East Fourth Street
Charlotte, NC 28202

RE: Charlotte Douglas International Airport Noise Exposure Map (NEM) Update
Technical Group Meeting – Wednesday, July 30, 2014 at 3:00 p.m. to 4:30 p.m.

Dear Ms. Mayfield:

The City of Charlotte (City) has initiated an update of the Noise Exposure Maps (NEMs) per Title 14 of the Code of Federal Regulations, Part 150 for the Charlotte Douglas International Airport. This NEM Update Study (the Study) will assess aircraft noise levels within the surrounding communities. The City has contracted with Landrum & Brown, a nationally recognized aviation-planning firm, to conduct the Study.

We are writing to invite you to attend a Technical Group Meeting related to the Study scheduled for July 30, 2014 from 3:00 p.m. to 4:30 p.m. at the CLT Center, 5601 Wilkinson Boulevard, Charlotte, NC 28208. Parking is available in front of the building. Please sign-in with the receptionist upon arrival. The meeting will be held in the Bellanca Room. This Technical Group Meeting is one of several meetings planned over the course of the Study to present information about the NEM Update. This meeting will present preliminary information on the process and methodology used to update the NEMs and gather input on the Study.

In addition to this Technical Group Meeting, two Public Information Workshops are scheduled from 6:00 p.m. to 8:00 p.m. on July 30th at the Charlotte Mecklenburg West Service Center at 4150 Wilkinson Boulevard; and from 6:00 p.m. to 8:00 p.m. on July 31st at the Steele Creek Presbyterian Church at 7407 Steele Creek Road. Similar information will be available at these two Public Information Meetings in an "Open House" format. Unlike the Technical Group Meeting, no formal presentation is planned for the Public Information Meetings so you may attend the open houses anytime between 6:00 p.m. and 8:00 p.m. You are welcome to attend one or both of these meetings in addition to the Technical Group Meeting on July 30th at 3:00 p.m.

I hope that you or a member of your team will be able to participate in this Study. Please contact me by telephone or email (information below) if you are able to attend this Technical Group Meeting. Please do not hesitate to contact me if you have any questions or comments regarding this meeting or the NEM Update.

Sincerely,

Lauren Scott

Lauren Scott
Associate Airport Planner
704.359.4814
lmscott@cltairport.com

TECHNICAL GROUP MEETING #1 INVITATION LIST

Name	Organization
LaWana Mayfield	City of Charlotte City Council
Prostell Thomas	FAA Air Traffic Manager
Pat Mumford	City of Charlotte Neighborhood and Business Services
Tim Stull	American Airlines
Tracy Montross	American Airlines
Dr. Heath Morrison	Superintendent, Charlotte-Mecklenburg Schools
Francis Harkey	Wilkinson Boulevard Residents Association
Mary Vickers-Koch	Central Peidmont Community College
Sue Friday	Berryhill / Dixie Community

CLT Noise Exposure Map Update
Technical Review Committee Meeting #1
July 30, 2014, 3:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Organization	Phone Number	E-Mail Address
1	Tracy Montross	AA	359-3738	tracy.montross@aa.com
2	Tim Stull	AA	412/638-6839	tim.stull@aa.com
3	Sue Friday	Berryhill / Dixie	704-3925019	tsfriday@aol.com
4	Diana Kooser	CMS schools	980-343-4879	diana1.kooser@cms.k12.nc.us
5	Michael Jenkins	N & BS - City	704-336-7988	mjenkins@charlottenc.gov
6	Kathy Dennis	CLT	704-359-4840	kpdennis@cltairport.com
7	Michael Matlock	CPCC	704-330-4643	michael.matlock@cpcc.edu
8	Jonathan Wells	CM Planning	704-336-4090	jwells@ci.charlotte.nc.us
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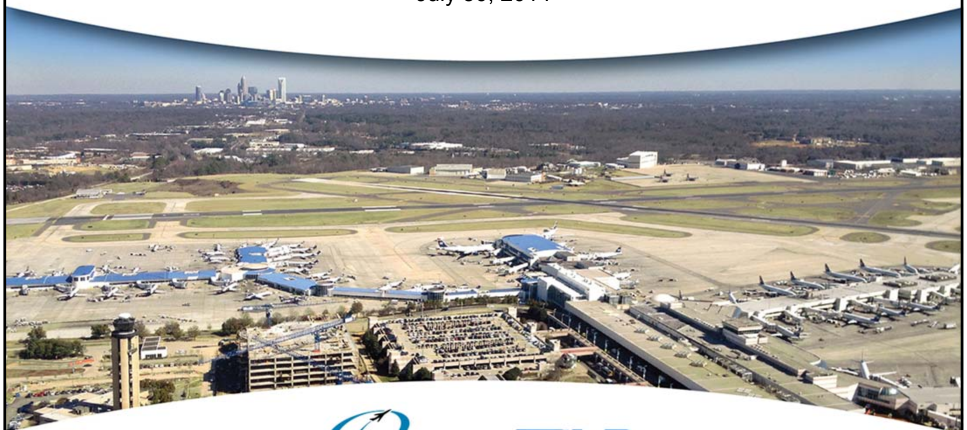
CLT Noise Exposure Map Update

Technical Group Meeting

July 30, 2014



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Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Agenda

- Welcome and Introductions
- Noise Exposure Maps (NEMs) General Overview
- Review of Previously-Approved NEMs
- Important Facts About NEM Updates
- NEM Update – Scope
- Data Collection
- NEM Update - Schedule

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Welcome and Introductions

- Charlotte Douglas International Airport
  - Sponsor of the Noise Exposure Map (NEM) Update
  - Certify the NEMs are accurate
  - NEM Team: Jack Christine, Katherine Dennis, Lauren Scott, Kevin Hennessey
- Consultant Team
  - Landrum & Brown is the lead consultant for the NEM Update
  - 60 years of aviation planning
  - Experts in aircraft noise and land use planning
  - Rob Adams, Principal-in-Charge
- Federal Aviation Administration
  - Developed guidelines for NEMs that must be followed
  - Review NEMs for accuracy and determination that guidelines were met
  - Provide technical support for noise modeling

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

NEM Update General Overview

- NEM Updates Document Noise Levels
  - The focus of the NEM Update is to quantify noise and identify land use incompatibilities that exist today and in the future
- NEM Updates must Follow FAA Guidelines
- NEM Updates do not:
  - Recommend changes to airport or runway, or implementing mandatory restrictions on aircraft
  - Recommend levying fines for not following procedures
  - Limit access to the airport based on size, type, or noise created by aircraft
  - Alter the noise compatibility measures already in place at the airport

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Previous NEMs at CLT

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
  - Prepared NEMs for 1996 and 2001 conditions
  - 2001 NEM included construction of the third parallel runway

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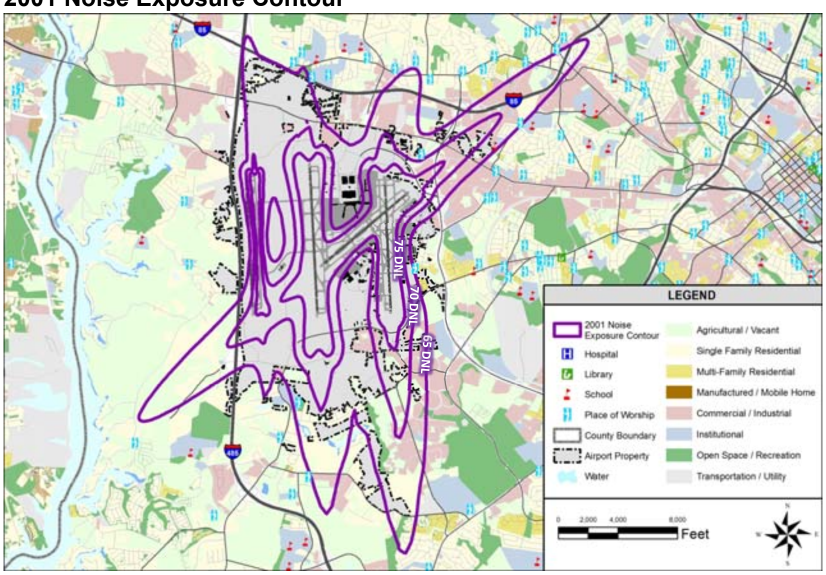
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

2001 Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Important Facts About NEM Updates

- Developing Noise Exposure Maps
  - FAA has established land use compatibility guidelines for identifying aircraft noise impacts
  - Based on Day-Night Average Sound Level (DNL)
  - Required to use Integrated Noise Model (INM)
  - Noise-sensitive uses are considered non-compatible at or above 65 DNL
    - Residential
    - Schools
    - Places of worship
    - Hospitals
    - Nursing homes
    - Daycare facilities where licensed education occurs
    - Libraries

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Calculation of Noise

- There are a number of ways to describe noise levels (maximum level, average noise level, 90th percentile, etc.)
- Noise Exposure Map Updates are required to use the Day–Night Average Sound Level (DNL) Metric
  - 24-Hour average
  - Penalty for nighttime (10 p.m. - 6:59 a.m.) flights (x10)
- National standard for all Federal agencies
  - 65 DNL threshold for significant impact

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Noise Exposure Map (NEM) Update

Calculation of Noise

- Prepared using the FAA's Integrated Noise Model (INM) Version 7.0d
- Noise measurements are used to verify the input into the INM, NOT to calculate noise contours
- Noise measurements versus noise model
  - Creating a noise contour from measured data would require thousands of monitors 24 hours a day for a full year
  - Data collected would represent that one year period
  - Noise modeling allows for future years to be analyzed

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Noise Exposure Map (NEM) Update

NEM Update Scope

- Major Scope Tasks:
  - Data Collection/Noise Monitoring Analysis
  - Creating Noise Exposure Maps
  - Conducting Land Use Compatibility Analysis
  - Public involvement

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

NEM Update Scope

- Data Collection - Noise Monitoring Analysis
  - Collect operational data from airport
  - Validate/verify the input data in the INM
  - Collect radar data from the tracking system
  - Collect noise monitor data from 10 existing sites
  - Conduct additional monitoring as needed
    - Not duplicate coverage of existing sites
    - Recommendations from the City, FAA, or public

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

NEM Update Scope

- Creating Noise Exposure Maps
  - Existing Noise Exposure Map to reflect current operating conditions (2014/15)
  - Future Noise Exposure Map to reflect five-year future conditions (2020)
  - Day-Night Average Sound Level (DNL) contours of 65, 70, and 75 DNL will be prepared
  - Contours will be overlaid onto a land use basemap and non-compatible land uses will be identified/quantified

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

NEM Update Scope

- Public Involvement
  - Goals include:
    - To engage people directly
    - Solicit meaningful input
    - Provide the most accurate data as possible
  - Outreach efforts include:
    - Six public information meetings (three sets of two back-to-back meetings)
    - Providing for Technical Group Meetings / special presentations
    - Dedicated website:
      - http://www.airportsites.net/CLT-NEM
      - Email: CLT-NEM@landrum-brown.com

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	777200	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	<0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	5.2	11.4
Airbus A320-200	A320-232	81.2	98.8
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.8*	*1,289.2*

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.7	1.0
Business Jet	CL600	4.1	5.9
Business Jet	CL601	2.7	4.0
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.4	3.5
Business Jet	CNA510	1.3	1.9
Business Jet	CNA55B	1.7	2.5
Business Jet	CNA750	1.4	2.0
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	4.0	5.8
Business Jet	GIV	4.1	6.0
Business Jet	GV	2.7	3.9
Business Jet	LEAR35	13.4	20.5
Business Jet	MU3001	12.0	17.3
Subtotal		*388.9*	*402.5*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	5.0	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	1.0
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.7
DASH 6	DHC6	4.4	4.2
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.8	4.2
Single-Engine Piston	GASEPV	4.7	3.0
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*146.7*	*149.4*
Military Aircraft			
Lockheed C130 Hercules	C130	2.5	3.8
Subtotal		*2.5*	*3.8*
Grand Total		**1,517.4**	**1,879.4**

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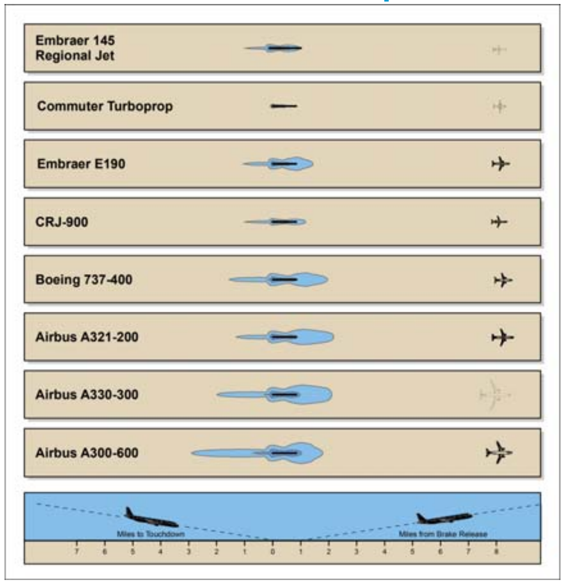
Charlotte-Douglas INTERNATIONAL AIRPORT

Aircraft Noise Footprints



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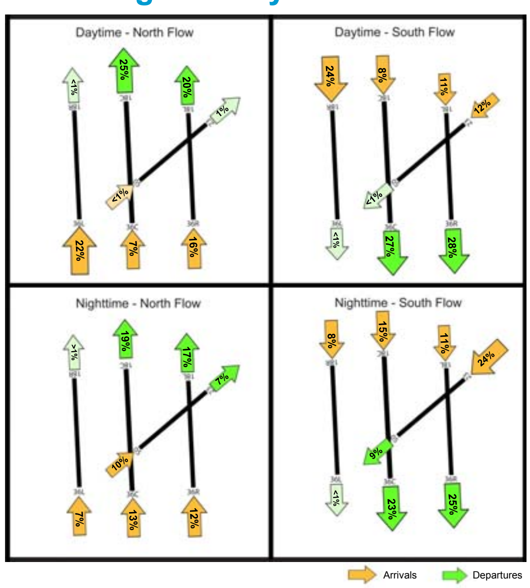
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Existing Runway Use Patterns



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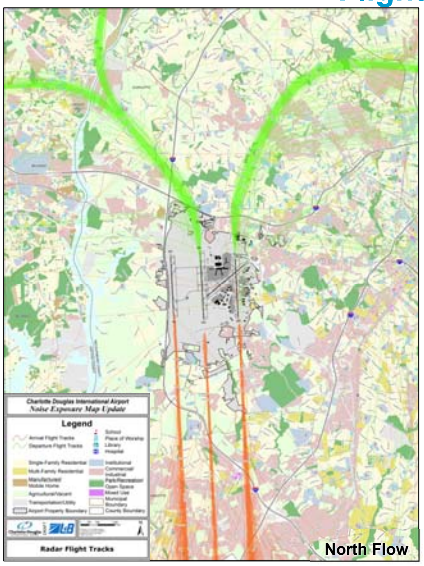
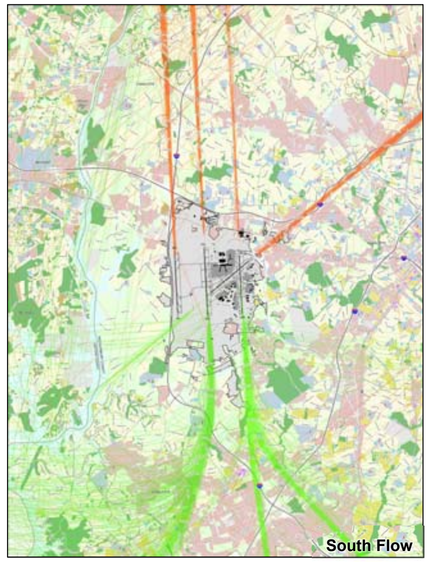
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Flight Tracks





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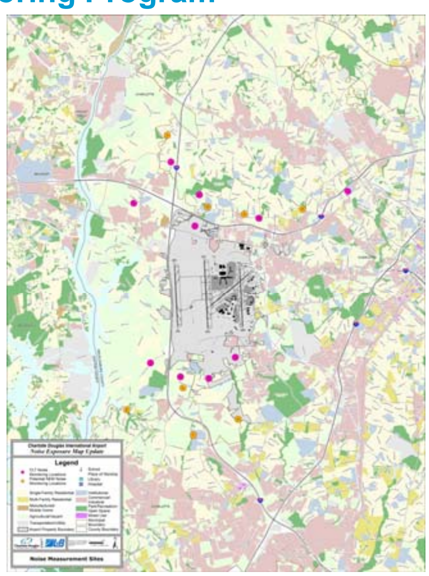
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Program

- Collect Data from 10 Existing Sites
  1. 601 Dewolfe Street
  2. 10300 Garrison Road
  3. Whippoorwill Drive
  4. 1924 Wildwood Drive
  6. 2900 Westerwood Drive
  7. Moores Lake
  8. McAlpine Drive
  9. 3515 Farhill Drive
  10. 6101 Tuckaseegee Road
  12. 9401 Markswood Road
- Conduct Monitoring from other sites
  - 8 Long-Term Sites (5 days)
  - 25 Short-Term Sites (1-2 hours)



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

NEM Update Schedule

- Public Meetings
  - Tonight at Charlotte-Mecklenburg West Service Center 6-8 pm
  - Tomorrow at Steele Creek Presbyterian Church 6-8 pm
- Preliminary NEMs
  - Late fall 2014
- Next Technical Group Meeting
  - Late fall 2014

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Charlotte-Douglas INTERNATIONAL AIRPORT

Questions / Answers

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Technical Group Meeting #2
December 3, 2014

Meeting Invitations
Sign-in Sheet
Presentation

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Charlotte·Douglas®
INTERNATIONAL AIRPORT

November 13, 2014

LaWana Mayfield
600 East Fourth Street
Charlotte, NC 28202

RE: Charlotte Douglas International Airport Noise Exposure Map (NEM) Update
Technical Group Meeting – Wednesday, December 3, 2014 at 3:00 p.m. to 4:30 p.m.

Dear Ms. Mayfield,

We are writing to invite you to attend the second NEM Technical Group Meeting scheduled for December 3, 2014 from 3:00 p.m. to 4:30 p.m. at the CLT Center, 5601 Wilkinson Boulevard, Charlotte, NC 28208. Parking is available in front of the building. Please sign-in with the receptionist upon arrival. The meeting will be held in the Bellanca Room. This meeting will present preliminary draft contours and information on the methodology used to update the NEMs and gather input on the Study.

In addition to this Technical Group Meeting, two Public Information Workshops are scheduled from 6:00 p.m. to 8:00 p.m. on December 3rd at West Mecklenburg High School located at 7400 Tuckaseegee Road Charlotte, NC 28214; and from 6:00 p.m. to 8:00 p.m. on December 4th, 2014 at Olympic High School located at 4301 Sandy Porter Road Charlotte, NC 28273. The same information will be presented at both meetings in an open house format with a short presentation at 6:30 p.m. You are welcome to attend one or both of these meetings in addition to the Technical Group Meeting.

I hope that you or a member of your team will be able to participate in this Study. Please do not hesitate to contact me if you have any questions or comments regarding this meeting or the NEM Update.

Sincerely,

Lauren Scott

Lauren Scott
Associate Airport Planner
lmscott@cltairport.com
704.359.4814

TECHNICAL GROUP MEETING #2 INVITATION LIST

Name	Organization
LaWana Mayfield	City of Charlotte City Council
Prostell Thomas	FAA Air Traffic Manager
Pat Mumford	City of Charlotte Neighborhood and Business Services
Tim Stull	American Airlines
Tracy Montross	American Airlines
Dr. Heath Morrison	Superintendent, Charlotte-Mecklenburg Schools
Francis Harkey	Wilkinson Boulevard Residents Association
Mary Vickers-Koch	Central Peidmont Community College
Sue Friday	Berryhill / Dixie Community

CLT Noise Exposure Map Update
Technical Review Committee Meeting #2
December 3, 2014, 3:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Organization	Phone Number	E-Mail Address
1	Michael Jenkins	H & BS	704-336-7998	mjenkins@charlottenc.gov
2	DIANA Kooser	CMS Schools		dkooser2@gmail.com
3	PROSTELL THOMAS	FAA	704-359-1003	PROSTELL.THOMAS@FAA.GOV
4	Kevin Hennessey	CLT	704-359-4008	kmhennessey@cltairport.com
5	Elaine Relyea	FAA	704-359-1014	elaine.relyea@FAA.GOV
6	BERNIE Davis	American	704-359-3778	bernie.davis@aa.com
7	JONATHAN WELLS.	C-M PLANNING	704-336-4090	JWELLS@CI.CHARLOTTE.NC.US.
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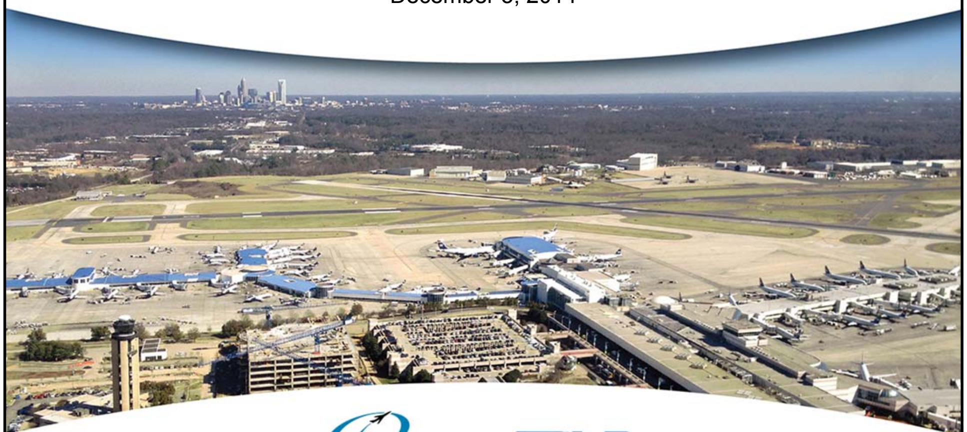
CLT Noise Exposure Map Update

Technical Group Meeting

December 3, 2014



Charlotte·Douglas INTERNATIONAL AIRPORT

Aviation Planning at the Leading Edge

Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Agenda

- Welcome and Introductions
- Noise Exposure Maps (NEMs) General Overview
- Review of Previously-Approved NEMs
- NEM Update Process
- Data Collection
- Noise Monitoring Program Results
- Preliminary Noise Contour Modeling Results
- Preliminary Land Use Impact Analysis
- Next Steps

2

Noise Exposure Map (NEM) Update

Welcome and Introductions

- Charlotte Douglas International Airport
  - Sponsor of the Noise Exposure Map (NEM) Update
  - Certify the NEMs are accurate
  - NEM Team: Jack Christine, Katherine Dennis, Lauren Scott, Kevin Hennessey
- Consultant Team
  - Landrum & Brown is the lead consultant for the NEM Update
  - 60 years of aviation planning
  - Experts in aircraft noise and land use planning
  - Rob Adams, Principal-in-Charge
- Federal Aviation Administration
  - Developed guidelines for NEMs that must be followed
  - Review NEMs for accuracy and determination that guidelines were met
  - Provide technical support for noise modeling

3

Noise Exposure Map (NEM) Update

NEM Update General Overview

- NEM Updates Document Noise Levels
  - The focus of the NEM Update is to quantify noise and identify land use incompatibilities that exist today and in the future
- NEM Updates must Follow FAA Guidelines
- NEM Updates do not:
  - Recommend changes to airport or runway, or implementing mandatory restrictions on aircraft
  - Recommend levying fines for not following procedures
  - Limit access to the airport based on size, type, or noise created by aircraft
  - Alter the noise compatibility measures already in place at the airport

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Previous NEMs at CLT

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
  - Prepared NEMs for 1996 and 2001 conditions
  - 2001 NEM included construction of the third parallel runway

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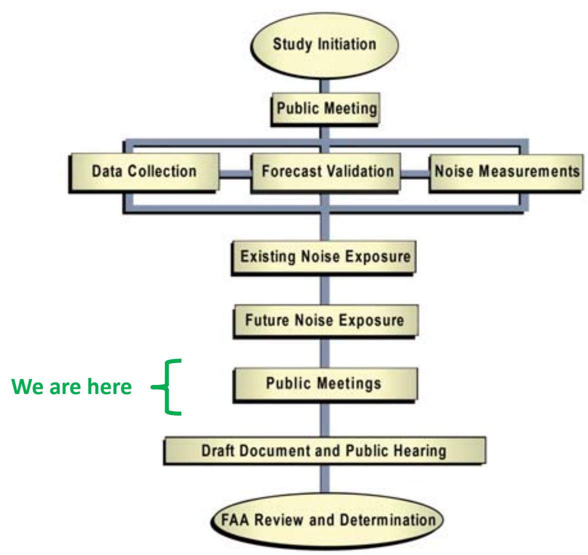
Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

NEM Update Process



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Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	21.6	27.6
Airbus A320-200	A320-232	64.8	82.7
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.7*	*1,289.3*
Regional / Business Jets			
Business Jet	CIT3	0.6	0.9
Business Jet	CL600	3.9	5.7
Business Jet	CL601	2.6	3.9
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.3	3.4
Business Jet	CNA510	1.3	1.8
Business Jet	CNA55B	1.6	2.4
Business Jet	CNA750	1.3	1.9
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	3.9	5.7
Business Jet	GIV	4.0	6.0
Business Jet	GV	2.6	3.9
Business Jet	LEAR35	13.0	20.0
Business Jet	MU3001	12.0	16.9
Subtotal		*387.8*	*400.9*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	4.8	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	0.9
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.6
DASH 6	DHC6	4.2	4.1
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.6	4.1
Single-Engine Piston	GASEPV	4.6	2.9
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*145.9*	*149.0*
Military Aircraft			
Lockheed C130 Hercules	C130HP	2.5	3.8
Subtotal		*2.5*	*3.8*
Helicopters			
Augusta A-109	A109	1.7	1.7
Bell 407 Jet Ranger	B407	0.3	0.3
Subtotal		*2.0*	*2.0*
Grand Total		**1,517.4**	**1,879.5**

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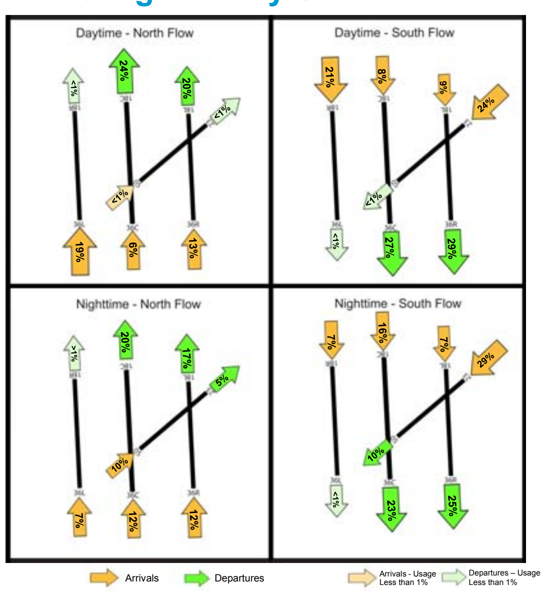
Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Existing Runway Use Patterns



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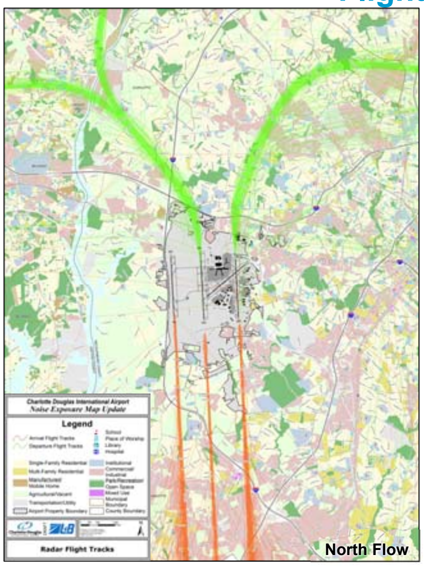
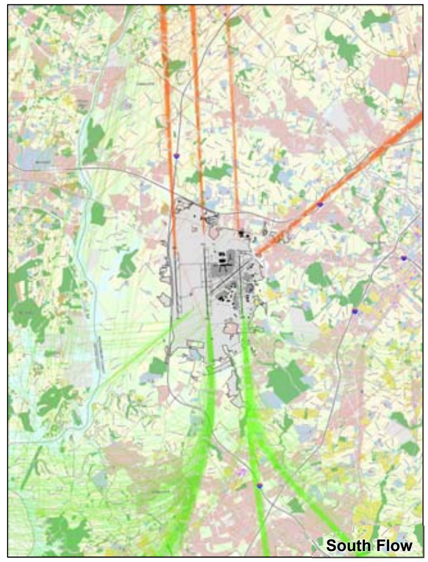
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Flight Tracks





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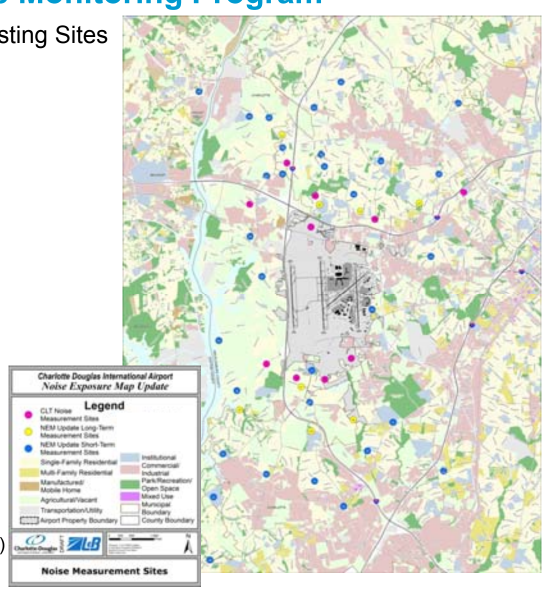
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Program

- Collected Data from 10 Existing Sites
  1. 601 Dewolfe Street
  2. 10300 Garrison Road
  3. Whippoorwill Drive
  4. 1924 Wildwood Drive
  6. 2900 Westerwood Drive
  7. Moores Lake
  8. McAlpine Drive
  9. 3515 Farhill Drive
  10. 6101 Tuckaseegee Road
  12. 9401 Markswood Road
- Conducted Monitoring from other sites
  - 8 Long-Term Sites (5 days)
  - 33 Short-Term Sites (~ 1 hour)



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results

- The monitoring was conducted from July 31, 2014 through August 13, 2014
- Long-term noise monitoring was conducted at 8 sites for over five days at each site
  - DNL noise levels ranged from 59.1 to 64.9 DNL and were consistent with INM predictions
- Short-term noise monitoring was conducted at 33 sites for approximately on hour per site

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Long-Term Noise Monitoring Results

Site ID	Site Description	Date of Measurements	Time of Measurements	Ambient Noise Level	Type of Events	Average Number of Events per Hour	Loudest Event (Lmax)	Loudest Aircraft
Long-Term Sites (5+ Days)								
L1	Shady Brook Baptist Church 2940 Belmeade Drive	8/1/2014 to 8/7/2014	Continuous	51.4	Arrivals and Departures	17	90.6	Airbus A321
L2	West Mecklenburg High School 7400 Tuckaseegee Road		Continuous	56.0	Arrivals and Departures	20	94.3	Airbus A319
L3	Mulberry Baptist Church 6450 Tuckaseegee Road		Continuous	53.3	Arrivals and Departures	8	88.2	Business Jet
L4	Tuckaseegee Park 4820 Tuckaseegee Road		Continuous	55.1	Arrivals and Departures	9	93.4	Boeing 727-200
L5	Windygap Road		Continuous	47.1	Arrivals and Departures	1	93.7	Turboprop
L6	Olympic High School 4301 Sandy Porter Road		Continuous	53.5	Arrivals and Departures	16	84.9	Airbus A321
L7	Airport-Owned Property near 9209 Snow Ridge		Continuous	51.4	Arrivals and Departures	16	89.8	Airbus A321
L8	Airport-Owned Property on Shopton near Lebanon Drive		Continuous	53.5	Arrivals and Departures	21	83.6	Canadair CRJ-900

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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Short-Term Noise Monitoring Results

Site ID	Site Description	Date of Measurements	Time of Measurements	Ambient Noise Level	Type of Events	Average Number of Events per Hour	Loudest Event (Lmax)	Loudest Aircraft
Short-Term Sites (approximately 1 hour)								
S4	Steele Creek Presbyterian Church	7/31/2014	Afternoon	53.7	Arrivals	11	71.4	Canadair CRJ-900
S6	O'Hara Drive & Bonnie Blue Lane	8/5/2014	Afternoon	49.0	Departures	39	74.1	Embraer EMB-170
S7	Thornfield Road cul-de-sac	8/6/2014	Afternoon	42.8	Departures	30	78.4	Airbus A321
S9	Steele Creek A.M.E. Zion Church 1500 Shopton Road	8/6/2014	Afternoon	46.0	Departures	30	69.9	Airbus A319
S10	Farmhurst Drive Treetops Apartments	8/6/2014	Evening	47.9	Departures	11	65.0	Embraer EMB-190
S13	Chappell Baptist Church Hovis Road & Bradford Drive	8/8/2014	Midday	47.5	Arrivals	25	62.8	Airbus A320
S14	Eagles Landing Drive	8/13/2014	Morning	45.1	Departures	21	77.8	Airbus A321
S15	1854 Still Pond Court	8/6/2014	Morning	51.6	Departures	20	79.9	Airbus A330
S16	7114 Cabe Lane	8/1/2014	Morning	49.7 - 58.5	Departures	27	74.0	Airbus A321
S17	Peachtree Road and Emmanuel Drive	8/13/2014	Morning	45.3	Departures	13	67.6	Canadair CRJ-900
S19	Coulwood Drive & Fielding Road	8/8/2014	Afternoon	44.0	Arrivals	27	68.4	Canadair CRJ-900
S23	Glendale Avenue & Highland Street Mt. Holly	8/7/2014	Afternoon	46.6	Departures	15	78.3	McDonnell Douglas MD88
S24	Garden Memorial Presbyterian Church 2324 Sam Wilson Road	8/4/2014	Afternoon	47.2	Departures	37	78.5	Airbus A321
S25	Berryhill Baptist Church 9801 Walkers Ferry Road	8/4/2014	Afternoon	49.8	Departures	28	65.2	Airbus A320

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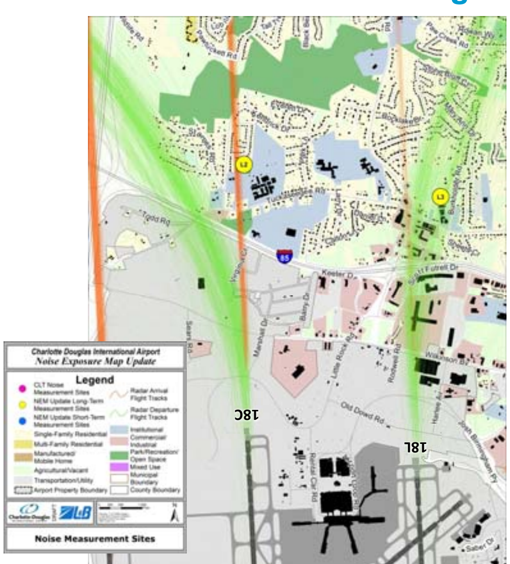
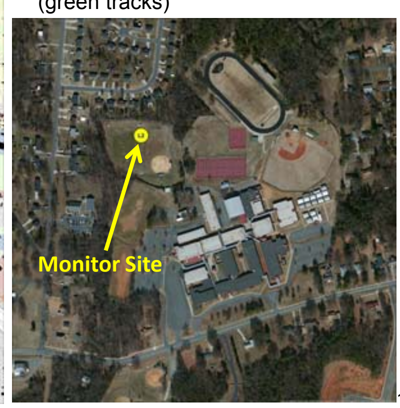
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Site L2



- Site L2 – Located at West Mecklenburg High School
- Site was below approach to Runway 18C (red tracks) and just east of primary departure corridor from Runway 36C (green tracks)



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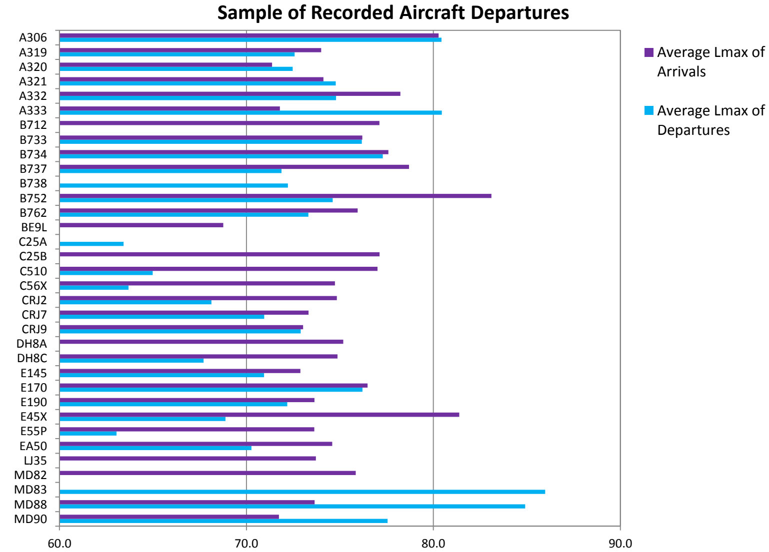
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Site L2



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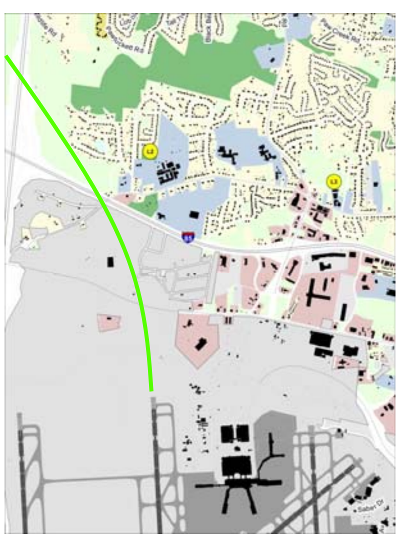
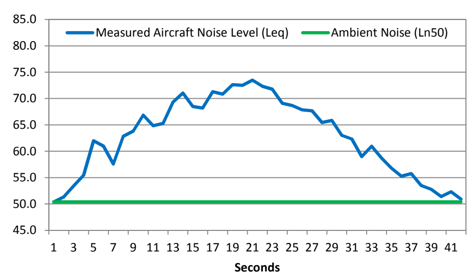
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Site L2





- Above graph represents noise profile of a typical (A319) departure event.
- Noise rises above ambient (background) noise level, peaks and then recedes below ambient noise level

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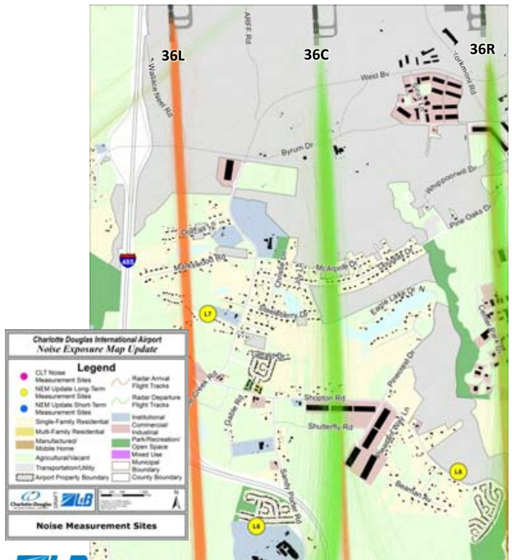
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Site L6



- Site L6 – Located at Olympic High School
- Site was just east of approach path to Runway 36L and west of approach path to Runway 36C (red tracks) and departure corridor from Runway 18C (green tracks)

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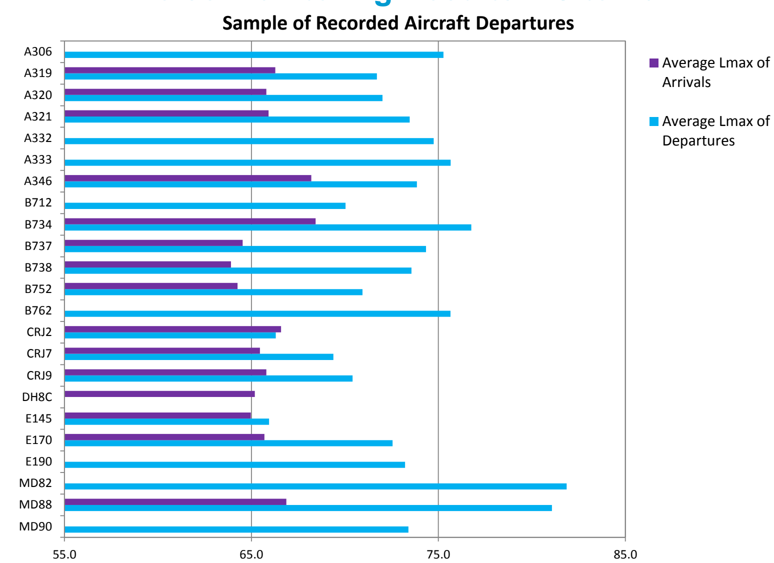
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Site L6



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results – Conclusions

- Measured noise levels from individual aircraft operations were compared to INM model predictions.
- The noise monitoring program identified no significant inconsistencies between measured noise levels and INM predicted noise levels.
- No modification to INM input is warranted based on the results of the noise monitoring program.

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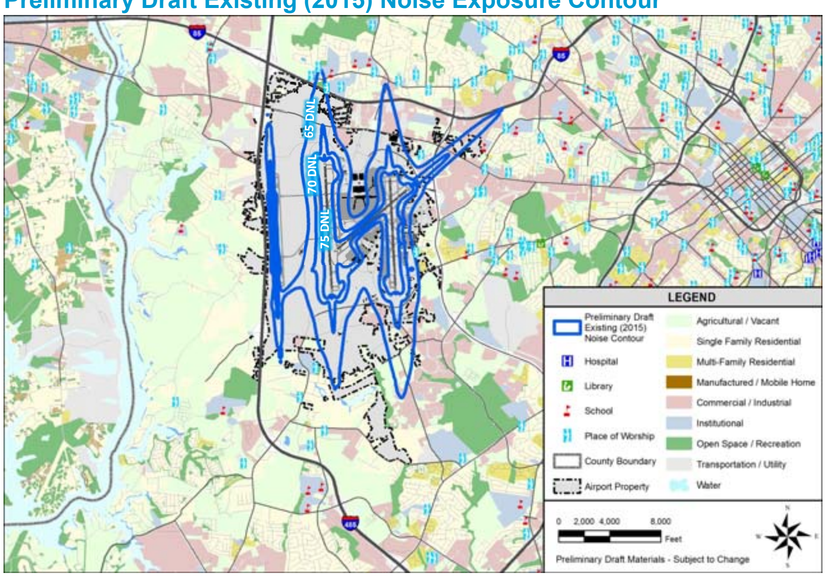
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Existing (2015) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	0
Previously Eligible for Sound Insulation	41
Sound Insulated	3
Total Housing Units	**44**
Population	
Total Population	**113**
Noise-Sensitive Facilities	
Schools	0
Churches	0
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**0**

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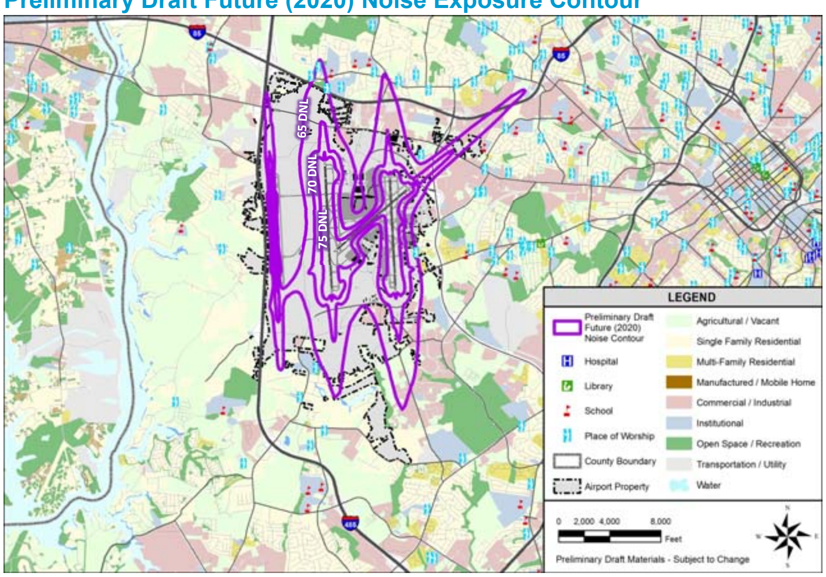
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Future (2020) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Future (2020) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	3
Previously Eligible for Sound Insulation	53
Sound Insulated	5
Total Housing Units	**61**
Population	
Total Population	**160**
Noise-Sensitive Facilities	
Schools	0
Churches	2
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**2**

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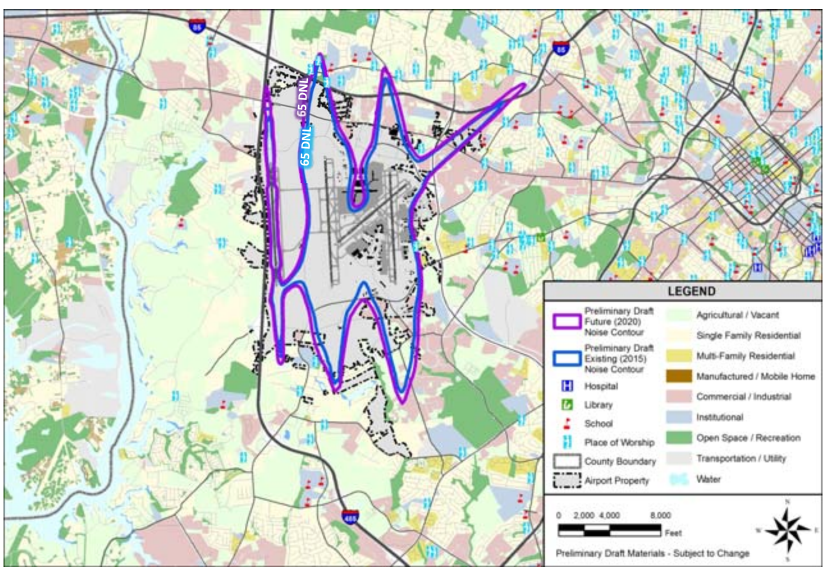
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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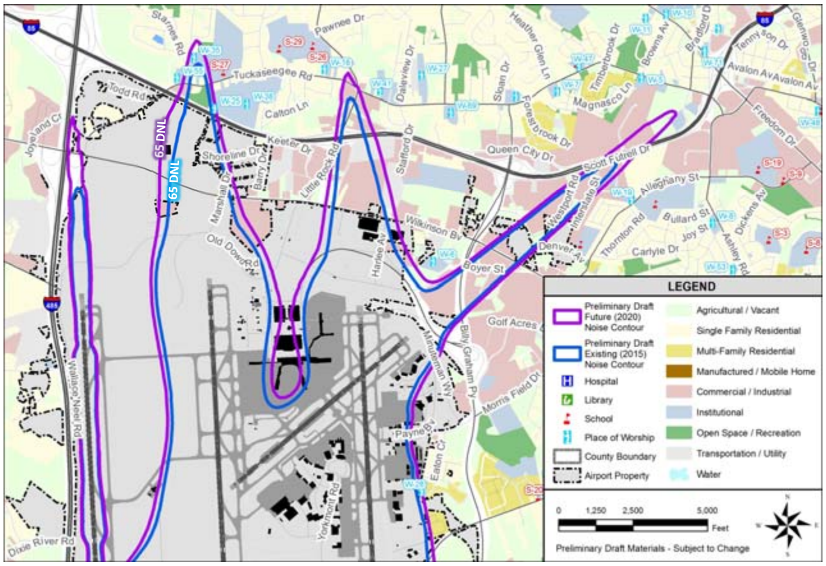
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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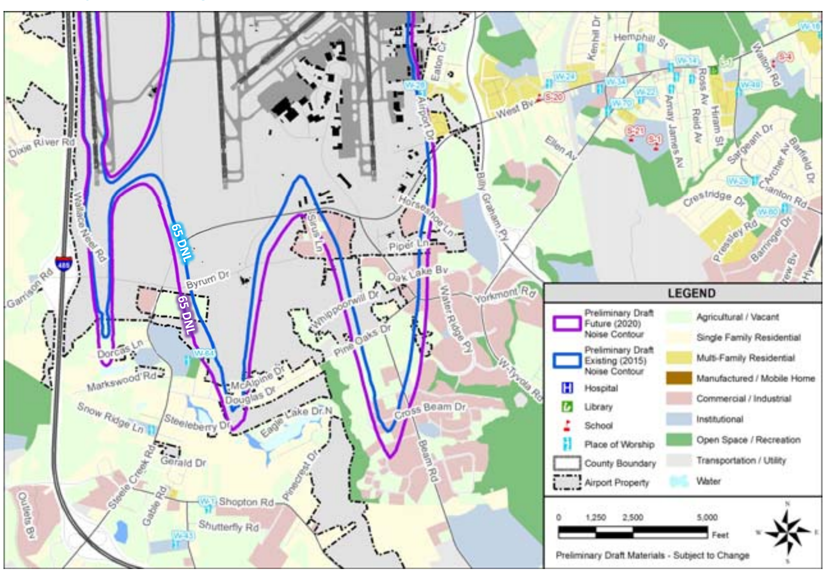
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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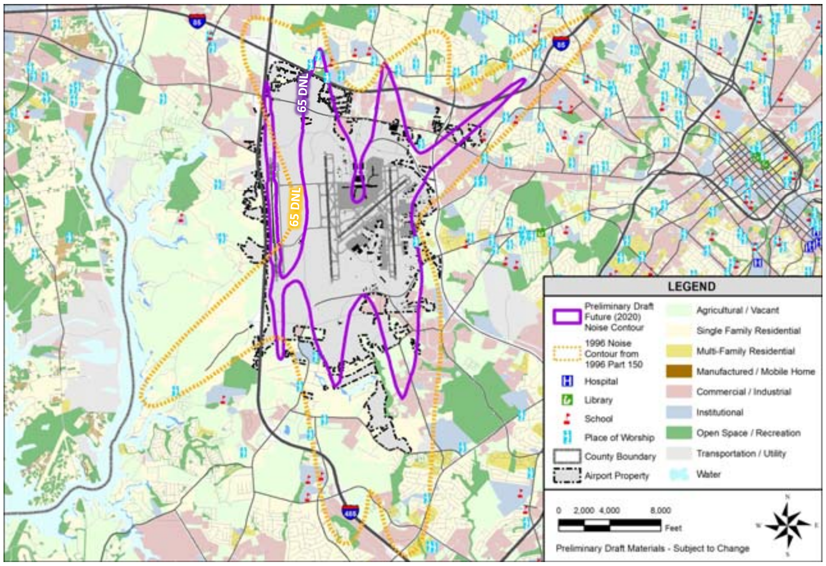
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Future (2020) Noise Exposure Contours compared to 1996 Noise Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities

Properties by Mitigation Area	1996 Noise contour	2015 Noise Contour	2020 Noise Contour
		65+ DNL	
Housing Units			
Unmitigated	n/a	0	3
Previously Eligible for Sound Insulation	n/a	41	53
Sound Insulated	n/a	3	5
Total Housing Units	**2,773**	**44**	**61**
Population			
Total Population	**6,700**	**113**	**160**
Noise-Sensitive Facilities			
Schools	4	0	0
Churches	15	0	2
Libraries	0	0	0
Hospitals	0	0	0
Nursing Homes	0	0	0
Total Noise-Sensitive Facilities	**19**	**0**	**2**

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

NEM Update Schedule

- Public Meetings
  - Tonight at West Mecklenburg High School 6-8 pm
  - Tomorrow at Olympic High School 6-8 pm
- Review Preliminary Draft NEMs and Prepare Draft NEMs
  - Winter 2014 / 15
- Next Technical Group Meeting
  - Spring 2015

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Charlotte-Douglas International Airport

Questions / Answers

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Technical Group Meeting #3
Information to be provided in Final NEM Update

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Public Information Meeting 1 & 2
July 30 & 31, 2014

Flyers/Postcards

Newspaper Notices

Registration

Meeting Summary

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CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

v 26.2 July 2014

Public Meeting NOTICE

CLT Prepares to Update Noise Exposure Maps

Charlotte Douglas is updating its 2006 Noise Exposure Map for 2015 and creating a 2020 map for the future. Six public meetings will be held for neighbors surrounding the Airport to gain information about the process, methodology and voice their opinion.

The first set of meetings will be held:

- 6 p.m. – 8 p.m. Wednesday, July 30 at West Service Center, located at 4150 Wilkinson Boulevard, Charlotte, NC 28208 and,
- 6 p.m. – 8 p.m. Thursday, July 31 at Steele Creek Presbyterian Church, located at 7407 Steele Creek Road, Charlotte, NC 28217.

Airport staff, land use and noise consultants will be on hand to answer questions.

Why the update?

CLT is updating its noise exposure maps due to aircraft fleet changes and recent changes in runway operations. In July 2013, the Federal Aviation Administration (FAA) informed the Airport of an operations issue in connection with the use of Runway 18C/36C and Runway 5/23, commonly referred to as a "converging operation." The runways do not intersect, however, the flight paths of aircraft operating on these runways may intersect in certain circumstances, which raised safety concerns.

Due to this issue, the FAA temporarily suspended the converging operation and used only the three parallel runways for all operations (arrivals and departures) during the day. As a result of the FAA's temporary suspension of Runway 5/23 converging operations, demand on CLT's three parallel runways has increased.

Landrum & Brown, Inc. is spearheading the update. Company representatives have already collected data to form noise contours, which will be presented at July's public meetings. A draft of the noise exposure map will be made public by winter 2014. The final map is scheduled to be completed in summer 2015.

What are noise contours?

Noise contours are lines of equal noise exposure, which are used to depict areas of noise. The noise exposure patterns show three contour levels of impact 65, 70 and 75 DNL and are produced by FAA developed software.

Continued on back page

Public Meetings Scheduled

The first set of meetings will be held:

- 6 p.m. – 8 p.m. Wednesday, July 30 at West Service Center, located at 4150 Wilkinson Boulevard, Charlotte, NC 28208 and,
- 6 p.m. – 8 p.m. Thursday, July 31 at Steele Creek Presbyterian Church, located at 7407 Steele Creek Road, Charlotte, NC 28217.

There will be a total of six public meetings held.

To receive Neighborhood Update electronically, scan the QR code below or email YouAreFirst@cltairport.com. Place "Neighborhood Update" in the subject line, and enter your name and address in the body of the email.

For more information about CLT, visit cltairport.com.

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
v 26.2 July 2014

Public Meeting NOTICE

Noise Exposure Maps

Continued from front page

What are the goals of a Noise Exposure Map?

Noise Exposure Maps quantify aircraft noise and identify land use incompatibilities that exist today and in the future, educate the public about the Airport and activity that occurs at the Airport and enable land use planners to make decisions about future development to ensure noise compatibility.

How are noise levels presented?

Noise levels are presented in terms of the Day-Night Average Sound Level (DNL) metric, which is a function of the loudness and frequency of noise events on an average-annual day. DNL adds a 10 decibel penalty to noise that occurs at night (10 p.m. – 6 a.m.). A 65 DNL is the level at which noise-sensitive land uses are considered to be incompatible without treatment to reduce interior noise levels (sound insulation).

How long is noise data collected?

Existing noise conditions are based on 12 months of data. Future condition projects noise levels five years into the future and take into account any changes (physical or operational) that may have an effect on the noise levels around the airport. ■

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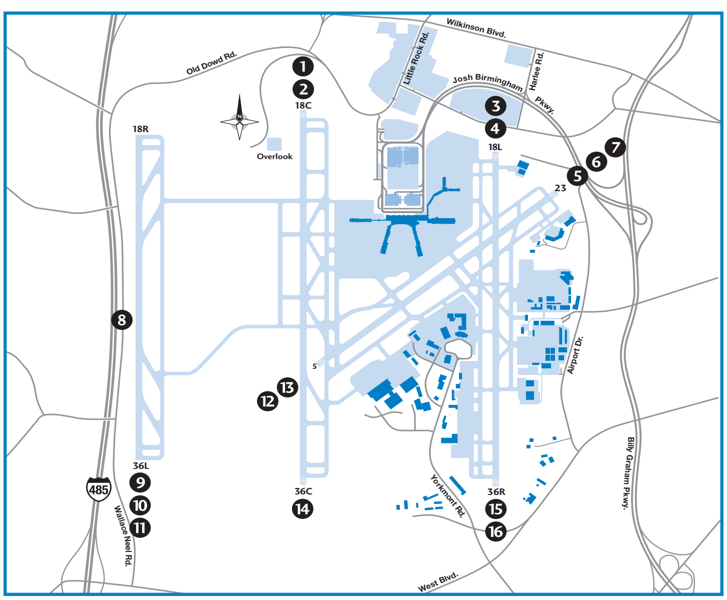
What is the Neighborhood Task Force?

In 1989, CLT's Airport Advisory Committee established the Neighborhood Task Force (NTF) in order to link directly surrounding communities. The Task Force consists of those living in neighborhoods closest to the Airport's runways. The 16-member group meets regularly in an effort to keep nearby residents informed about Airport issues and voice neighborhood concerns.



1. Jerry Hunter, 2222 Sam Wilson Rd.
2. Dean Haskett, 7801 Laine Rd.
3. Carol Taylor, 2308 Toddville Rd.
4. Ronald Sills, 2831 Larry Dr.
5. Archie Hargett, 5200 Wilkinson Blvd.
6. George Kuebler, 2601 Baystock Rd.
7. Edith Herron, 4315 Morris Field Dr.
8. Marie Ryberg, 4344 Rockwood Rd.
9. Debbie Sutton, 8912 Dixie Dr.
10. Lester Covington, 11401 Antebellum Dr.
11. Jack Zeock, 15623 DeHavilland Dr.
12. Bill Shaw, 10813 Garrison Rd.
13. Tim Gilbert, 9401 Markswood Rd.
14. Paul Bell, 8929 Steeleberry Dr.
15. Katie Simmons, 2103 OHara Dr.
16. Rick McCombs, 4311 Eagle Lake Dr.

North Carolina } ss

Mecklenburg County }

The Charlotte Observer Publishing Co.
Charlotte, NC
Affidavit of Publication

Charlotte Observer

REFERENCE: 355155 LANDRUM & BROWN

0001154286 PUblic meetings on noise exposure map

Before the undersigned, a Notary Public of said County and State, duly authorized to administer oaths affirmations, etc., personally appeared, being duly sworn or affirmed according to law, doth depose and say that he/she is a representative of The Charlotte Observer Publishing Company, a corporation organized and doing business under the laws of the State of Delaware, and publishing a newspaper known as The Charlotte Observer in the city of Charlotte, County of Mecklenburg, and State of North Carolina and that as such he/she is familiar with the books, records, files, and business of said Corporation and by reference to the files of said publication, the attached advertisement was inserted. The following is correctly copied from the books and files of the aforesaid Corporation and Publication.

PUBLISHED ON: 07/18/2014, 07/28/2014

AD SPACE: 15.00 INCHES

FILED ON: 08/29/2014

Public Information Meetings
On Noise Exposure Map Update Study

Charlotte-Douglas
INTERNATIONAL AIRPORT

The meetings will be held at the following times and locations:

Wednesday, July 30, 2014	Thursday, July 31, 2014
6:00 pm to 8:00 pm	6:00 pm to 8:00 pm
at:	at:
Charlotte-Mecklenburg West Service Center	Steele Creek Presbyterian Church
4150 Wilkinson Boulevard	7407 Steele Creek Road
Charlotte, NC 28208	Charlotte, NC 28217

The same information will be presented at both meetings.
No formal presentations are planned – stop in anytime.

More information about the Noise Exposure Map Update is available online at:
http://www.airportsites.net/CLT-NEM

NAME: ______________ TITLE: Acctg Clerk

DATE: AUG 31 2014

In Testimony Whereof I have hereunto set my hand and affixed my seal, the day and year aforesaid.

Notary: ______________ My commission Expires: ___/___/___

My Commission Expires May 27, 2016

CLT Noise Exposure Map Update
Public Open House #1
July 30, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Kimberly Bassett	1447 Quail St. Charlotte, NC 28214	704-968-6039	
2	Rollie J. Walker	1509 Wickham Charlotte NC 28208	704 377 6291	
3	Eric Rysdon			eric.rysdon@RSandH.com
4	Sheila Washington	6925 Dixie River Rd 28278	704-588-6765	
5	Laurie McElveen	5220 Plantation Ridge Rd 28214	704 595 7112	laurie.mcelveen@gmail.com
6	Pete McElveen	" " "		pmcelveen@gmail.com
7	Rick Cook	9110 Thayer Rd. 28214	704-394-0307	rcookind@aol.com
8	Anne & Jimmy Miller	2915 Kairnlola Dr 28214	704-392-2989	miller_ANNE0626@att.net
9	Theo Betheal-Layton	1846 Still Pond Ct. 28214	(704) 393-8423	
10	Joe Gilbert	6224 Deepforest Lane Charlotte 28214	704-393-0080	Bluessinger62@aol.com
11	Mara Williamson	5900 Sullins Rd Char, NC. 28214	704-391-2849	mynsorroma@yahoo.com
12	Carol Parker	7401 Honey Flower Pl. Char NC 28214	704-398-1585	mshoneyflower@yahoo.com
13	Billy McLean	7401 " " " "	" " "	wmclean61@.com
14	Lorenna Pinner	2430 Sam Wilson Rd.	704 399 8908	
15	Catherine Mitchell	602 E. 10th St - 28202	704-898-0605	catherine@cmitchellrealty.com
16	Vicky Neal	1601 Little Rock Rd 28214	704-391-3485	vicky.neal@antegroup.com
17	Blondina Reid	1831 Still Pond Ct 28214	704-394-1233	
18	Aida Jacic Kasapovic	6504 Peacehaven Dr 28214		AJACIC@GMAIL.COM
19	Marcia Hunter	2610 Park Ln 28214	704-394-0784	mhunter2@bellsouth.net
20	Greg Phipps	600 E. 4th Street 28202	704-336-3436	gaphipps@charlottenc.gov

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July 30, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Prentice Alexander	1527 Wickham Lane	704 333-5678	
2	Joan Shinn	8500 Fallsdale Dr	704 392-9453	LRMJES@att.net
3	Doug Burnett	1118 Kiker Circle	704-608-4876	dougburnett64@gmail.com
4	Robert Torrence	1316 Lakeway Dr	704-399-7136	Torrench@bellsouth.net
5	Martha McCorkle	1548 Wickham LN 28208	704 377-1744	marthamcco5621@aol.com
6	Rodolfo Joaquin	6220 Rocklake Dr 28214	7042939644	Keenerc17@gmail.com
7	Charles Udoh	1235 Joannas Ct Charlotte 28214	708-817-8919	charlesu@hotmail.com
8	[illegible] T Alexander	3823 [illegible] Dr	704-[illegible]	
9	Sherry Eaves	1120 Hannah Rae Ct. Charlotte 28214	980-200-2231	eaves13579@yahoo.com
10	James C Kay Kendal	2731 Thornton Rd 28208	704 6082592	
11	Jennifer Passantino	606 Tribune Dr 28214	704 2586510	JP17@msn.com
12	Evonne Starling	7023 Flintrock Rd 28214	704-394-9718	Starling1637@yahoo.com
13	Carol Jayla	2308 Toddville Rd 28214	704-392-4575	
14	Linda N. Christian	1200 Reggie [illegible] 28214	704-604-3165	lindachristian@yahoo.com
15	James D Epstein	638 Pecanwood Rd 28214	704-399-4821	Carolyn4821@bellsouth.net
16	Carolyn Palmer	"	"	"
17	Richard Bumgardner	9046 Longview Dr 28214	704-393-7481	FDFRMB@AOL.com
18	Sherrill Hampton	820 East 7th St., Suite 431	(704) 650-3313	shampton@SherrillHampton.com
19	Shirley W. Bolden	2639 Alleghany St 28208	704-394-7853	NONE
20	Earnest Watson	2520 Woodshire Dr 28208	704-391-8765	None

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July 30, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	BOB & SALLYE CAMPBELL	7100 WHITSIDE LN.	704-392-6581	SALLYEBOB@bellsouth.NET
2	Sandy Miller	3701 Davis Ave	704 394-7406	NCSANDY02@AOL.com
3	Beverly Gamble	2119 Heather Glen Ln	704/756-6566	N/A
4	David Merritt	1315 Lakewood Dr	704 451-4188	DAVELYNA@Bellsouth.net
5	Craig Upshaw	2671 E Main St Lincolnton	704-748-6892	craigu@piedcorp.com
6	Martha Goodman	2035 Dove Dr Charlotte NC	704-394-6003	
7	George + Sheila Cooper	6224 Quiet Water Pl 28214	704.395.7811	SPAGE2005@yahoo.com
8	Frank Garner	4200 Welling Ave. 28208		fgarner60@gmail.com
9	Pat Hallinger	328 Glencurry Dr. 28214	704-392-1441	phallinger@aol.com
10	Debbie Smith	8411 Kerrybrook Cir	704-3994657	~~dess1011~~ dcss1011@carolina.rr.com
11	Camelia Bittle	3226 Capitol Drive	980-233-0224	bittlecamelia@aol.com
12	Jodie-Scott Adams	2508 Park LANE Char, NC 28214	704-394-8730	cadams005@carolina.rr.com
13	Loretta Harry	6655 Pawnee Dr. Char. 28214	(704) 399-1774	loharry@bellsouth.net
14	Sandra Medlin	6636 Glenmoor Dr. Char 28214	704-277-5653	Sandra.medlin@wellsfargo.com
15	A.J. Dinsdale	1026 Marietta St " "		
16	A. DOGAN	9600 Center Grove Lane 28214	704 562-7200	[illegible] jodog81@gmail.com
17	Reneé Robbins	2617 Oasis Lane Char. NC 28214	704-392-0765	robbirr@att.net
18	Elaine Lyerly	126 N Main St Belmont 28012	704-5253937	elyerly@lyerly.com
19	SARAH ALLEN	9511 Brookmere Lane 28214	704-516-1972	srb762000@yahoo.com
20	Geraldine Porter	1854 Still Pond Ct 28214	704 506-8842	geraldineporter@att.net

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July 30, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Joel EBERHART	5417 Old Town LA Gastonia	28056	eberhartJ7e aol.com
2	Jerry Bridges	6607 manderley Dr.	28214	BridgesJay@Att yahoo
3	NANCY SKINNER	1833 HART RD	28214	
4	Dennis Whittington	106 Carderock Ct (Coulwood)		dennisrwhittington@yahoo.com
5	Evelyn Newman	6640 Manderly DR.	704 399-1922	—
6	Harvey W. Gouch	5820 Wilkenson Blvd	704-392-5817	Harveygouch@bellsouth.net
7	Ella R. Evans	2732 Capitol Av.	704-392 5145	
8	Lentz Morton, Jr.	8500 Fallsdale Dr.	704-392-9453	
9	MICHAEL HOPRICH	CLT APT NATCA	704-359-1000	
10	Cora Robinson	601 Revolfe St	704-394-4633	
11	Bobby Robinson	601 Revolfe St	704-394-4633	
12	THOMASINA MASSY	2001 Oaklawn Ave.	704-347-0922	
13	Diane Bass	9124 Joyeland Ct	704-308-2545	bmidkiff@Carolina.rr.com
14	CONNIE Bradburn	7212 MARley Cir	704-399-2935	RBradburn@Carolina.rr.com
15	Sharon Ryerson	10235 Harbor Dr. Charlotte	6074265896	
16	Kimberly Reed	8125 Steele creek Rd Charlotte	704-488-4875	reed8125@yahoo.com
17	Lynne Puskas	8038 Laine Rd Charlotte	704-393-7700	LPuskas@carolina.rr.com
18	LORETTA WHITE	7015 DIXIE RIVER RD. CHARL 28278	704-588-6872	lorettawhite07@bellsouth.net
19	Elfredia Brown	3036 Markland Dr Char 28208	704 392 7395	[illegible]@aol.com
20	Ruth Habersham	7116 Cabe Lane 28214	704-904-0023	Rhabersham@aol.com

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July 30, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Darren Cole	P.O. Box 668073 Charlotte, N.C. 28266	704-560-3498	none
2	Joyce Stewart	9841 Walkers Ferry Charlotte	704-399-5153	
3	Chris + Phillis Columbus	7114 Case Lane	704-399-5711	
4	Sylvia Cannon	5447 Elizabeth Rd	704-575-4801	SLCANNON3@CS.COM
5	Charles McGee	6801 Tuckaseegee Rd	704 995 3373	Stanandlynn.mcgee@aol.com
6	Katherine Moyle	6633 Pawnee Dr	704 391-2668	
7	RONNIE WILLIAMSON	7113 MARLEY CIRCLE	704-393-2666	RLW2000@BELLSOUTH.NET
8	Ethel Wyche	1208 EagleRidge Dr	704 351-5341	
9	Ron & Suzanne Sills	2831 Larry Dr	704-392-6969	SILLSRE@Bellsouth.net
10	Michael Armstrong	3527 Talwyn Court	704 548-0045	mwyarm@carolina.rr.com
11	Cheryl DeVault	7901 Kerrybrook Circle, 28214	704/654-8110	ike68tiger@yahoo.com
12	Phyllis Smith	731 Tennyson St	980-207-1669	
13	Mark Dutton	1416 Lakeway Dr	704-393-5690	WDBUDMAN@CAROLINA.RR.COM
14	Odessa Jackson	3119 Narwich Place	704 372-8044	
15	Kim Averitt	2421 Placid Lake Dr	704-393-2493	
16	Carol Blackmon	5400 Dowgate Dr Char. NC. 28208	704 817-9692	—
17	Shane Helms	6742 Wildturkey Ln 28214	704 280 2199	Shane.Helms.NC@Gmail.com
18	Nancy McDonald	3208 Capitol Dr	704-392-3569	
19	LYNN R. SMITH	10901 South Ford Rd.	704-502-8296	LYNNRSMITH23@YAHOO.COM
20	Avis Meeks	6610 Wesbrook Dr CLT 28214	704 458 4889	avismeeks@ureach.com

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1	Melia Lyerly	126 N. Main St. BLMT, NC	704-996-4607	mlyerly@lyerly.com
2	Rhonda Nickerson	1332 Plumstead Rd Char NC	704-533-4136	
3	DEBRA MAYNARD	12213 SHADOW RIDGE LANE	704 622 9546	debra@allfoodmatters.com
4	Rosa Mustafa	8034 Lobilia Lane	704.919.1650	ROSANodge_1@gmail.com
5	Thelma Wright	7727 Lobilia Lane	704-996-7292	twrig428214@hotmail.com
6	Betty Morgan	1020 Ashford St. Charlotte 28214	704-393-9569	BBF.MORGAN@gmail.com
7	John Thomas	4900 Ridgeley Dr	704-398-4421	
8	Dione Thomas	4900 Ridgeley Dr	704 649-2535	
9	Amanda Tucker	2507 Farimi Dr. Char, N.C. 28214	704-392-1237	adtsonc@bellsouth.net
10	Al Austin	City Council		
11	Robert Ashford	732 MARBLE St	704-606-9670	N/A
12	Linda Brown	2610 Park Lane Charlotte 28214	704-394-0784	lbrown5@carolina.rr.com
13	Loretta Bell	2720 Alleghany St Charlotte NC 28208	704 562 5384	
14	Larry K. Nuu	544 RHYNE Rd., CHARLOTTE, N.C.	757-897-9825	ZOONZOA@yahoo.com
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	Name	Address	Phone Number	E-Mail Address
1	Bonita Lueff	2707 Heather Glen Lane	704-399-3419	bonitaluef@carolina.rr.com
2	Tracy Montross			tracy-montross@yahoo.com
3	Ralph Clark	2320 Westerly Hills Dr	704 392-0284	rlclark112@aol.com
4	Mary Cleveland	560 Rhyne Rd	704-399-7779	mpcleve@gmail.com
5	Valerie Lambrecht	2224 Mt Isle Harbor Drive	704-398-3398	vaslamb@hotmail.com
6	Steve "	" "	"	slamNc@gmail.com
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	Name	Address	Phone Number	E-Mail Address
1	REGINALD GREENE	544 RHYNE RD, CHARLOTTE, NC	520-268-1604	REGGIE82237@YAHOO.COM
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Public Open House #1
July 31, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Clyde Polk	8706 Douglas Drive	704-588-0410	—
2	PHIL SEAMAN	12000 Swanee LN	704-588-3701	
3	TERRY Henderson	1739 Teddington DR	704-561-3179	
4	W.P. Lockwood	13914 APPLing LANE	704-588-6612	—
5	Helen Porter	2704 Sadler Rd	704-589 1303	
6	JACK WILCOXON	9016 DOUGLAS DR	704-588-1335	
7	Penny Welsch	13936 Shopton Rd West	704-287-1611	
8	Tom & Cheri Loy	3216 Meadow Stone Ct	704-560-6181	raining0613@yahoo.com
9	George & Beela James	10324 Prairiegrouse Ct	704 567-0378	dandbbj2002@yahoo.com
10	Alfreda Whitfield	8946 Gerald Dr Clt 28217	704-962-2594	AlfredaWhitfield@yahoo.com
11	Pauline Taylor	3324 Sadler Rd 28278	704-393 5841	
12	Scott Telk	463 Cranborne Chase Ft Mill 29708	803-548-0287	
13	Ledell Hudson	5911 Running Deer Rd 28214	704-392-7256	
14	WAYNE CAldwell	1801 Wildlife Rd 28214	704 392 7176	
15	Leslie Egleston	6544 Rocklake Dr 28214	704-399-4881	Egleston4881@BellSouth.Net
16	Jessica Brown	11837 Springpoint lane Clt. 28278	704-578-5995	JessieBe7399@gmail.com
17	Ashleigh Simpson	8307 McAlpine Drive Clt 28217	704 807 4297	alsimpson@novanthealth.org
18	Libby Shipman	14029 Appling Lane CLT28278	704 588 0241	
19	Suzy Garrett	8017 McAlpine dr 28217	704 537 7528	ICanlogothat@gmail.Com
20	EDDIE Stokley	7616 Steele Creek 28217	704-449-6082	StokleysAuto@yahoo.com

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July 31, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	Milas Pearlie Williams	8337 Regs Street	704 596-4461	pearlie.williams@gmail.com
2	Mary Michael	8926 Douglas Drive	704-56	41944.
3	Mr + Mrs John McLaughlin	14108 Brown-Grier Rd	704 588-1269	mjlaughlinj@bellsouth.net
4	Zeb and Sandi Green	9007 DOUGLAS DRIVE	704-588-4212	ZSGREEN2022@yahoo.com
5	Roze Mozer	3883 CREEKS FORK DRIVE	704-504-3883	
6	Dot Townsend	2413 Placid Lake Dr.	704-392-3348	
7	Mario Caraballo	1821 Brim St	704.392-0421	Mario.Caraballo@att.net
8	Debra F. Moore	7912 Douglas Dr.	704-588-0479	
9	Patreece Lanier	2504 Snow Creek Lane, 28273	704-497-5958	drpatreece@gmail.com
10	Paule Jones	2226 Pleasant Dale Dr 28214	704-393-2502	HPJones01@yahoo.com
11	Shirley Moore	9020 Whispering Pines 28217	704-913-7231	edshirl12@bellsouth.net
12	Ed Moore	" " "		
13	DEAN HASKETT	7801 LAINE RD 28214	704 3948657	
14	Anna Wadsworth	7225 meadow run La. charlotte, NC 28277	704-541-6646	ahwadsworth@carolina.rr.com
15	Carnell Jenkins	4813 Lebanon Dr. Charlotte NC	704-588-1441	cjenkins@[illegible]
16	Marie Butler	7800 Sullivans Trace Dr Charlotte 28217-3082	"	mb5505@aol.com
17	PATRICK ANDERSON	3209 BON REA DR CHARLOTTE NC 28226	704-681-5731	PANDERSON1@YAHOO.com
18	JEFF BAREFOOT	4003 TUFFY LN CLT. 28278	704.608-3603	BAREFOOT.PROPERTIES@YAHOO.com
19	Glenda Williams	7837 Sullivans Trace Dr. 28217	704-264-6027	Bigtank1@peoplepc.com
20	Mark Lisy	2035 Mt Isle Harbor Dr. 28214	704-393-5569	mark.lisy@century21.com

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	Name	Address	Phone Number	E-Mail Address
1	Cheryl Sinerly	3208 Sadler Rd 28278	704-394-6211	Cheryl@csinerly.com
2	Katie H Simmons	2103 O'Hara Dr. Charlotte, NC 28273	704-588-0881	KatieSimmons@bellsouth.net
3	Mary Frith	1811 WILDLIFE RD	704-399 6147	frith@BELLSOUTH.NET
4	[illegible]	11501 Red Hickory Ln.	704-491-2340	none
5	Lewis McSwain	4940 Pleasant Way Ln. 28273	704 588 1437	
6	A. & John Freeman	14901 Birnamwood Ln 28278	704-588-4804	
7	Wayne Tidwell	8827 Steelberry Dr. 28217	704 588 5545	waynetidwell2005@aol.com
8	SHANE NANTZ	7803 KERRYBROOK CIR 28214	704-392-3011	KNANTZ@ci.CHARLOTTE.NC.US
9	R.F. MAZARAKIS			
10	Sandra Green	9007 Douglas Dr 28217	704-5884212	ZSGreen2022@yahoo.com
11	Katie Keels	6311 Baltray Rd 28278	704.497.6558	katie.keels@yahoo.com
12	Russell Anderson	8017 McAlpine Dr. 28217	704 904 2457	russanc@hotmail.com
13	Brenda DiModugno	Barrands Lane Charlotte	917-817-3277	
14	Sheila Olsa	1942 Pleasant Glen Rd Clt NC 28214	704-399-3555	Shenicols@aol.com
15	AMAR & USHA DESHAMUDRE	11332 RIDGE OAK DR, CHARLOTTE NC 28273	704 588 9154	amarcd1@gmail.com
16	Marwan & Nicki Shishakly	100 Copper Cove, Mt. Holly	704 812 8190	NMShish2@gmail.com
17	KATHY REINECKER	12608 Moores Chapel Rd CHARLOTTE NC	980-333 6412	KatheKer@yahoo.com
18	Melissa Ferguson	2909 Shopton Rd Char, NC 28217	704-587-7432	fergusonmelissa.c@bellsouth.net
19	Celia Gray	1401 Bear Mtn Rd	704-756 9697	celia@tcgracing.com
20	Johnell SULLIVAN	7515 Double Springs Ct	704/352-6902	JohnellSullivan@yahoo.com

CLT Noise Exposure Map Update
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	Name	Address	Phone Number	E-Mail Address
1	Donna Cook	12101 Charing Grove Ln	704 4004563	dl-cook@outlook.com
2	André Leach	7306 Woodbourne Ln 28273	704-953-2937	andre_leach@yahoo.com
3	Curtis Councel	7306 Woodbourne Ln 28273	704 953 2937	Kurtis_28352@yahoo.com
4	Jimmie Wisenar	7300 Pawtuckett Rd 28214	704-942-8387	JIWCMW@yahoo.com
5	DELORIS DUCKWORTH	14011 PYTCHLEY LN 28273	704-504-0902	LIGHTHOUSE07@ATT.NET
6	Phyllis Madrich	10823 Preservation Park Dr 28214	704-953-1084	PEM8431@Carolina.RR.Com
7	Tom Mason	5017 Pleasant Way Ln 28273	704 588-3746	lmanmason@bellsouth.net
8	Jean Whitley	7240 Melody Lane 28214	704-392-8045	JW7240@AOL.Com
9	PAUL WADSWORTH	7225 MEADOW RUN LN 28277	704.541.6646	PWADSWORTH@CAROLINA.RR.com
10	Lisa Garland	13820 Loch Loyal Drive 28273	704-497-6894	ixasis@bellsouth.net
11	Murry Potts	4613 Sadler Rd 28278	7047241280	murry1960@yahoo.com
12	Reginald Keistler	4025 Rockwood Rd 28214	704 392-9524	
13	Anne Garrison David Oates	4206 Collingham Dr. 28273	704 554 3934	anzpony@aol.com
14	ANDREW ZORICHAK	3972 GRIERS FORK DR 28273	980-233-9168	azorichak@yahoo.com
15	KRISTIN DAVIS	7435 FLODDEN FIELD CT. 28217	704.266.0651	KRISTIN.N.DAVIS@ICLOUD.com
16	Eugene Moore	3804 MARGARET LANE 28214	704-392-0997	
17	Roy + Doris Berryhill	7908 Douglas Dr.	704-5880736	rberryhill@carolina.rr.com
18	KAY DAVIS	4600 Lochfoot DR 28278	704 756 2560	Kaydavis54@yahoo.com
19	[illegible]	638 Pine Forest Rd 28214	980592476	[illegible] 1397080
20	Allen Middleton	606 Grays Creek Ln	704 913 3696	amiddleton6@Hotmail.org

CLT Noise Exposure Map Update
Public Open House #1
July 31, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	James/Susan Chandler	8716 Douglas Dr.	704-867-1142	jrchandler1 c earthlink.net
2	Jim WINTERS	9360 PINEWOOD AVE	704 617 6982	Jim.WINTERS@OUTLOOK.com
3	Wanda Pegues	8814 Cerren Ct	704-277-4283	wpegues13@gmail.com
4	[illegible]	2211 SAM Wilson ROAD	704-393-8341	djones68@bellsouth.net
5	RICHARD WONCURE	458 LEAF ARBOR CT. Clover, SC	803 746 5577	ALPINEL7@AOL.COM
6	Alfred P. Townsend	2413 Placid Lake Dr.	704-392-3348	—
7	Jane Feith	7912 Douglas Dr	704-588-0479	jfeith@carolina.com
8	Antone + Adrienne Scott	2024 DOVE DRIVE	973-986-7201	DREEMOSCO@msn.com
9	Vince SALAZAR	8938 WHISPERING PINES LANE	704-588-7645	—
10	Janet Houston Crane	8308 Kerrybrook Cir	704-392-9999	
11	Charles + Carolyn Renner	9010 Whispering Pines Lane	704-588-2388	buckyr@carolina.rr.com
12	Craig Fish	11411 Ridge Oak Drive	704-264-4341	cfish2009@hotmail.com
13	BEN & W. TAYLOR	2008 WILDLIFE RD.	704-399-4424	—
14	Shayla McDaniel	7233 Kinley Commons Ln Charlotte, NC 28278	937-768-0817	Shayla1.McDaniel@yahoo.com
15	TIM & ELAINE HOOD	11434 ADJEBELLON DR CHAR NC 28214	704-504-5522	LEXIEHOOD@GMAIL.COM
16	Marlin Clevenger	9402 Snow Ridge Ln, Charlotte 28278		mkc28278@yahoo.com
17	Michael Krakowski	3533 Sandy Porter Rd, Charlotte 28273	704.587.1026	mkrako1084@bellsouth.net
18	Martha Bill McFADDEN	11219 CHERRECVIEW DR	704 607 2465	billmcfadden@bellsouth.net
19	JEFF BAUGHMAN	10115 SAW MILL RD		JBAUGHMAN@CAROLINA.RR.COM
20	David Zuppo	8424 Douglas Dr	704-806-9787	

CLT Noise Exposure Map Update
Public Open House #1
July 31, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Carolyn Horton	1907 Dove Dr Charlotte 28214	704 392 2994	
2	Shirlene Hartis	2024 Wildlife Rd. Charlotte NC 28214	704-399-2770	shartis2@att.net
3	James + Melody Nelson	11610 Village Pond Dr CLT, NC 28278	704/277-6926	MMOOREFIELD66@GMAIL.COM
4	Ralph Suttle	7800 Wilkinson Blvd CHLT NC 28214	704 399-3521	rsuttle1@carolina.rr.com
5	David Primm	1610 Plumcrest Dr. 28216	704-398-1271	
6	Blair + Rick McCombs	4311 Eagle Lake Dr 28217	704-588-3846	blair.m38@att.net
7	Ron Kassover	108 Copper Cove Mt. Holly 28120	704-812-8469	ronkass513@gmail.com
8	Fran Reinecke	12608 Moores Chapel Rd	980 333 6412	franeker@yahoo.com
9	Bill Webb	12791 Spirit Bound Way	704 817 4332	
10	Paul Buckley	4206 Steele Oaks Dr	704-588-6159	PAULDBUCKLEY@BLURPS.COM
11	Elizabeth Krabonde	3533 Sandy Porter Rd	704-587-1026	None
12	Earl Bradley	3525 Sandy Porter Rd.	704-588-1906	EARL.BRADLEY@ATT.NET
13	Jackie Wall	4830 Gable Rd	704-588-7348	weldermanwall@gmail.com
14	Mary Jane + Roger Palmer	9800 Shopton Road West	704-588-9482	
15	Kent Main	5509 Eagle Lake Dr	704-336-5721	KMAIN@CI.CHARLOTTE.NC.US
16	Kim Hardee	2406 Madeline Meadow Dr	704 525 3498	khardee71@hotmail.com
17	Sherry Rathod	7528 Buckland Rd.	704-583-3347	drathodace@aol.com
18	David Creasy	15036 Taylor Ridge Ln.	980-207-2931	—
19	Joan Creasy	15036 Taylor Ridge Ln.	980-207-2931	—
20	Mary Coskrey	15626 Albion Ln Charlotte 28278		

CLT Noise Exposure Map Update
Public Open House #1
July 31, 2014, 6:00-8:00 p.m.
SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	RANDEL ROLAND	4804 BENTHAVEN LN. 28269	704-921-1310	RANDEL@RROLAND.COM
2	T DANIELS	PO Box 39324 28278		daniels_terri@yahoo
3	Martha Edwards	7338 Buckland Rd 28278	704-607-7078	msoutbd@carolina.rr.com
4	Sherrie Catledge	9229 Hampton Ln. 28270	704-847-4036	scatledge@earthlink.net
5	Charles Wilson	7413 Captain John Ln 28273	704-527-9469	charlesWilson7413@msn
6	Rebecca Bowman	3252 Beeman Ave 28273	704 726 9670	beccabowman80@gmail.com
* 7	Jolie + Steve Matlock	236 Gringley Hill Rd Fort Mill, SC 29708	803-548-5503	ssmatlock@comporium.net
8	Carla Pettis	1920 MaryAnn Dr 28214	(704) 614-4999	mspettis_003@yahoo.com
9	Mary Wilson	4221 Tyndale Ave. 28210	(704) 552-1570	mecodesign@gmail.com
10	Doug Harris	8406 McAlpine Dr 28217	704 588-7126	harris.douglas@att.net
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CLT Noise Exposure Map Update
Public Open House #1
July 31, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	George Kuebler	2601 BAYStock Rd	704-399-9075	GKuebler1 at HTENET
2	Stephanie Lasne	7818 Douglas Dr.	704-604-1592	slasne@icloud.com
3	TerRy GilberT	9413 MarKswood Rd	704-588-0865	
4	Charles McRorie	7233 Buckland Rd	704-910-3981	cmcrorie@aol.com
5	Tim & Betty Chambers	3038 Morning Mist Lane, Charlotte, NC	704-553-8818	tchambers4@att.net
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Charlotte Douglas International Airport
Noise Exposure Map Update
Public Information Meeting 1 and 2

July 30, 2014 - 6:00 pm to 8:00 pm at the Charlotte-Mecklenburg West Service Center

July 31, 2014 - 6:00 pm to 8:00 pm at the Steele Creek Presbyterian Church

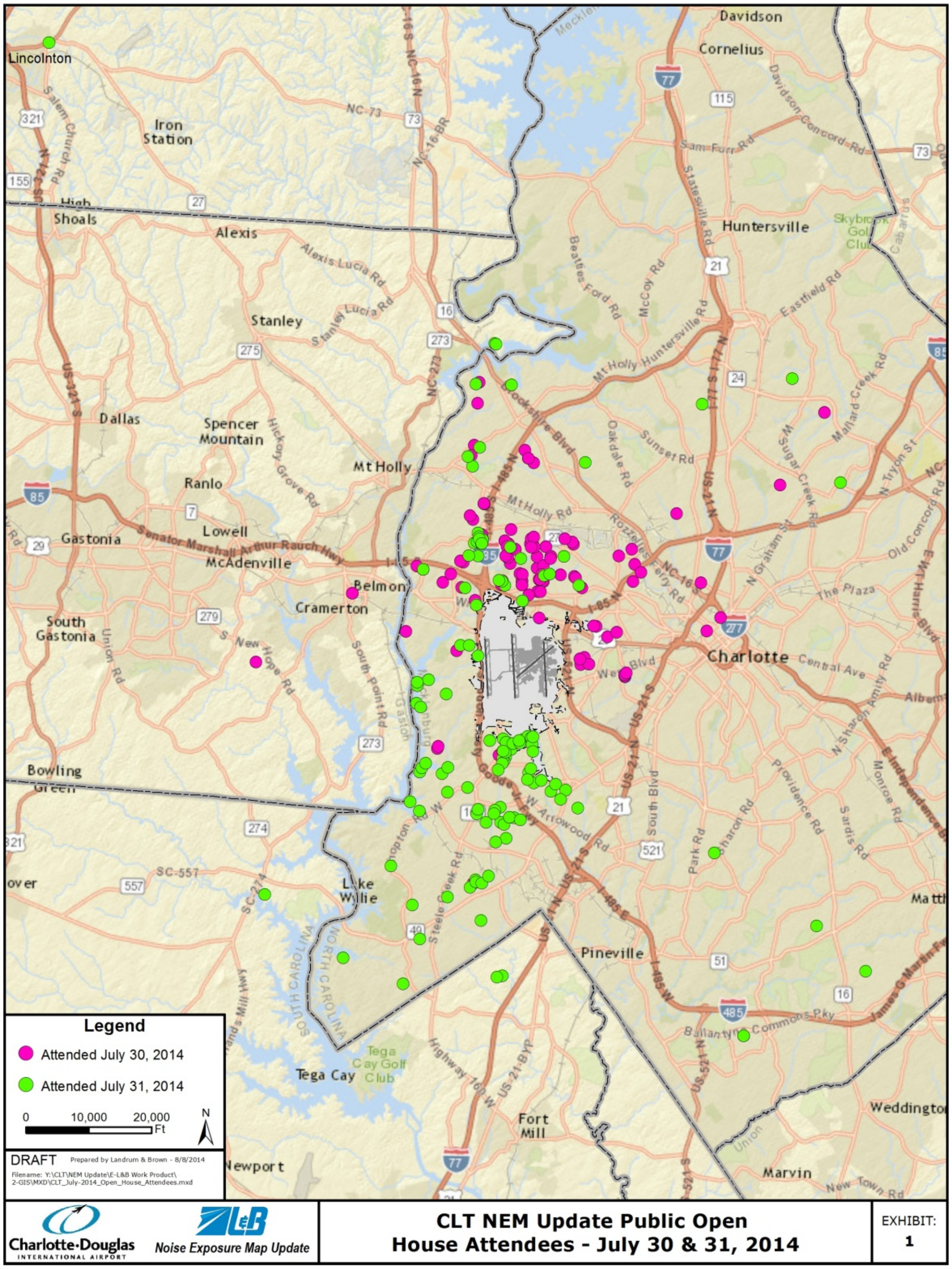
Format and Purpose of the Meeting

The Public Information Meetings were open house sessions intended to allow for the opportunity to provide information to the public regarding the Noise Exposure Map (NEM) Update and allow the public the opportunity to ask questions and provide comments at an early stage in the Study. By design, there was no formal presentation; materials were on display on 30”x40” graphical display boards. Airport and Consultant staff members were available to listen to comments and answer questions. Comment forms were also available for attendees to leave written comments.

Staff in Attendance	
Name	**Organization**
Brent Cagle	City of Charlotte
Jack Christine	City of Charlotte
Jeff McSwain	City of Charlotte
Kathy Dennis	City of Charlotte
Lauren Scott	City of Charlotte
Kevin Hennessey	City of Charlotte
Lee Davis	City of Charlotte
Rob Adams	Landrum & Brown
Chris Sandfoss	Landrum & Brown
Sarah Potter	Landrum & Brown
Suzie Kleymeyer	Landrum & Brown
David Grigg	Arora Engineers

Public Attendance

Based on sign-in sheets, approximately 130 people attended the Public Information Meeting on July 30, 2014 and approximately 160 people attended on July 31, 2014. The Exhibit on the following page shows the locations of the addresses listed by each attendee on the sign-in sheets.


Legend
Attended July 30, 2014
Attended July 31, 2014
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DRAFT Prepared by Landrum & Brown - 8/8/2014
Filename: Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\CLT_July-2014_Open_House_Attendees.mxd
Charlotte·Douglas INTERNATIONAL AIRPORT
L&B Noise Exposure Map Update
CLT NEM Update Public Open House Attendees - July 30 & 31, 2014
EXHIBIT: 1
Davidson
Cornelius
Lincolnton
Iron Station
High Shoals
Alexis
Stanley
Huntersville
Dallas
Spencer Mountain
Mt Holly
Ranlo
Lowell
Gastonia
McAdenville
Belmont
Cramerton
South Gastonia
Charlotte
Bowling Green
Lake Wylie
Pineville
Tega Cay
Fort Mill
Weddington
Marvin
Newport

Charlote·Douglas
INTERNATIONAL AIRPORT

Materials on Display

Display boards were presented to provide information regarding the specific methodology and inputs into a Noise Exposure Map (NEM) Update. Information presented on the display boards included the following topics:

- Introduction to Noise Exposure Map Update
- Aircraft Noise Modelling Methodology
- Input Data Collection
- Noise Measurement Program
- Next Steps

Copies of the display boards are included as **Attachment 1**.

Meeting Photos

July 30, 2014 – Charlotte Mecklenburg West Service Center

Meeting Photos

July 31, 2014 – Steele Creek Presbyterian Church

Charlotte·Douglas
INTERNATIONAL AIRPORT

Summary of Comments Received

There were a total of 61 people (or couples together) that submitted comments on the comment forms provided or via email. In many cases, individuals commented on more than one topic. In general, a total of 141 comments were made by the 62 people. The chart below summarizes the comments by topic.

Comment Topic	**Number of Comments**
Noise monitoring	23
Noise (General)	22
Vibration/Property Damage	16
Disruption of Speech / Television / Outdoor Activities	12
Aircraft Flight Paths / Altitude	12
Sound Insulation	10
Aircraft Operations	7
Meeting format	7
Nighttime / Early Morning Noise	7
Sleep Disruption	7
Study Process / Methodology	4
Environmental/Air Quality	2
Property Values	2
Proposed Runway	2
Request for information	2
Property Acquisition	2
Avigation easements	1
Study Methodology	1
Land Use Planning	1
Safety	1
Total	141

The topic in which the greatest number of people commented was noise monitoring. Specifically, several people requested noise monitoring be conducted in the vicinity of their home. A noise monitoring program occurred following the Public Open House. This program consisted of long-term monitoring for five continuous days at eight locations around CLT, and short-term monitoring for approximately one hour at over 30 more locations. Attendees at the Public Open House were offered the opportunity to request locations at which noise monitoring could be conducted. Efforts have been made to conduct monitoring at or very near to all the locations requested.

A large percentage of the other comments received were regarding aircraft noise and noise-related issues such as disruption of speech or other activities, vibrations, and noise associated with nighttime aircraft operations. A copy of all the comments received is included as **Attachment 2**.

ATTACHMENT 1
PUBLIC MEETING DISPLAY BOARDS

Welcome!

to the

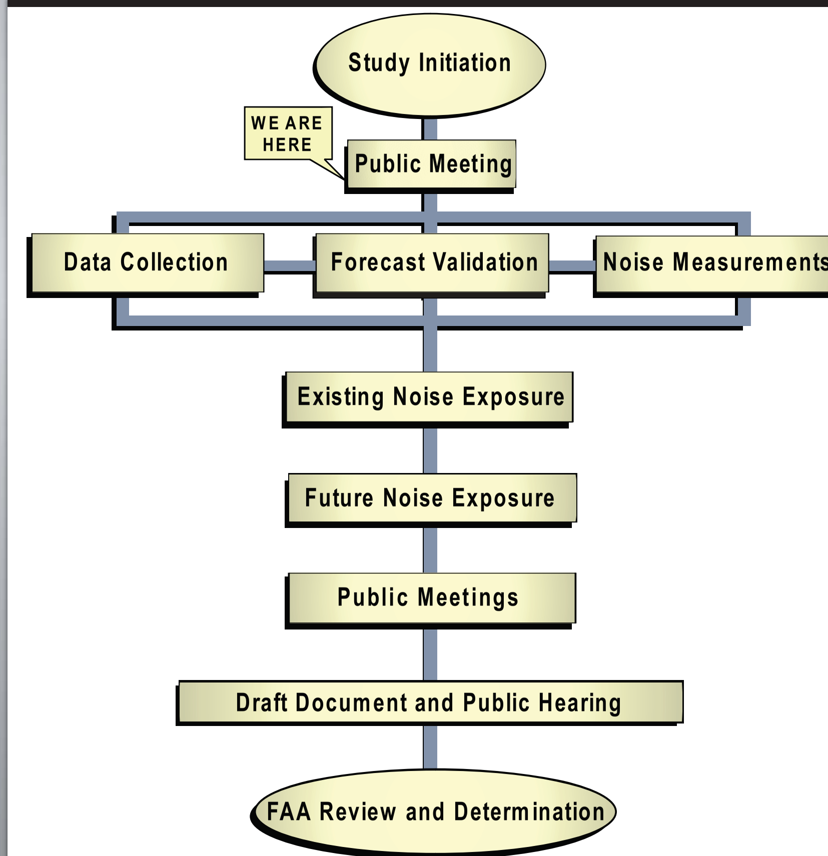
Public Information Meeting

for the

Noise Exposure Map Update

Charlotte-Douglas International Airport

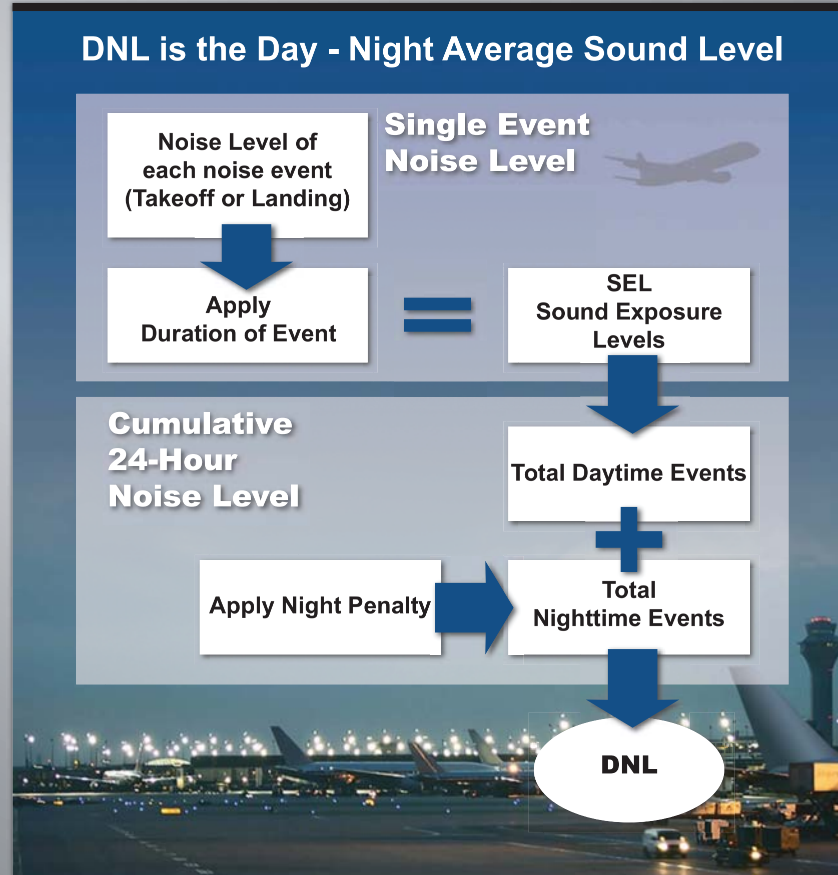
Noise Exposure Map Update Process



History of Noise Compatibility Planning at Charlotte Douglas International Airport (CLT)

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
- 2014/15 Noise Exposure Map (NEM) Update
  - This NEM Update will prepare NEMs for Existing (2015) and Future (2020) Conditions for CLT

What is DNL?

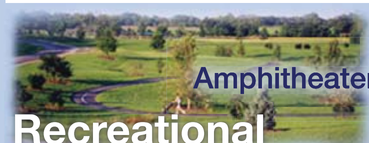


Land Use / Noise Sensitivity Matrix

Per Part 150:
Compatible — Compatible with Sound Insulation — Incompatible

Land Use	Use	OUTDOOR NOISE LEVEL < 65 DNL	65-75 DNL	75+ DNL
Residential	1-2 Family	Compatible	Compatible with Sound Insulation	Incompatible
	Multi-Family	Compatible	Compatible with Sound Insulation	Incompatible
	Mobile Homes	Compatible	Incompatible	Incompatible
	Dorms, etc.	Compatible	Compatible with Sound Insulation	Incompatible
Institutional	Schools	Compatible	Compatible with Sound Insulation	Incompatible
	Place of Worship	Compatible	Compatible with Sound Insulation	Incompatible
	Hospitals	Compatible	Compatible with Sound Insulation	Incompatible
	Nursing Homes	Compatible	Compatible with Sound Insulation	Incompatible
	Libraries	Compatible	Compatible with Sound Insulation	Incompatible
Recreational	Sports/Play	Compatible	Compatible	Incompatible
	Amphitheaters, Music Shells	Compatible	Incompatible	Incompatible
	Camping	Compatible	Compatible	Incompatible
Commercial	All Uses	Compatible	Compatible	Compatible
Industrial	All Uses	Compatible	Compatible	Compatible
Agricultural	All Uses	Compatible	Compatible	Compatible





How Noise Contours are Generated

User Inputs

Inputs	Source
Airport Information	Airport Layout Plan
Aircraft Flight Tracks	FAA Radar Data
Aircraft Fleet	Tower, Airport Records, Official Airlines Guide (OAG)
Number of Operations	Tower, Airport Records, OAG
Runway Utilization	Radar/Wind Data, Airport Records
Time of Day	Radar Data, OAG, Airport Records
Aircraft Climb Profiles	INM, Radar Data, Airline Records
Departure Trip Length	OAG
Meteorological Data	Climatic Data, Airport Records
Topographic Data	Airport Layout Plan, U.S. Geological Survey

Integrated Noise Model (INM)

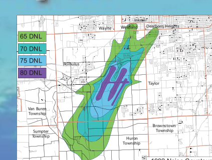
INM-Provided Information

- Aircraft Noise Levels
- Aircraft Performance Data

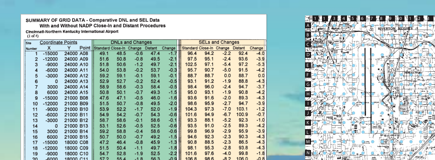
Types of Aircraft Noise Considered within INM

- Arrival
- Departure
- Flyover
- Reverse Thrust (Braking)
- Run-up Noise

Output



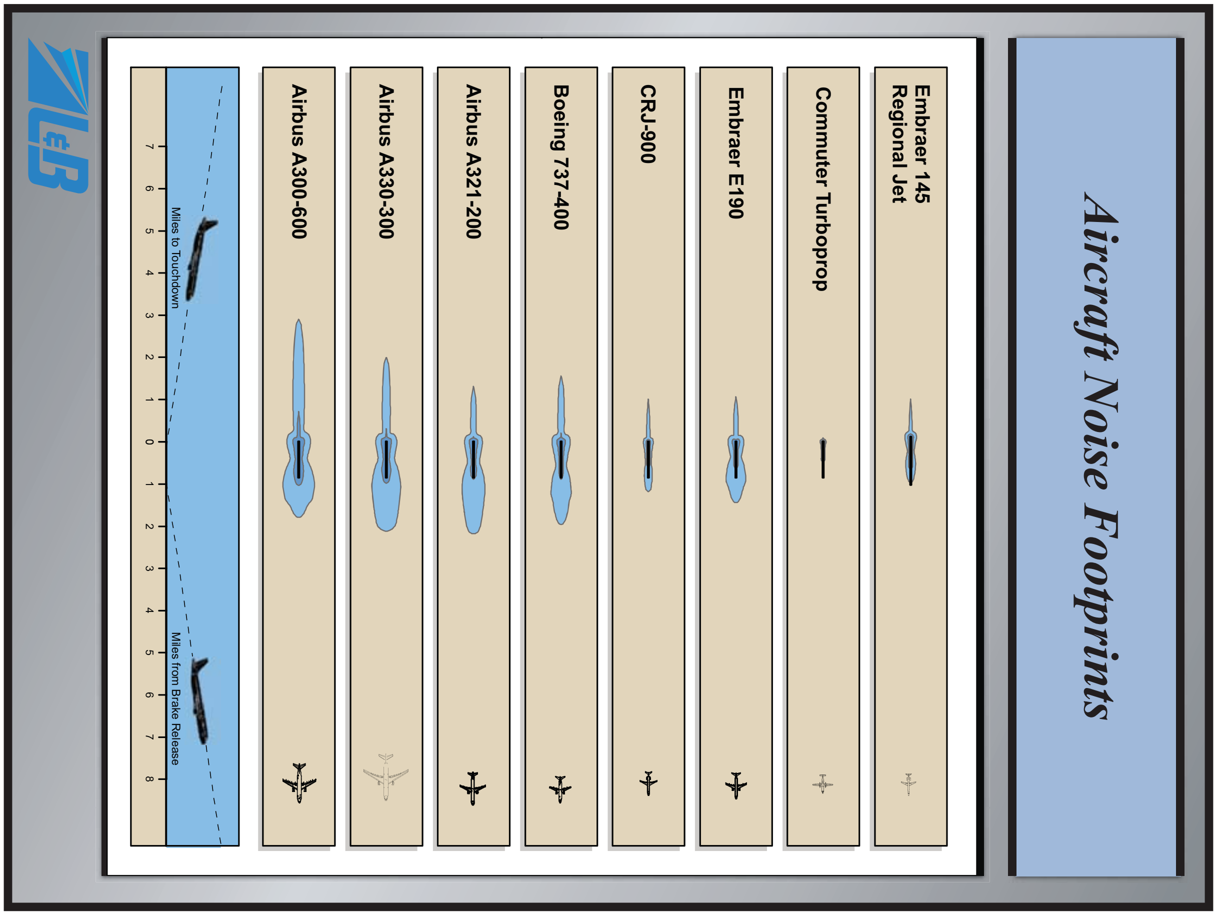
Noise Contours

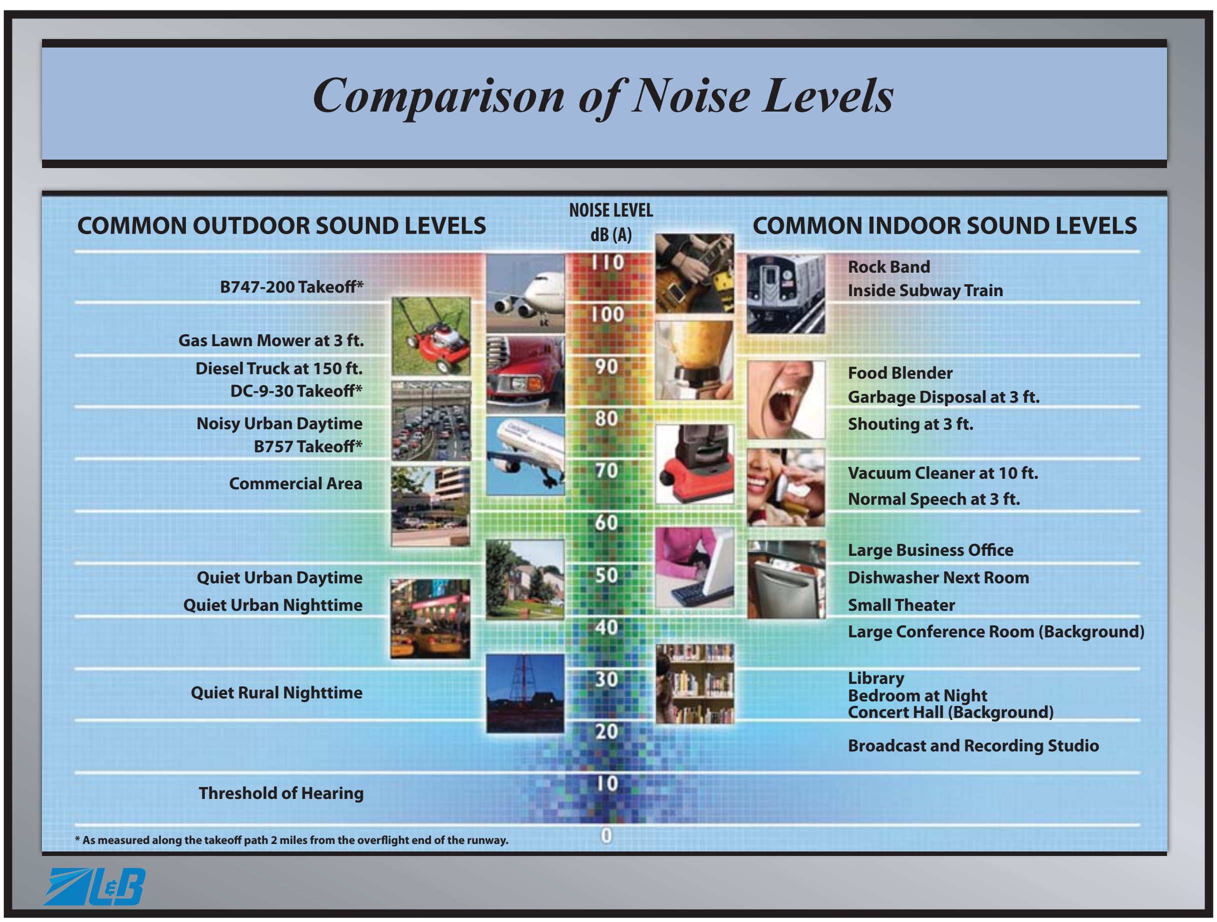


Tabular Reports

Grid Point Analysis

Note:
OAG: Official Airlines Guide


Aircraft Noise Footprints
Embraer 145 Regional Jet
Commuter Turboprop
Embraer E190
CRJ-900
Boeing 737-400
Airbus A321-200
Airbus A330-300
Airbus A300-600
Miles to Touchdown
Miles from Brake Release

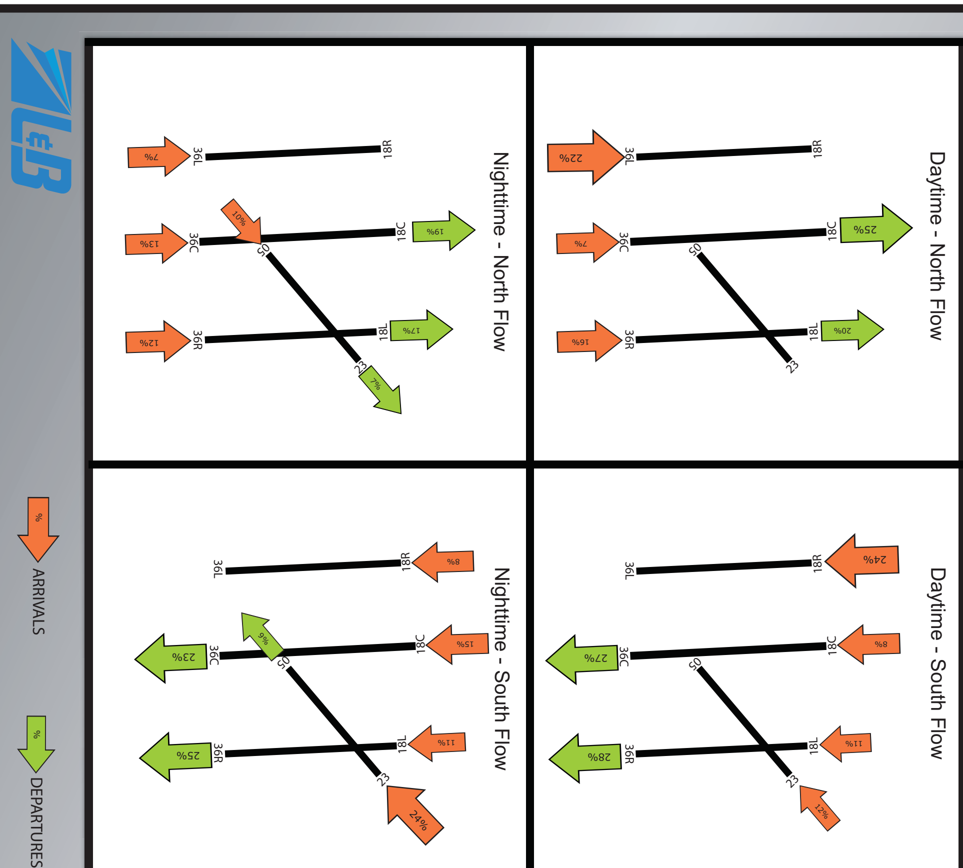

Comparison of Noise Levels
COMMON OUTDOOR SOUND LEVELS
NOISE LEVEL dB (A)
COMMON INDOOR SOUND LEVELS
110
Rock Band
Inside Subway Train
B747-200 Takeoff*
100
Gas Lawn Mower at 3 ft.
Diesel Truck at 150 ft.
DC-9-30 Takeoff*
90
Food Blender
Garbage Disposal at 3 ft.
Noisy Urban Daytime
B757 Takeoff*
80
Shouting at 3 ft.
Commercial Area
70
Vacuum Cleaner at 10 ft.
Normal Speech at 3 ft.
60
Large Business Office
Quiet Urban Daytime
Quiet Urban Nighttime
50
Dishwasher Next Room
Small Theater
40
Large Conference Room (Background)
Quiet Rural Nighttime
30
Library
Bedroom at Night
Concert Hall (Background)
20
Broadcast and Recording Studio
Threshold of Hearing
10
0
* As measured along the takeoff path 2 miles from the overflight end of the runway.

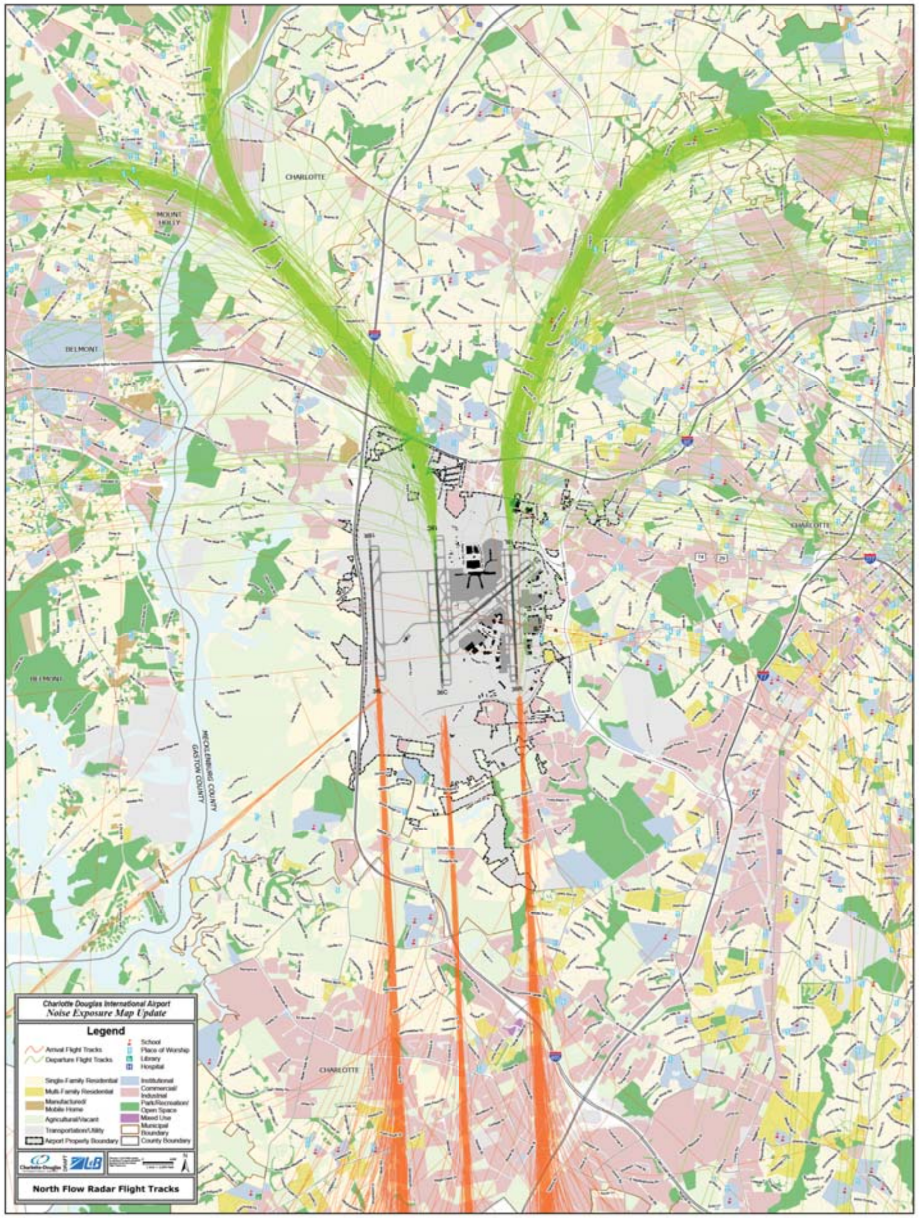
Existing Operating Levels and Fleet Mix

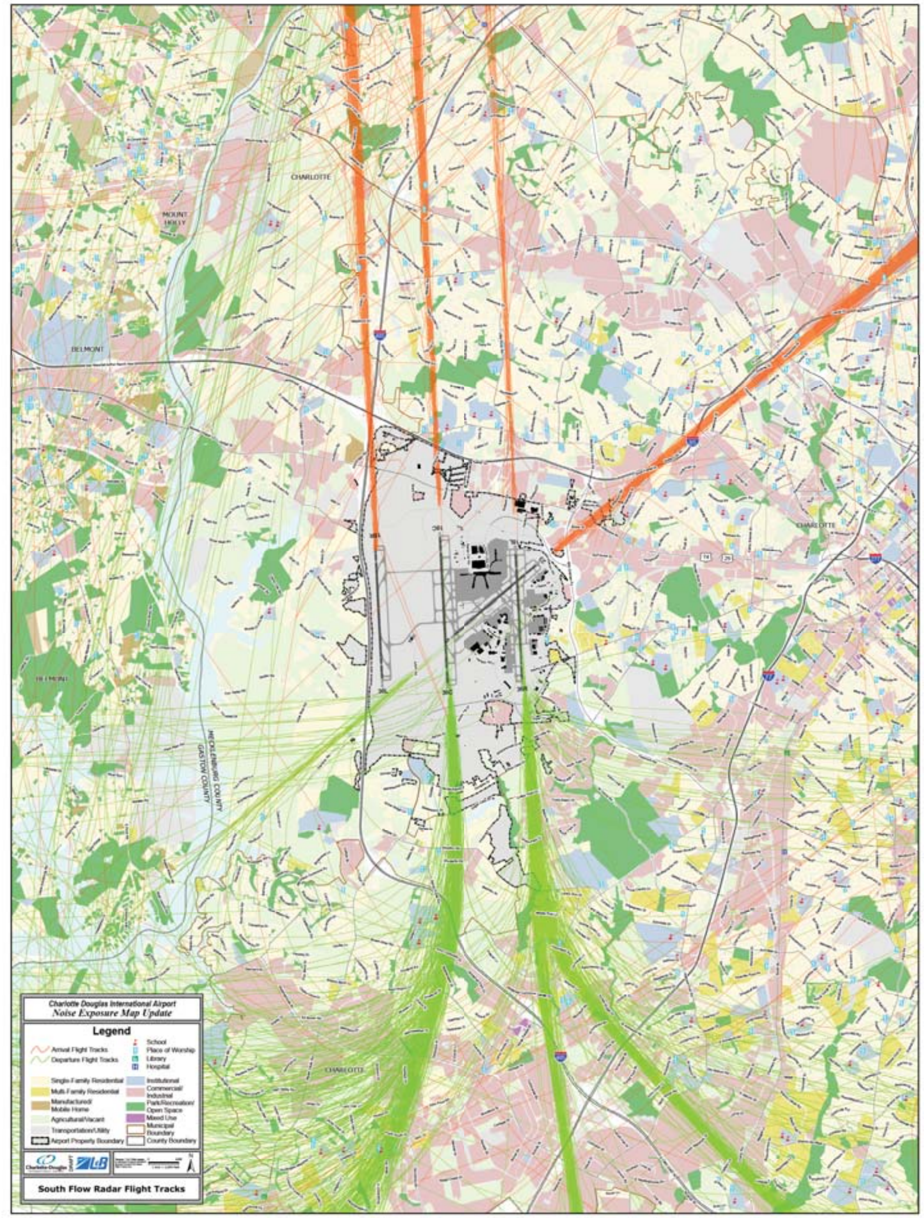
Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy/Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-700	737700	9.1	10.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	<0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	5.2	11.4
Airbus A320-200	A320-232	81.2	98.8
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.8*	*1,289.2*

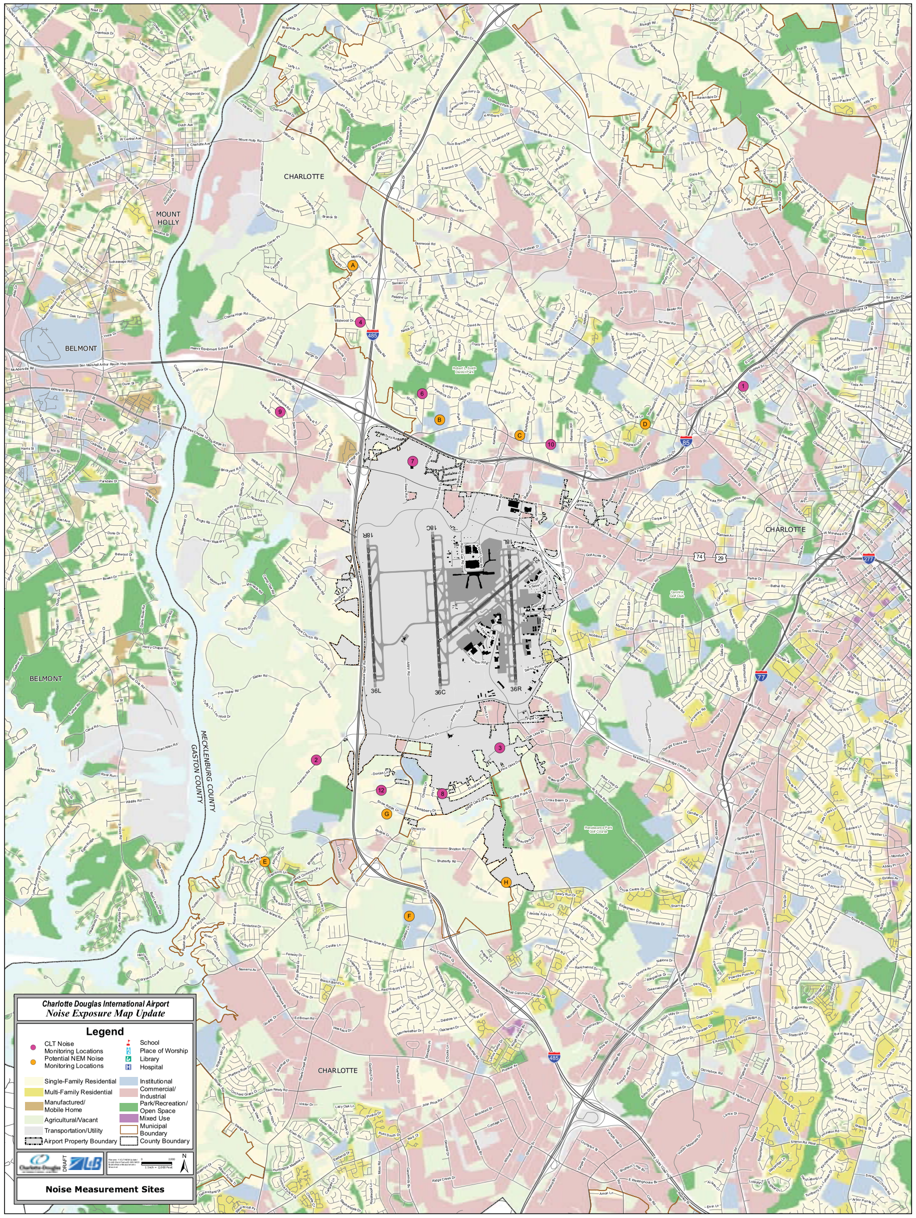
Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.7	1.0
Business Jet	CL600	4.1	5.9
Business Jet	CL601	2.7	4.0
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.4	3.5
Business Jet	CNA510	1.3	1.9
Business Jet	CNA55B	1.7	2.5
Business Jet	CNA750	1.4	2.0
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	4.0	5.8
Business Jet	GIV	4.1	6.0
Business Jet	GV	2.7	3.9
Business Jet	LEAR35	13.4	20.5
Business Jet	MU3001	12.0	17.3
Subtotal		*388.9*	*402.5*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	5.0	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	1.0
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.7
DASH 6	DHC6	4.4	4.2
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.8	4.2
Single-Engine Piston	GASEPV	4.7	3.0
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*146.7*	*149.4*
Military Aircraft			
Lockheed C130 Hercules	C130	2.5	3.8
Subtotal		*2.5*	*3.8*
Grand Total		**1,517.4**	**1,879.4**

Existing Runway End Utilization




CHARLOTTE
MOUNT HOLLY
BELMONT
MECKLENBURG COUNTY
GASTON COUNTY
Charlotte Douglas International Airport
Noise Exposure Map Update
Legend
Arrival Flight Tracks
Departure Flight Tracks
School
Place of Worship
Library
Hospital
Single-Family Residential
Multi-Family Residential
Manufactured/ Mobile Home
Agricultural/Vacant
Transportation/Utility
Airport Property Boundary
Institutional
Commercial/ Industrial
Park/Recreation/ Open Space
Mixed Use
Municipal Boundary
County Boundary
North Flow Radar Flight Tracks


CHARLOTTE
MOUNT HOLLY
BELMONT
MECKLENBURG COUNTY
GASTON COUNTY
Charlotte Douglas International Airport
Noise Exposure Map Update
Legend
Arrival Flight Tracks
Departure Flight Tracks
School
Place of Worship
Library
Hospital
Single-Family Residential
Multi-Family Residential
Manufactured/ Mobile Home
Agricultural/Vacant
Transportation/Utility
Airport Property Boundary
Institutional
Commercial/ Industrial
Park/Recreation/ Open Space
Mixed Use
Municipal Boundary
County Boundary
South Flow Radar Flight Tracks



Next Steps

- Noise Monitoring Program
  - Late July through Early August
- Prepare "Preliminary Draft" Noise Exposure Contour for review
  - Fall 2014
- Conduct Second Round of Public Information Meetings
  - Fall 2014
- Comments may be submitted tonight or online at:

website: http://www.airportsites.net/CLT-NEM

email: CLT-NEM@Landrum-Brown.com

ATTACHMENT 2
PUBLIC OPEN HOUSE COMMENTS

COMMENT FORM

PUBLIC INFORMATION MEETING

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

July 30 & 31, 2014, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by August 22, 2014.

Betty Morgan - 1020 Ashford St. - off Little Rock Rd.

Plane g fly to low - and 12-3000AM - in morning - planes - rack - the windows of my House. house build in 1996 - Walls are cracking - I call the airport - all I get is a letter. - ~~not~~ that does not mean a thing. Now you are building a new runway. Please Help.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Betty Morgan

Address: Please monitored the noise at 1020 Ashford St. Charlotte off - Little Rock

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

July 30 & 31, 2014, 6:00 p.m. to 8:00 p.m.

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I WAS UNDER THE IMPRESSION THAT WE WERE HERE FOR A MEETING. I ALSO THOUGHT WE WERE HERE TO SEE CONTOUR MAPS.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: RONNIE WILLIAMSON
Address: 7113 MARLEY CIRCLE
CHARLOTTE, N.C. 28214

COMMENT FORM

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106 Cardrock Ct.

Unable to use my patio —
Unable to Keep windows open —

Planes fly directly - directly over my house.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Dennis Whittington
Address: 106 Cardrock Ct.
28214
dennisrwhittington@yahoo.com

COMMENT FORM

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I have a Concern about the Frequency of air Craft traffic at my house and the noise levels. My windows in my house rattle when airplanes fly over. I would like the City and the Airport to look in to it.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Shane Helms

Address: 6742 Wildturkey Ln
Charlotte, N.C. 28214
7042802199

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I do not know what zone I live in, but I know how low planes fly over my house. I can see ~~the~~ every detail on the bottom of the plane. If the occupants looked out windows I could wave to them.

This occurs from 5:30 AM until late PM. Not everyday, but often enough to be bothersome. The drawers in my furniture vibrate and open about an ~~a~~ inch. I have to push them to close. The noise is horrendous.

This did not just start. It has been this way for years. I moved into my home 1-27-1987.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Katherine Moyle

Address: 6633 Pawnee Dr.
Charlotte
704/391-2668

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My family and I have been greatly affected by the noise level from departing and arriving flights. Over the course of the past 30 years, we have been negatively affected. We have endured loud noises on sometimes a consistent basis which have interrupted sleeping, general conversation, and emotional well-being. At this present time, I am suffering with Tinnutis (which occurred last July as a result of closing one runway). I have also incurred financial Expenses in response to cracked ceilings and walls due to the airplane noise.

We are seeking some relief and/or retribution due to this unbearable situation. Please respond!

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Ms. Loretta Harry

Address: 6655 Pawnee Dr.
Charlotte, NC 28214

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I feel this was a waste of time. Charts are well done, and beautiful. The beautiful Charts were not explained as a whole. No one had real answers for real questions, I expected a sit down meeting with the charts being explained to an entire group. A hand out with information should have been given to each person, so we could read it and form our questions, from an informed information. I am leaving the meeting with what I came with "NO Information"

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Ruth Habersham
Address: 7116 Cabe Lane
Charlotte, NC 28214

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We live in the Coulwood Neighborhood, which was greatly impacted when runway 18L opened. Whenever the diagonal runway is closed, we experience periods of intense noise due to aircraft flying directly over our house as often as every 40 seconds for 2 hours at a time.

With the diagonal runway in operation, the noise is not a problem. Our concern is that the contour map being developed will not address the possibility of that runway being closed again as it was last year. Would the contour maps be automatically updated if that happens? Can your computer model use the data you are generating to predict the noise contours with the ~~diagonal~~ diagonal runway closed?

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Joan Shinn & Lentz Morton

Address: 8500 Fallsdale Dr.
Charlotte, NC 28214

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Too Much Noise.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: John E [illegible]
Address: 4900 Ridgeley Dr.
Charlotte, N.C. 28208

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I am within a 5 mile radius of the airport @ the Forest Pawtuckett/Paw Creek Subdivision. At this point it does not appear we are being looked @ for insulation. I would strongly encourage our area to be SERIOUSLY studied. We are a stable family oriented neighborhood w/ families, elderly, + children, schools, churches. It is important that our neighborhood receives this consideration due to the noise, property value, + stability needed to maintain the ~~so~~ area surrounding the airport

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Tara Williamson
Address: 5900 Sullins Rd.
Charlotte, 28214

mynsorroma@yahoo.com

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WE HAVE 3 HOUSES ON YOUR FLIGHTS ZONES
DOING NOTHING BUT INCREASING YOUR BUSINESS
AND MAKING IT HARDER FOR US TO CALL OR
PROPERTY "HOME" WITH ALL NOICE YOU CREATING,
LOT DEPRESION AND DEPRITIATION !
WE HAVING HARD TIME TO SELL IT TOO !

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum brown.com

Name: AIDA JACIC KASAPOVIC

Address: 6504, 6531 PEACEHAVEN DR
6725 MANDERLY RD, 28214
CHARLOTTE

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I live at 2610 Park Lane Charlotte NC, 28214. Depending on the flight pattern, we have had our windows jarring on the front of the house. Should we expect that to continue? Would we have any compensation for new windows that would not jar? Of course, the plane noise is very loud during the time the windows are effected.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum brown.com

Name: Linda P. Brown

Address: 2610 Park Lane
Charlotte, NC 28214

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① I Am concerned about noise and Air traffic presently generated and will be when RUNWAYS are completed.
② I am concerned that the board does not include in Resident from the affected area. Not from Beatties Ford Rd Because it is not impacted
③. I am concern about environmental Impact study for the expansion and when it will be generated.
④ I am concerned about Coal Ash placement being considered at the airport

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Rosa Mustafa
Address: 8034 Lobilia Lane
Charlotte, NC 28214

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I am on the arrival flight path-
Beginning @ 530 A.m. M-F, a little later
Sat and Sunday I use for alarm clock-
The planes Are low enough To see the numbers
of plane. The planes in the evening run as
Late As 12 A.m. I realize this is usually
delayed Flights-
The volume of planes has increased- In addition
now departures fly diagonally - Both west
and east - Higher than arrivals But
the noise is still heard- especially early
evening when outside noise is generally Less-

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum brown.com

Name: Thelma Wright

Address: 7727 Lobilia Lane
Charlotte NC 28214

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I would like a monitor placed in my yard to let you know the noise I put up with.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum brown.com

Name: Amanda D. Tucker

Address: 2507 Tairin Dr.
Charlotte, N.C. 28214
Phone 704-451-2811 Cel

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At the rescent Noise Exposure meeting I suggested that even though my neighborhood is peside the newest runway instead of under a flight path it is full of old mobile homes. On the maps at the meeting it doesn't even show up as a mobile home developement. I think a noise monitor should be placed in the area because it may not be too loud for a residence but it is for mobile homes. Please put a noise monitor in the Parkwood Developement off of Walkers ferry Rd. the streets of Sharyn Drive, Parkwood Drive, Margaret Lane.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Robert Cole

Address: 3803 Margaret Ln, Charlotte, N.C. 28214

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I Live in the Heather Glenn Subdivision and I am very concerned about the Noise level increase. I called CLT approximately 2yrs ago and was inquiring about the noise insulated windows. I was told to call back in August of 2012 and did so. I have not received any additional Information, or solution to the growing noise Level from CLT. Yet they continue to build parking decks and facilities costing thousands, millions of dollars. The Community is a valueable part of CLT as well. Please give us your solutions so that our Quality of life is more than NOISE!

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Carol L. Blackmon
Address: 5400 Dowgate Dr.
Charlotte, N.C. 28208
(704) 817-9692
email: cLbb42@yahoo.com

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I am Cora Robinson, My husband is Robert Robinson We live at 601 Dewolfe St in Beechwood. We are in the Direct Path of the Planes Coming in to land. We have had a monitor in our Backyard for years. When the Dispute Came up the monitoring stopped. We are Constanly seeing something white coming from the planes. I was told this was gas being let out of the Plane. If this is true, why should this be allowed. I am also concerned about the disposal of the Coal Ash I do hope it will not be dropped on this side of the City. If it is What effect will it have on the Homeowners in this Area.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Cora + Robert Robinson

Address: 601 Dewolfe St
Charlotte, NC 28208

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The noise is very bad over my Home.
We built the House 29-30 years ago
Did not realize the air port was
going to put in a run way that was
going to affect us. The planes are
Coming 2-5 minutes apart.
The noise is awful.

Martha Goodman

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Martha M. Goodman
Address: 2035 Dove Dr.
Charlotte N.C. 28214

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I would like to know if you are going to do a buyout on Allegheny St.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Shirley W. Bolden
Address: 2639 Allegheny St
704-394-7853

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I would like an update on what is available to reduce the airport noise. I live on 1846 Still Pond ct. Charlotte, N.C.. As your graphs at this meeting on July 30th, 2014 indicated my home is within the flight path of the airport. I would just want a later date for knowledge of new noise reducing equipment that would be available.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Melvina Bethea
Address: 1846 Still Pond. Ct.

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WOULD LIKE TO HAVE MEETING TO FIND OUT WHERE WE STAND ON NOISE LEVEL. THIS WAS SUPPOSED TO HAVE BEEN A MEETING

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: ROBERT CAMPBELL
Address: 7100 WHITSIDE LN.
CHARLOTTE, N.C. 28214

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I have complaint concerning the noise & frequency of the planes during the course of 24 hrs daily/nitely the planes are flying much more frequently & are louder increasingly. At one point I've recieved info concerning windows & insulation to sound proof & was told repeatedly to call back & was told it wouldn't take place at that particular time if not then, or now When the noise levels are much worse now than before & as stated for the Steele Crk area the windows & insulation was a possiblity yet those are much newer homes & I personally feel my neighborhood & others in the area should be given first consideration. I'd appreciate your immediate attention & look forward to hearing ~~from~~ from you in the very near future

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Beverly Gamble

Address: 2119 Heather Glen Ln
Charlotte, NC 28208
Beverly.gamble0403@gmail.com

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NOISE EXPOSURE MAP UPDATE

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Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by August 22, 2014.

Please check the decible level at my Residence. Planes are usually directly over the house (taking off or landing). Planes shake windows and house.
Address is
6801 Tuckaseegee Rd
Charlotte NC 28214
704 995-3373

Mailing Address 16511 Cabarrus Rd
Charlotte NC 28227

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Charles S. McGee

Address: 6801 Tuckaseegee Rd
Charlotte NC 28214

evaulation

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
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I would like the address of: to be monitor
1854 Still Pond Ct for the Noise
Charlotte, NC 28214 exposure
Sincerely
Also every time a airplane Geraldine Porter
flies over my TV set goes out
until the plane passes over

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Geraldine Porter
Address: 1854 Still Pond Ct
Charlotte, NC 28214
geraldineporter@att.net

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Please Monitor

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Chris + Phillis Columbus

Address: 7114 Cabe Lane
Charlotte, NC 28214

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Vibrations in house Windows shake
noise Coming from air port
sounds as though, the airplane, is Coming in the house

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Bonita L Bell
Address: 2707 Heather Glen Lane
Charlotte NC 28208
bonitabell@carolina.rr.com

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Where I live the planes are entirely too low. They wake me up and the interruption can prevent going back to sleep. If I am in my yard the planes are very low. Vibration has caused a problem inside.

We moved to this location in 1971 and it has been a problem since that time. Got worse as air traffic increased.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Evelyn Newman

Address: 6640 Manderly Drive
28214
off Little Rock Rd.

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We are building a 165,000 sq ft building at Wilkinson & Boyer St. Can we please get any updates to maps, etc, to help in our planning.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Craig Upshaw

Address: 2671 E Main St
Lincolnton, NC 28092
Craigu@piedcorp.com
704-748-6892

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1.) Showing an existing noise contour (old or new) model would have helpful.

2.) Little trust in how noise levels are measured. Flight patterns, altitude, low cloud cover has a huge variance on ability to hear outside & inside house.

3.) Most people are interested in hearing about replacement windows / noise insolation.

4.) Not brought up before but impact on both 'free' broadcast TV reception and residents ability to take advantage of "lower cost" sattelite T.V.! Both services are interrupted due to aircraft fly over during landing & takeoff.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Doug Burnett

Address: 1118 Kike Circle
Charlotte NC 28214

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HOME LOCATION SOUTH FORD RD @ CORNER OF PINE FOREST

① INCONSISTENCY OF TRAFFIC - ALL OR NOTHING - 1 1/2 STRAIGHT @ 1+ BUT LESS THAN 2 MIN. - 1/2 NOTHING - STARTS BACK UP FOR 1/2 - 3/4 HR, THEN BEFORE 6 AM THE NEXT MORNING - HOW TO GET AN ADVERAGE DECIBEL COUNT

② NOISE MITIGATION - OUTSIDE: STOP CONVERSATION INSIDE W/WINDOWS OPEN - HAVE TO USE TV REMOTE CONTROL - PAUSE TO HEAR TV. W/WINDOWS CLOSE - REPEATED CHANGE OF SOUND (+ EFFECTS AS DIFFERENT PLANE HAVE DIFFERT SOUNDS)

③ CAN START BEFORE 6 AM + GO AFTER 10 PM (BOTH OFTEN) HAVE USED FLIGHT RADAR 24.COM TO TRACK ALTITUDE ON IN-COMING - RANGE 2800 FT - 2200 FT - SOME LOOK LIKE THEY WILL LAND ON PINE FOREST →

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: LYNN SMITH
Address: 10901 SOUTH FORD RD.
28214 704-502-8296
LYNNRSMITH23@YAHOO.COM

CONSERNED ABOUT PROPOSED ANOTHER PARALLEL RUNWAY IN WHICH ARRIVAL FROM NORTH — CURRENLY DIAGONAL TAKES SOME STRESS OFF

CONCERNED — LOST OF PROPERTY VALUE EVEN MORE

Fold Here

Place Stamp Here

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

NEIGHBOR'S INPUT — VIBRATION & NAILS POPPING

MOUNTAIN ISLAND LAKE FRIEND — TV INTERFERENCE

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I filled out seperate comment form
I am a board member of a 136 unit condo complex
'Pawtuckett on the Green" Spyglass Place, Troon lane
& Blackheath Circle are directly under 'northern'
approach to center runway. Please include us (me)
in all notifications of future meetings. We
can muster a lot of support in short notice.
Thanks.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Doug Burnett
Address: dougburnett64@gmail.com
9115 F Spyglass Place
Charlotte NC 28214

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I have lived at this location for 5 years. Since this Time I have noticed that the aircraft Noise seems to Have gotten louder especially during cloudy days. It seems the aircraft fly lower during this weather and the sound reflects off the clouds so loud, it actually makes some of my windows and nicknacks rattle. Outside when a plane flys overhead we have to stop talking until they go by. It also seems that the aircraft start applying airbrakes derectly over my House or just prior to my House. Also they usually start *(or when I notice a lot of noise) flying at just before 6:00 AM every 10 minutes or so. and again at night until 11:00 PM. or so.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Thank-you.

Name: Jill Gilbert & Chris Handel

Address: 6224 Deep Forest Lane
Charlotte NC 28214
Bluessinger62@aol.com

* I would like to have my address monitored escpecially on cloudy days.

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Greetings:
I attended the public inf. meeting for the NEM update for Charlotte Douglas Internal Airport, and below are my comments:
I commend the display of posters. There were four of them depicting daytime and nighttime air traffic. However, handouts would be more helpful for closer public viewing.
There should be an FAA spokesperson at future meetings to explain property locations...

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT NEM@landrum brown.com

Name: Ethel Wyche
Address: 1208 Eagle Ridge Dr.
Charlotte, North Carolina
28214

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Our concern is the late night noise. Planes departing 11:00pm until Midnight or later. We also have difficulty hearing some phone conversations - at all hours of the day and as stated during night time sleeping hours. Would be willing to sell our property for the right price. At one time the airport purchased a right of way over our property - not sure that it is still being observed.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Duke Jones
Address: 2211 Sam Wilson Rd.
Charlotte, NC 28214

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In order to have a more functional meeting it would be better to have the speakers present in a forum discussin rather than have people walk to each speaker.

I would also request that a study be conducted in the Sullivans Trace sub divison especially at the entrance and back of the sub divsion.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Wanda Pegues
Address: 8814 Gerren Ct
Charlotte, NC 28217

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I have been communicating with Mr. Kevin Hennessey for almost a year now. I live at 1942 Pheasant Glen Rd 28214. The plane noise begins at 04:45am every am & does not stop until 02:00 am sometimes. I received 2 letters from Mr. Hennessey in the past stating they're in the progress of updating the noise map. I am about to hire an aviation attorney if I don't hear anything by September 1st, 2014. Please make sure he is forwarded this letter because I have home damage, sleep deprivation & is tired of fixing leaking tires due to the airplane debris falling in my driveway

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Shenita Watson

Address: 1942 Pheasant Glen Rd
Charlotte NC 28214

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My concern is the noise right over the house on take off. Cargo planes are terrible! Can here them pour the power on right over the house. A few times it actually shook the house!
When will they be sound proofing - how soon!!!

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Elizabeth Krakowski
Address: 3533 Sandy Porter Rd
Charlotte,
N.C. 28273

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My most concern is about the noise level at my home. I live on Shopton Rd. which is at the corner of Shopton Rd & Steelecreek (Rte 160). And I get the noise all the time but it seems like Sunday morning, which take off every 5-10 minutes. And the noise level is ~~g.~~ very high. I am not sure if there is anything that can be done to my home insulate some of the noise, but it is worth me knowing.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Glenda Williams
Address: 7837 Sullivans Trace Dr.
Charlotte NC 28217

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The fact the gentlemen mentioned IT was getting quiter - Really! ~~that~~ Planes have doubled yet you show a Contour map from 1996 - the plans sound comes at you from 2-3 at Any one time - yet IT'S Quiter according to your folks here - ~~this was~~ With that few of Sensors how would you get an accurate reading - The meeting was to educate ~~of~~ us - yet nothing mentioned about the new runway that will impact us - the contour map - Accurate mm IT does not even show the 2010 runway so why would we believe the 2015 would take in effect the new runway -

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Russell Anderea

Address: 8017 McAlpine dr
28217

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my home has continuous stress cracks at the doorways. most of my doors won't close or will not open. I have had to change door hinges constantly. my home was built in 1988 It's not settling!! Runway 18L goes right over my home.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Carla Pettis

Address: 1920 Mary Ann Dr
Char NC 28214

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CRUMP ~ THIS IS MY 3RD GO AROUND WITH NOISE. PLANES ARE COMING IN 3 ABREST. I SEE ALL MY NEIGBIRS COMPLAINING MORE EVERY DAY MY PHONE # IS 3995063.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: DWIGHT CRUMP

Address: 638 PINE FOREST RD.
CHARLOTTE N.C. 28214

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I just attended the info session & have several concerns:
- the only monitoring stations are close to the airport preventing realistic data gathering further out
- data input into the model is based on optimum plane noise levels. This does not account for actual levels. As engines and equipment ages, it gets louder. Even a 10% increase could push an area into a higher DNL zone.
- Landing paths are rigid causing a maximum amount of noise in a very narrow band. This should be spread out

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Kenneth TELK
Address: 463 Cranborne Chase
Ft Mill SC 29708

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CAN YOU HAVE SOMEONE TO COME OUT DURING EVENING AND WEEKENDS TO DO NOISE ORDIENCE IN THE WATERLYN COMMUNITY.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: MELODY NELSON

Address: 11610 VILLAGE POND DR.
CLT, NC 28278

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Please buy my home
8706 Douglas Drive
Good Condition

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Clyde Polk
Address: 8706 Douglas Dr.
Charlotte N.C 28217
704-588-0410

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NOISE EXPOSURE MAP UPDATE

July 30 & 31, 2014, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by August 22, 2014.

I would like to suggest a noise monitor station along the Dixie River/ Sadler/ Lochfoot Dr area.
Our concern is the night time flights (late evening until ~~[illegible]~~ early morning)
We do have alot of commuters that go directly over our house and the large ones ~~at night~~ early morning.
Thank You!

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Kay Davis

Address: 4600 Lochfoot Dr
Charlotte NC
28278
704 756 2560

COMMENT FORM

PUBLIC INFORMATION MEETING

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

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Would like to see maximum noise exposure say in 15 minutes. besides just for a day.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Tim Gray
Address: 1401 Bear Mtn Rd
Charlotte, NC.

COMMENT FORM

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WE HAVE BEEN IN THE SAME LOCATION FOR 25 YEARS AND THE NOISE LEVEL HAS INCREASED CONSTANTLY. THE ALTITUDE ON TAKEOFFS AND LANDINGS OVER THE HOUSE HAS DECREASED SIGNIFICANTLY. AT THIS MEETING WE ARE TOLD THAT WE ARE OUTSIDE THE CONTOUR STUDY AREA. SO WE ARE STUCK!!

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: PAUL BUCKLEY

Address: 4206 STEELE OAKS DR.
CHARLOTTE, NC 28273

COMMENT FORM

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I don't See Noise Monitoring devices are located at all the affected areas, after looking at the map (Showing location of Noise Monitoring devices).

I hope whatever results you publish during fall 2014, is fair and realistic.

Maybe More monitoring devices be placed at all affected areas (as shown in take-off & landing noise level maps).

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: AMAR DESHAMUDRE
Address: 11332 RIDGE OAK DR
CHARLOTTE
NC 28273

COMMENT FORM

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Please put a noise monitor in my yard

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Paula Jones

Address: 2226 Pleasant Dale Dr.
Charlotte NC 28214
704-393-2502

COMMENT FORM

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Please put monitor in my yard.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: George & Brela James
Address: 10324 Prairiegrouse Ct
Charlotte, N.C. 28214
704 567-0378

COMMENT FORM

PUBLIC INFORMATION MEETING
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Please take Noise Measurement
At 6544 Rocklake Dr 28214.
It is hard to carry on a conversation
when planes are landing and taking off.

Please Help

Thanks

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Leslie Egleston
Address: 6544 Rocklake Dr.
Charlotte N.C 28214

COMMENT FORM

PUBLIC INFORMATION MEETING
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Libby Shipman
14029 Appling Lane
Charlotte NC 28278
704 588 0741
Hi Kevin - I called you Wed to leave message - know you were busy - I attended the meeting Thursday nite - My development is in a direct flight path for take off and landings - every 2 hrs 6-7 flights each bank - over my house and neighbors - into 11:00 at nite - then at 4:30-5:00 am every morning with west coast red eyes - I am requesting a map of flight tracks and a noise monitor set at my house. Thank you -

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Libby Shipman
Address: 14029 Appling Lane
Charlotte NC 28278

From: Bj Butler <butler.bj@gmail.com>
Sent: Monday, July 28, 2014 8:47 AM
To: CLT-NEM
Subject: CLT Comment

I don't understand why my peace & quiet in and around my home in Cornelius - miles away from Clt/Douglas - has been so drastically reduced in recent months by the noise of low flying passenger jets, obviously on a flight landing pattern. One after the other, some days, they roar overhead continuously.

BJ Butler
20416 Deep Cove Ct
Cornelius, NC

Sent from my iPad

From: Judy Seebach <judyseebach@hotmail.com>
Sent: Wednesday, July 30, 2014 3:55 PM
To: CLT-NEM
Subject: noise

We live in Mountain Island & the airplane noise is unbearable. You can not carry on a conversation outside at night, as the planes are coming in every few minutes & they come in right over the house/lake. My husband was flying in from a trip, he called from the clt airport to ask why the garage door was open - THAT is how close the plane was to our property!
When you go to sleep at night- you can hear them/ and you don't need an alarm to wake you in the am - the planes coming in do that.
Thanks for listening
Judy Seebach
Sent from my iPad

From: Ron Kassover <ronkass513@gmail.com>
Sent: Thursday, July 31, 2014 2:52 PM
To: CLT-NEM
Subject: Air Traffic

I moved to 108 Copper Cove in Mount Holly, NC (a subdivision named Stonewater) three years ago and quickly learned that I was in the flight path of planes heading to Charlotte-Douglas airport. I adjusted to the noise as best as one can. I am generating a complaint as the frequency of planes flying directly over and alongside my house has increased exponentially. I now have hundreds of planes flying directly over or alongside my house from 5:30 in the morning until 10 pm or later at night. The airplane traffic is often continuous with planes flying above my head less than sixty seconds apart. In the past, there would be periods of peace and quiet however, those quiet times are extremely rare and nearly nonexistent.
I have read about Fair Air Charlotte who advocate for greater disbursement of planes however, this group seems to focus on air traffic departing the airport. I want to advocate for greater disbursement of flight paths for those planes arriving at Charlotte-Douglas airport. I spent my career problem-solving with community boards and families regarding supports and services for individuals with disabilities and know that there is always room for improvement. I am now a retired citizen and would like to assist in any capacity toward improving the air noise in my community.

Sincerely,

Ronald Kassover

Sent from my iPad

From: Shirlene and Roy Hartis <Shartis2@att.net>
Sent: Thursday, July 31, 2014 8:06 PM
To: CLT-NEM
Subject: CLT NEM PROJECT

Dear Mr. Rob Adams

I was at the Plublic Meeting tonight for Information update of the ongoing airplane noise in flying over my husband and my house at 2024 Wildlife Rd. in the Wildwood Estate. We were shone the 1996 map.We according to the map was not within the lines to get any kind of
sound protection. You said the 2015 update map is in progress.

Please put us on the list for our house to be monitored for the noise level. We would like Sound proofing windows. The planes fly so low over our house it vibrates our windows and its hard to close them at the top and we can't lock them. I have to constantly close them because the vibrations from the planes causes them to open enough to let insects come inside if we don't get a chance to check on them and close them. Thank you for caring about this matter. Sincerely, Roy & Shirlene Hartis.

From: Mary Alice Frith <frith@bellsouth.net>
Sent: Friday, August 1, 2014 11:49 AM
To: CLT-NEM
Subject: COMMENT FORM

Mr. Rob Adams,

I attended the public information meeting regarding the noise exposure update map last evening. I am very adversely affected by the airport noise in that my home is located under the center line for aircraft approaching the newest parallel runway. I have lived here since 1967. I am also subjected to the noise to a lesser extent from all the other runways, Both landing and departing flights fly directly over my home which is located at 1811 Wildlife Road. (FYI, I have lived here since 1967 and at that point in time, this area was like the Garden of Eden.) Flights are now being banked and as a result I get several periods throughout the day when planes are flying over my home every minute or so for up to an hour at a time and begin around 6:00 AM and often last til past midnight. I have counted up to 45 consecutive landing planes in a single period. Using my yard is completely out of the question and the noise inside my home is more than a little annoying. TV reception is more often than not garbled as the planes fly over. Therefore, I respectfully request you consider this location for a site to monitor the airport noise for the pending noise study. Need for additional soundproofing will be clearly indicated, I believe. To that end I ask for your assistance in having this done ASAP.

Would you be so kind to notify me that you have received and read this email.

Mary Alice Frith
frith@belllsouth.net
1811 Wildlife Rd.
Charlotte,NC 28214
(704)399-6147

From: Mwyarm-Carolina <Mwyarm@carolina.rr.com>
Sent: Sunday, August 3, 2014 9:49 PM
To: CLT-NEM
Cc: mwyarm@carolina.rr.com
Subject: Charlotte Airport Noise Comments
Attachments: Google Map Maker CLT Airport - Mallard Grove_v5.pdf

Thank you for hosting the study. It is critically needed as the public has expressed significant concerns in the University area (see map).

My comments are:

- Respectfully request a temporary or permanent noise monitoring device in the University Area of North Charlotte (suggested area - Norcroft Drive/Harris Blvd). We recently hosted a meeting in the University YMCA which was attended by City and Airport Officials. Individuals expressed a concern that the noise level has changed significantly after the FAA closed runway 05/23 during Oct 2013 - Feb 2014 but reopened in March 2014. The noise level often reads between 60 - 75 decibels using an iPhone application on our cell phones. Something has changed and we are hoping that the noise study will support that the noise level is much higher due to some unexplained change. We are located 12-15 miles from the airport and we would expect the noise level to be more on the level of white noise. However, that is not the case and it is impacting our quality of life.

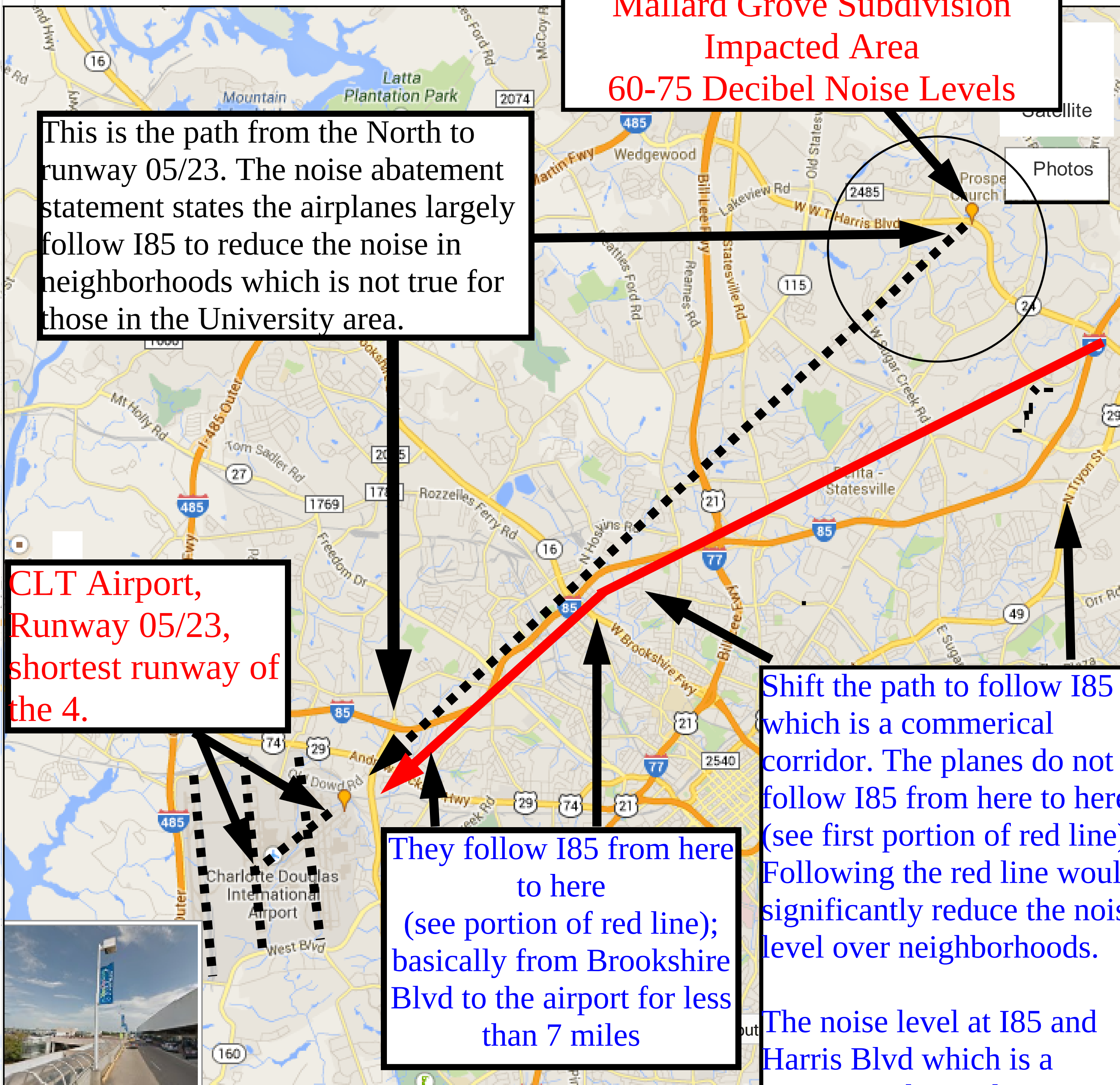
- We also request studying the relocation of the path for runway 05/23. The current path has the planes going over a large swatch of University residents which is unnecessary when we have I85 located about 2 -2.5 miles away and is a commercial corridor. Having the planes use a path over I85 would significantly reduce the noise in the University neighborhoods. We request shifting the path so it "largely" follows I85 until it reaches the Brookshire Blvd **(see attached map).** We have found by shifting the noise level just 1-2 miles it significantly reduces the impact to the neighborhoods. The study should consider flying over the commercial park of the University area versus flying directly over neighborhood homes.

- Generally, the noise level in the affected area begins as early as 6am in the morning and can be heard within neighborhood homes. I personally installed triple pane windows and I can still hear the airplanes which wake me up when they are flying overhead starting at 6am till about 8:30am. Additionally, from 5pm - 9pm the noise level is also hugely distracting such that you cannot enjoy our decks and have a normal outdoor conversation. You cannot use your cell phone and you cannot use your IPAD or any other device outside as the noise level overrides any pleasure.

Michael Armstrong
3527 Talwyn Court
Charlotte, NC 28269
704-548-0045
mwyarm@carolina.rr.com

5501 R C Josh Birmingha

ADD NEW | Edit | Browse



Mallard Grove Subdivision
Impacted Area
60-75 Decibel Noise Levels

This is the path from the North to runway 05/23. The noise abatement statement states the airplanes largely follow I85 to reduce the noise in neighborhoods which is not true for those in the University area.

CLT Airport, Runway 05/23, shortest runway of the 4.

They follow I85 from here to here (see portion of red line); basically from Brookshire Blvd to the airport for less than 7 miles

Shift the path to follow I85 which is a commerical corridor. The planes do not follow I85 from here to here (see first portion of red line). Following the red line would significantly reduce the noise level over neighborhoods.

The noise level at I85 and Harris Blvd which is a commercial corridor is significantly less than 2 -2.5 miles west to the Mallard Grove subdivision whereby the noise level is significantly greater.

This document is for informational sharing purposes only and was developed with access to limited information. Therefore, it may contain inaccuracies, has limited value and cannot be fully relied upon.

From:	Joseph Csensick <jccar959789@outlook.com>
Sent:	Wednesday, August 13, 2014 9:53 PM
To:	CLT-NEM
Subject:	FW: Jet noise in my home

From: jccar959789@outlook.com
To: clt-nem@landrum-brown.com
Subject: FW: Jet noise in my home
Date: Wed, 13 Aug 2014 21:50:15 -0400

What help can you be to people like me????

From: jccar959789@outlook.com
To: 9-aso-ato-cltoapm@faa.gov
Subject: FW: Jet noise in my home
Date: Wed, 13 Aug 2014 19:36:14 -0400

Joseph Csensick 14004 Merganzer CT Charlotte NC 28273 This is a copy of a letter I sent to Mr. Hennessey.

From: jccar959789@outlook.com
To: kmhennessey@cltairport.com
Subject: Jet noise in my home
Date: Sun, 13 Jul 2014 22:38:37 -0400

I have lived at this address for 23 years. I never even thought about calling the airport about airplane noise in or around my home for the first 20 years. I never ever heard a plane inside my home during those years. I hear more planes in my home in one hour than all previous 20 years put together.

In In In your letter you started that I complain from seeing or hearing planes over my home. If you would have listened to my complaints, they are only when I hear planes in my home, keeping me awake after 10P.M., or waking me up in the morning. As for the take off planes, I get a large number of them in the high 60db range to 82db range. Not only do I receive take off planes but I also have landing planes within two homes away. These register in the high 50db range to high 60db range. It seems that these make a high pitched downshifting noise that also enters my home. I counted planes for two days that I heard inside my home, starting at 5:45A.M. Day one count 174. Day two count 203. With 30 to 40 planes after 10P.M. to 12P.M. or later. That is over 70,000 planes a year, with over 14,000 being after 10P.M. I think that you will agree that is an insane number for planes heard inside my home over 7 miles from the airport. I never get a break coming or going on plane noise inside my home ,18 hours a day,365 days a year. The impact on my home has been great. I no longer can enjoy my deck. I no longer can enjoy peace and quite inside my home and I am down to 6 hours of peaceful sleep time a night. I also reported and never received any response on the two reports of near collisions. The one was within 2 seconds of each other, very, very close.

You say there was or is nothing you, the airport, or the city of Charlotte can do about the noise inside my home. Yet there was or still is on RNAV . I have researched the internet all the way back to 2009 and could not find anything of an organized effort by the city of Charlotte, or the airport to have public meetings on RNAV. For example the type that are going on in Minneapolis (www.Minneapolismn.gov/Ward11issues/WOMS1P-096357). They have delayed RNAV on one runway for 2 years and gotten changes on there other runway. If they are receiving changes, why is the city of Charlotte, the airport, not more proactive and receiving changes. Again you say this is not possible, yet it is being done there.

I am more than confident that after you read and review my facts and concerns, you will consider my email as one of the many opportunities to reconsider and reassess the current issue of noise pollution. I am hoping that the prospect of working with the community and neighboring communities could possibly capture the vision that the city and this study truly wishes to embrace and promote. Thank you for your time and I do look forward to hearing back from you. Joseph Csensick. (jccar959789@outlook.com) P.S. Please help me.

From: Stan & Lynn McGee <stanandlynnmcgee@aol.com>
Sent: Thursday, August 21, 2014 8:32 AM
To: CLT-NEM
Subject: Property

I spoke to **Kevin Hennessey** at the community meeting on July 30, 2014 and he advised me that my property at 6801 Tuckaseegee Rd Charlotte, NC qualified for sound insulation. That was about a month ago and I sent my noise complaint in about two months ago and wanted to know where I am in the process. Please contact me at 704-995-3373. Thanks.

Charles Stanley McGee - "Stan"

August 20, 2014

Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

Dear Mr. Adams:

The Charlotte University area needs relief from incessant airplane noise. We understand that living in an urban area will result in some airplane noise. But the changes in the past 1-2 years on the flight paths and the low altitude of the planes have ruined our quality of life at our home and the lives of thousands in this region.

Many days the plane traffic on the diagonal runway 5/23 at Charlotte-Douglas International Airport start between 5:30-6 a.m. and go non-stop many days until 1 a.m. the next morning. Here is an example of a Saturday morning in June 2014 in just a snapshot of time. This pattern goes on nearly daily now.

6, 6:03; 6:06; 6:09; 6:11; 6:14; 6:19; 6:21; 6:23; 6:25; 6:27; 6:29; 6:31; 6:35; :38; 6:39; 6:46; etc.

The step down approach the planes are using now to land on this 5/23 runway are bringing in aircraft sometimes only 1,200 feet above our home. The aircraft is so low one could read a spray-painted message on the bottom of a plane. This step down approach currently being used shakes our home when the brakes on the aircraft are used at this altitude coming into Charlotte. The non-stop parade of planes and the noise they have created has rendered our back patio useless. We wired our patio for cable to watch sports outside. You can't watch sports outside when you have so many planes coming overhead that you cannot hear the television.

I work in local government and have to be ready to answer my phone and move into action at a moment's notice. I cannot sleep with ear plugs or take anything for sleep assistance. So imagine my quality of life with some nights now getting only four hours of sleep due to the plane traffic over the neighborhood. We have to turn up the television in our family room to try to drown out the noise and in order to get work done in our office, I have to wear noise cancelling headphones to concentrate. We should not have to do any of this to live peacefully in our house.

Here's the amazing part of this story. We chose to live where we do because it was far away from the airport yet easy enough to get on the interstate to get there. We live 25 minutes from the terminal, which is approximately 15 miles. But now the FAA and airport has increased flight frequency on Runway 5/23 to over 40 percent capacity, along with putting the approach right on top of our homes, diminishing the value of our homes. Currently, we are facing the hard choice of having to leave University City in the northern part of Charlotte due to the negative effects of the airplane noise. This is very unfortunate since this is one of the most vibrant and diverse areas of the Queen City.

We think that the flight capacity for reach runway should be a more equal percentage which would reduce some of the volume on runway 5/23. It would be great to have each runway have 20-25 percent capacity. We also would strongly recommend the FAA implement a higher gradual arch approach for flights over the current step down approach. This would result in airplanes not have to gear down the engines every 1,000 feet or so and reduce air noise.

Other airports such as John Wayne Airport in Orange County, California, have general aviation noise abatement measures where the planes come in high and then come down to land due to the residential areas. We used to see the planes up high but could hardly hear them. This mode of operation is what needs to occur again so we can regain our neighborhoods and peace in our homes.
We respectfully submit these comments for the Noise Exposure Map study.

Sincerely,

Jean Leier & Jess Avina
3505 Mayspring Drive
Charlotte, NC 28269

From: Reid, Blondina <breid@ci.charlotte.nc.us>
Sent: Thursday, August 21, 2014 5:05 PM
To: CLT-NEM
Subject: Public Information Meeting--Comments

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

Dear Mr. Adams,
I attended the public information meeting on July 30, 2012, I have lived in this area for several years (19 to be exact) and over the years the noise lever from the planes that pass over my home and in the neighborhood have gotten worst. I have experienced interference with my T.V. and radio from planes flying so low you could hear the transmission from the pilots. There has also been times when my house has rumbled from the planes, not to mention the times at night when I was trying to sleep and the planes were passing over one after another. I don't usually complain but I felt this was a great opportunity. A few of my neighbors have discuss this problem and we all agree. I feel there is a problem when I myself have walked in the neighborhood or been at the store (Food Lion) in the parking lot and the planes sometimes have flown so low it almost seems if you could jump high enough that you could touch them. I hope that something can definitely be done to remedy this problem. Thank you

Sincerely,

Blondina Reid
1831 Still Pond Ct
Charlotte, NC 28214
breid@charlottenc.gov

Public Information Meeting 3 & 4
December 3 & 4, 2014

Flyers/Postcards

Newspaper Notice

Registration

Meeting Summary

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CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

v 26.4 November 2014

Public Meeting NOTICE

Noise Exposure Map Update Process FAQs

Charlotte Douglas International Airport is updating its 1996 Noise Exposure Map for 2015 and creating a 2020 map for the future. Below are the most frequently asked questions about the process.

What are Noise Exposure Maps?

Noise Exposure Maps (NEMs) identify the noise impacts of current operating conditions and projected future conditions. Operational conditions included within this analysis will be airport departure and arrival procedures, daytime and nighttime flights and aircraft engine run-ups. Aircraft noise is depicted on the NEMS as noise contours, which show the average noise levels around the Airport.

What is a Noise Exposure Map Update?

A NEM Update is designed to identify noise-sensitive land uses surrounding an airport for existing conditions and for five years in the future. For the purpose of an NEM Update, noise sensitive-land uses are generally defined as residences or public use facilities (libraries, places of worship, schools, nursing homes and hospitals) within the 65 Day-Night Average Sound Level (DNL) noise contour, the area the Federal Aviation Administration (FAA) defines as significantly impacted by aircraft noise.

How is a Noise Exposure Map Update different from a Noise Compatibility Study?

Like NEM Updates, Noise Compatibility Studies identify noise-sensitive land uses surrounding an airport. However, a Noise Compatibility Study also recommends measures to both correct existing incompatible land uses and to prevent future incompatibilities. Both a NEM and a Noise Compatibility Study are guided by FAA regulations found in 14 CFR Part 150.

Why prepare a Noise Exposure Map Update?

The NEMs for CLT were last updated in 1996. The FAA recommends that NEMs be updated periodically to take into consideration changes that may have occurred at the Airport, such as aircraft fleet changes or an increase or decrease in aircraft operations.

What has CLT done to mitigate aircraft noise impacts?

To date, CLT has sound insulated over 1,000 homes. This forthcoming NEM Update will prepare new NEMs that identify properties that are within the 65 DNL noise level based on current conditions and

Continued on back page.

Public Meetings Set for December

The first set of Noise Exposure Map public meetings was held in late July for Airport neighbors to gain information about the process, methodology, ask questions and to share their opinion. More than 250 Airport neighbors attended.

The second set of public meetings will be held:

- 6 p.m. - 8 p.m. Wednesday, December 3 at:
  West Mecklenburg
  High School
  7400 Tuckaseegee Road
  Charlotte, NC 28214

and

- 6 p.m. - 8 p.m. Thursday, December 4 at:
  Olympic High School
  4301 Sandy Porter Road
  Charlotte, NC 28273

Continued on back page.

To receive Neighborhood Update electronically, scan the QR code below or email YouAreFirst@cltairport.com. Place "Neighborhood Update" in the subject line, and enter your name and address in the body of the email.

For more information about CLT, visit cltairport.com.

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

v 26.4 November 2014

Public Meeting NOTICE

Map Update Process

Continued from front page.

conditions expected five years into the future at CLT. These updated NEMs will be the basis for the continuation of the residential sound insulation program at CLT. Based on federal guidelines, CLT can only receive federal funding to sound insulate homes that are inside the 65 DNL noise exposure contour.

How long will the Noise Exposure Map Update take to complete?

The NEM Update began in the spring of 2014. The map update is expected to be submitted to the FAA for review by spring 2015.

How do I comment on the study?

To submit a comment or question regarding the NEM Update, email: clt-nem@landrum-brown.com.

Can operations be restricted at Charlotte Douglas International Airport?

The FAA is the only entity that can manage aircraft runway operations or aircraft in flight at CLT. Furthermore, as a recipient of FAA grant funds, the Airport must abide by FAA-imposed obligations and conditions.

A specific condition prohibits the Airport from restricting or limiting airfield access based on noise or time of day. Airlines have the ability to set flight schedules based on demand at the airport and while airlines may voluntarily limit operations during the late night and early morning, there is no mandatory curfew for aircraft operations at Charlotte Douglas.

Continued below to left.

Charlotte·Douglas
INTERNATIONAL AIRPORT
Public Affairs
P.O. Box 19066, Charlotte, NC 28219
P: 704.359.4000 ■ **F:** 704.359.4030
cltairport.com

Continued from above.

Can flight paths or altitudes of aircraft on arrival be modified to direct overflights away from my house?

The FAA designs flight corridors and aircraft arrival and departure procedures to maximize operational efficiency while maintaining aircraft safety. The Airport has no control over how the FAA designs the airspace around Charlotte.

How can I get involved with the Noise Exposure Map Update as it progresses, and where can I find information?

A series of public information meetings will be held at key milestones during the NEM Update. Open to all, each meeting is designed to make it easy for the public to provide input, ask questions and offer recommendations in a more personal setting. For upcoming meeting dates, visit: www.airportsites.net/CLT-NEM/meetings.htm.

Public Meetings

Continued from front page.

Preliminary draft contours will be on display, as well as several informational graphic boards in an open house style setting. A 30-minute presentation will begin around 6:30 p.m. The open house session will occur from 6 p.m. to 8 p.m. During that time, attendees will be encouraged to ask questions of Airport staff, land use and noise consultants, who will be in attendance before and after the presentation.

To submit a comment or question regarding the Noise Exposure Map Update, email: clt-nem@landrum-brown.com.

The Charlotte Observer Publishing Co.
Charlotte, NC
Affidavit of Publication

North Carolina } ss

Mecklenburg County }

Charlotte Observer

REFERENCE: 155917 CHARLOTTE DOUGLAS INTERI

0001417214

Before the undersigned, a Notary Public of said County and State, duly authorized to administer oaths affirmations, etc., personally appeared, being duly sworn or affirmed according to law, doth depose and say that he/she is a representative of The Charlotte Observer Publishing Company, a corporation organized and doing business under the laws of the State of Delaware, and publishing a newspaper known as The Charlotte Observer in the city of Charlotte, County of Mecklenburg, and State of North Carolina and that as such he/she is familiar with the books, records, files, and business of said Corporation and by reference to the files of said publication, the attached advertisement was inserted. The following is correctly copied from the books and files of the aforesaid Corporation and Publication.

See attached

PUBLISHED ON: 11/21/2014, 11/26/2014

AD SPACE: 15.00 INCHES

FILED ON: 12/08/2014

NAME: [signature] TITLE: Credit Dept Team Lead

DATE: 12/8/14

In Testimony Whereof I have hereunto set my hand and affixed my seal, the day and year aforesaid.

Notary: Judith M Sears My commission Expires: My Commission Expires May 17, 2016 ___/___/___

Public Information Meetings

On Noise Exposure Map Update Study

Charlotte·Douglas
INTERNATIONAL AIRPORT

The meetings will be held at the following times and locations:

Wednesday, December 3, 2014	Thursday, December 4, 2014
6:00 pm to 8:00 pm	6:00 pm to 8:00 pm
at:	at:
West Mecklenburg High School 7400 Tuckaseegee Road Charlotte, NC 28214	Olympic High School 4301 Sandy Porter Road Charlotte, NC 28273

The same information will be presented at both meetings.

Preliminary draft contours will be on display, as well as several informational graphic boards in an open house style setting. A 30-minute presentation will begin around 6:30 p.m. The open house session will occur from 6:00 p.m. to 8:00 p.m., at which attendees will be encouraged to ask questions of Airport staff, and land use and noise consultants who are in attendance before and after the presentation.

More information about the Noise Exposure Map Update is available online at: http://www.airportsites.net/CLT-NEM

CLT Noise Exposure Map Update
Public Open House #2
December 3, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	John Gordon	200 Fite Rd. Belmont, NC	704/460-4738	wishiwas24@yahoo.com
2		28012		
3	David Ferguson	2021 Lanier Ave Charlotte 28205	(704) 537-4898	davidferguson1229@att.net
4	R. Charles Toushie	7700 Tuckaseegee Road	704 399-7934	
5	GARY A. PECK	10424 WILSON GLEN DR CLT 28214	704-[illegible]10-1145	
6	Kimberly Bassett	1447 Quail St. CLT 28214	704-968-6039	
7	TRUNG NGUYEN	1210 YORKDALE DR. 28217	704 626 9331	
8	Bea Roberson	8805 Stoneface Rd. 28214	704-421-4088	broberts93@AOL.Com
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CLT Noise Exposure Map Update
Public Open House #2
December 3, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Mary Wilson	4221 Tyndale Ave, Char, NC28210	704-552-1570	mecodesign@gmail.com
2	Alfred Miles	1204 Yorkdale Dr	7045259791	
3	Shenita Oldsa	1942 Pheasant Glen Rd	704-399-3555	Shenicds@aol.com
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CLT Noise Exposure Map Update
Public Open House #2
December 3, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Jodi Greenwood	11270 Trout man rd midland	704-309-2981	jfgafc@aol.com
2	Jerry Putnam	7051 DeLisa Drive 28214	704 393-9537	N/A
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CLT Noise Exposure Map Update
Public Open House #2
December 3, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Erleen Hamelink	10101 Old Dowd Rd. #6 28214	704-910-3234	ehamelink45@gmail
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CLT Noise Exposure Map Update
Public Open House #2
December 3, 2014, 6:00-8:00 p.m.

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	Name	Address	Phone Number	E-Mail Address
1	W. Shaw	10813 GARRISON Rd	704 840 8044	
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CLT Noise Exposure Map Update
Public Open House #2
December 4, 2014, 6:00-8:00 p.m.
SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	JOYCE A. ROBINSON	1960 ASTON MILL PLACE 28273	704 620-4543	
2	Abi Eiger Helfiker	8938 Gerald Dr	704 698 7144	
3	Gary Helfiker	" "	203-247-4056	
4	Melissa Ferguson	2909 Shopton Rd	704-587-7432	
5	MR. Oscar O. Davis III	2612 O'HARA DR.	704-249-2022	N/A
6	Charlie Taylor	11600 Antebellum DR. Char. N.C.	980-318-2009	N/A
7	Lewis McSwain	4940 Pleasant Way Ln.	704 5881437	
8	DEAN HASKETT	7804 LAINE RD 28214	7043948657	
9	Bill Porter	12137 Taragate 28273	704-588-3330	
10	Delores Cannon	12130 Red Hickory Ln 28273	704 307-7301	
11	Chris FitzGibbon	12900 Seascape Ln Charlotte 28278	704-942-8680	Chris.FitzGibbon@Netzero.com
12	Joe m Kemp	15000 Wiltshire manor Dr.	910-297-5739	—
13	Rose Mozer	3883 Griers Fork Rd.	704-504-3883	
14	Glenn Small	8627 Larchmont Cr	704-394 4209	Cars@CarolinaRR.com
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CLT Noise Exposure Map Update
Public Open House #2
December 4, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Katie H-Simmons	2103 O'Hara Drive Charlotte, NC 28273	704-588-0831	
2	Martha Edwards	7338 Buckland Rd Charlotte 28278	704 607-7078	msoutbd@carolina.rr.com
3	Marian Richardson	12615 Hillstone Ct Charlotte 28273	704-588-8902	
4	Marlin Clevenger	9402 Snow Ridge Lane	704-588-0071	mkc28278@yahoo.com
5	Paul Micalizzi	10234 Withers Rd		
6	Dave Wiggins	13938 Dingess Rd Clt 28273	704-504-5403	info@steelecreekresidents.org
7	SAM FRANKLIN	4030 LOCHFOOT DRIVE CLT 28273	704-675-1474	SFRANKLIN@CURTISSWRIGHT.COM
8	Ron Sills	2831 LARRY DR	704-737-5546	
9	Charles Wilkerson	12009 Regent Ridge Ln 28278	704 504 9348	
10	GEORGE HEGE	11800 BROADWATER LN 28273	704-907-7740	
11	Millers Rick & Laura	8922 English Saddle Ln 28273	704-583-9974	LMiller06@gmail.com
12	Mike Carpenter	4000 Shopton Rd 28217	704-587-0760	
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CLT Noise Exposure Map Update
Public Open House #2
December 4, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Joe Czensick	14004 Merganzer Ct		
2	Daniel Mosely	1920 Ayrsley Town Blvd		
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CLT Noise Exposure Map Update
Public Open House #2
December 4, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Patrick Evans-LeRay	2027 Pheasant Glen Rd	704-393-2301	—
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CLT Noise Exposure Map Update
Public Open House #2
December 4, 2014, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Ken Rollins	4231 Steele Oaks Dr.	704-583-6301	KLRollins@yahoo.com
2	Diane Dolhen	15000 Wiltshire Manor	910 793 4634	———
3	Jeff Barefoot	4003 Tuffy Ln, CLT 28278	704-608-3603	barefoot.properties@yahoo.com
4	Neil Del	2404 Scaredy Run Lane	2044241006	ADMIN@FREYLITUSA.COM
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Charlotte Douglas International Airport
Noise Exposure Map Update
Public Information Meeting 3 & 4

December 3, 2014 - 6:00 pm to 8:00 pm at West Mecklenburg High School

December 4, 2014 - 6:00 pm to 8:00 pm at Olympic High School

Format and Purpose of the Meeting

Public Information Meetings 3 and 4 had two components, a public open house and a formal presentation. The public open house was intended to allow for the opportunity to provide information to the public regarding the Noise Exposure Map (NEM) Update and allow the public the opportunity to ask questions and provide comments at an early stage in the Study. Information was presented on 30”x40” graphical display boards and Airport and Consultant staff members were available to listen to comments and answer questions. Comment forms were also available for attendees to leave written comments. A formal presentation was also given with similar information as the static display boards.

Staff in Attendance	
Name	**Organization**
Brent Cagle	City of Charlotte
Jack Christine	City of Charlotte
Jeff McSwain	City of Charlotte
Kathy Dennis	City of Charlotte
Lauren Scott	City of Charlotte
Kevin Hennessey	City of Charlotte
Lee Davis	City of Charlotte
Rob Adams	Landrum & Brown
Chris Sandfoss	Landrum & Brown
Lisa Schafer	Landrum & Brown
Suzie Kleymeyer	Landrum & Brown
David Grigg	Arora Engineers
Richard Hughes	Arora Engineers

Public Attendance

Based on sign-in sheets, approximately 14 people attended the Public Information Meeting on December 3, 2014 and approximately 34 people attended on December 4, 2014. The Exhibit on the following page shows the locations of the addresses listed by each attendee on the sign-in sheets.

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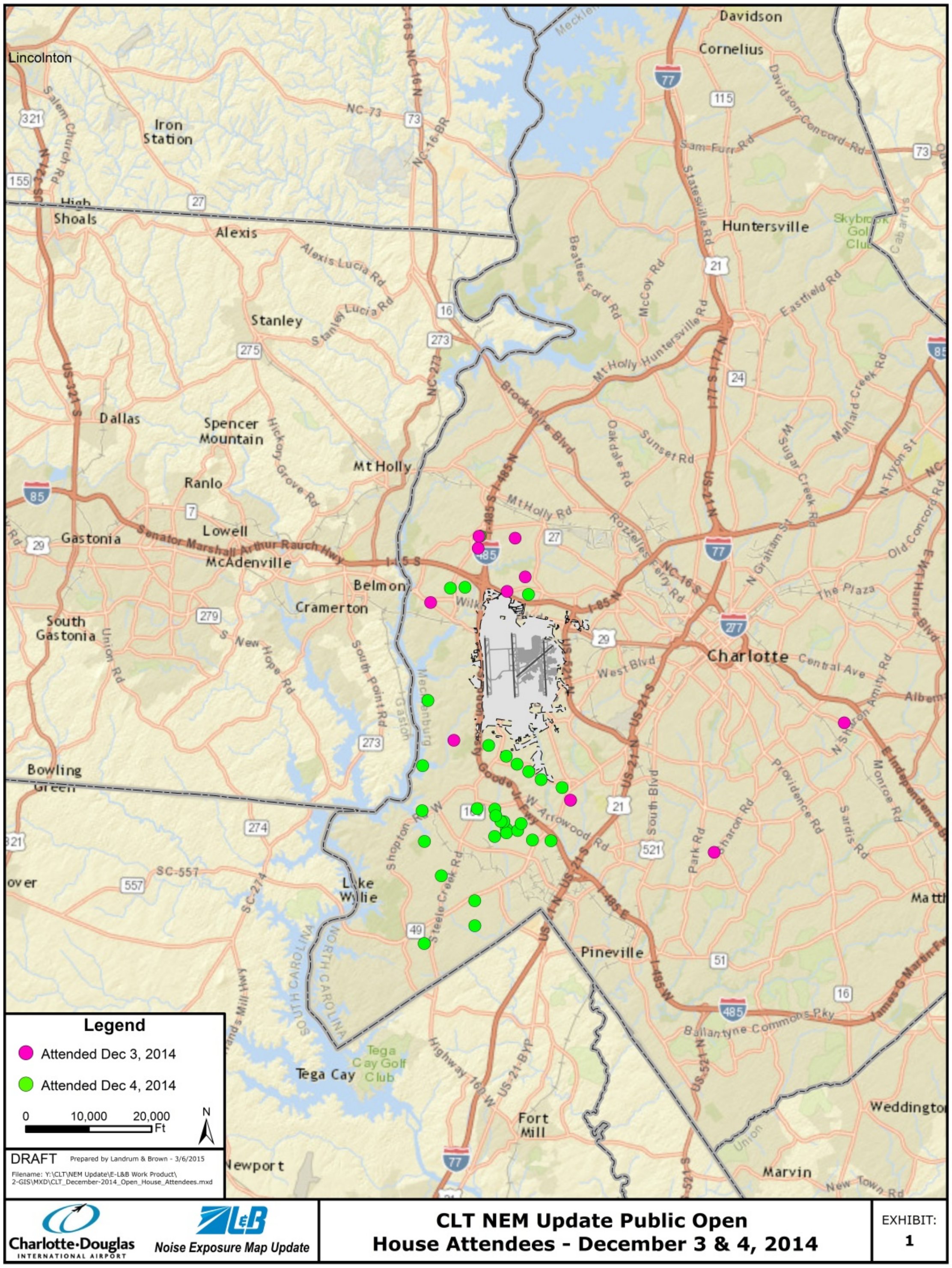

Presentation

A brief presentation was given that included information similar to the information on the display boards. The presentation allowed another means for attendees to obtain information. A copy of the presentation is included as **Attachment 1**.

Display Boards

Display boards were presented to provide information regarding the specific methodology and inputs into a Noise Exposure Map (NEM) Update. Information presented on the display boards included the following topics:

- Introduction to Noise Exposure Map Update
- Aircraft Noise Modelling Methodology
- Input Data Collection
- Noise Measurement Program
- Preliminary Noise Contour Modeling Results
- Next Steps

Copies of the display boards are included as **Attachment 2**.

Summary of Comments Received

There were a total of 10 people (or couples together) that submitted comments on the comment forms provided or via email. In many cases, individuals commented on more than one topic. In general, a total of 24 comments were made by the 10 people. The chart below summarizes the comments by topic.

Comment Topic	Number of Comments
Disruption of Speech / Television / Outdoor Activities	4
Aircraft Flight Paths / Altitude	3
Sound Insulation	3
Aircraft Operations / Frequency of Overflights	2
Meeting Notice	2
Nighttime / Early Morning Noise	3
Sleep Disruption	1
Military Operations	1
Request for information	3
Study Area	1
Safety	1
Total	24

A copy of all the comments received is included as **Attachment 3**.

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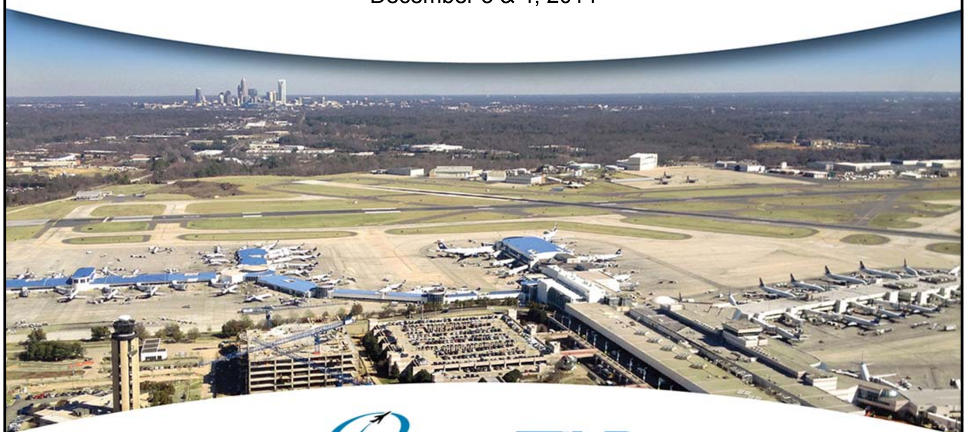
ATTACHMENT 1
PUBLIC MEETING PRESENTATION

CLT Noise Exposure Map Update

Public Information Meeting

December 3 & 4, 2014



Charlotte·Douglas INTERNATIONAL AIRPORT

L&B Aviation Planning at the Leading Edge

Noise Exposure Map (NEM) Update

Agenda

- Welcome and Introductions
- Tonight's Meeting Format
- NEM Update Process
- Noise Exposure Maps (NEMs) General Overview
- Review of Previously-Approved NEMs
- Important Facts About NEM Updates
- Noise Contour Modeling Input Data
- Noise Monitoring Program Results
- Preliminary Noise Contours
- Future Meetings

2

Noise Exposure Map (NEM) Update

Public Information Meeting Format

- What is the purpose of tonight's meeting?
  - Present study information/progress to date and gather public input
- Open House with information presented on display boards
  - Study Background and Methodology
  - NEM Input Data
  - Noise Monitoring Program Results
  - Preliminary Draft Noise Exposure contours
- How to get involved in the study?
  - Comments are being accepted tonight and through U.S. Mail/Email through December 19th
  - Consultant and Airport staff are available to answer questions and discuss study process and preliminary findings

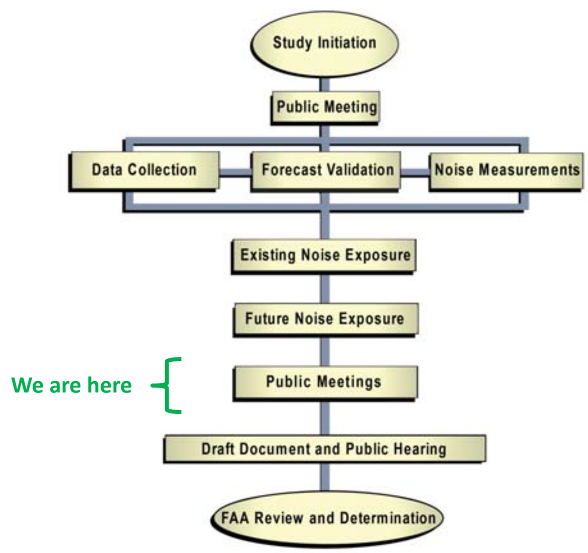
Noise Exposure Map (NEM) Update

Welcome and Introductions

- Charlotte Douglas International Airport
  - Sponsor of the Noise Exposure Map (NEM) Update
  - Certify the NEMs are accurate
  - NEM Team: Jack Christine, Katherine Dennis, Lauren Scott, Kevin Hennessey
- Consultant Team
  - Landrum & Brown is the lead consultant for the NEM Update
  - 60 years of aviation planning
  - Experts in aircraft noise and land use planning
  - Rob Adams, Principal-in-Charge
- Federal Aviation Administration
  - Developed guidelines for NEMs that must be followed
  - Review NEMs for accuracy and determination that guidelines were met
  - Provide technical support for noise modeling

Noise Exposure Map (NEM) Update

NEM Update Process



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Noise Exposure Map (NEM) Update

NEM Update General Overview

- NEM Updates Document Noise Levels
  - The focus of the NEM Update is to quantify noise and identify land use incompatibilities that exist today and in the future
- NEM Updates must Follow FAA Guidelines
- NEM Updates do not:
  - Recommend changes to airport or runway, or implementing mandatory restrictions on aircraft
  - Recommend levying fines for not following procedures
  - Limit access to the airport based on size, type, or noise created by aircraft
  - Alter the noise compatibility measures already in place at the airport

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Previous NEMs at CLT

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
  - Prepared NEMs for 1996 and 2001 conditions
  - 2001 NEM included construction of the third parallel runway

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Important Facts About NEM Updates

- Developing Noise Exposure Maps
  - FAA has established land use compatibility guidelines for identifying aircraft noise impacts
  - Based on Day-Night Average Sound Level (DNL)
  - Required to use Integrated Noise Model (INM)
  - Noise-sensitive uses are considered non-compatible at or above 65 DNL
    - Residential
    - Schools
    - Places of worship
    - Hospitals
    - Nursing homes
    - Daycare facilities where licensed education occurs
    - Libraries

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Important Facts About NEM Updates

- Differences between and NEM Update and a Noise Compatibility Program (NCP)
  - Noise Exposure Map (NEM) Updates prepare existing and future noise exposure contours and land use compatibility analysis.
  - Noise Compatibility Programs (NCPs) prepare existing and future noise exposure contours and land use compatibility analysis PLUS develop new noise abatement and land use mitigation alternatives.
  - NEM Updates and NCPs BOTH include a Public Outreach component to obtain public input.

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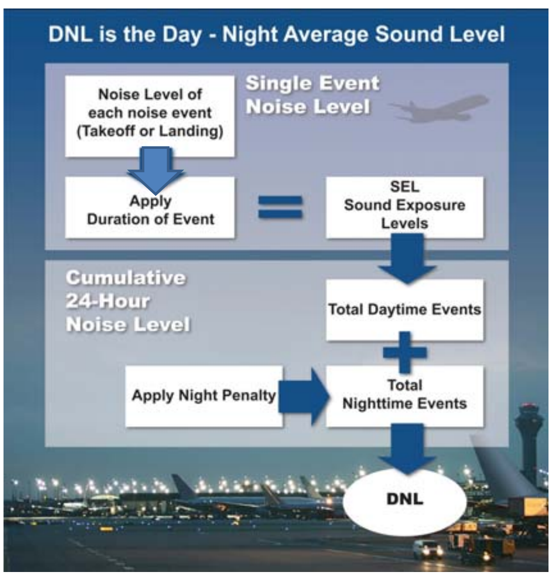
Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

What is DNL?



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Land Use / Noise Sensitivity Matrix

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Noise Exposure Map (NEM) Update

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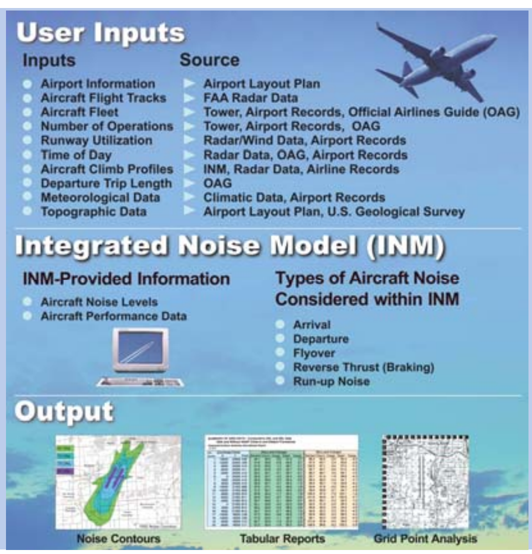
How Noise Contours are Generated



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Noise Exposure Map (NEM) Update

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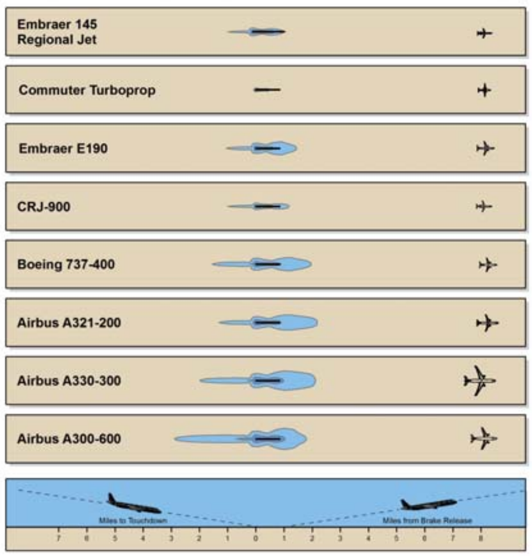
Aircraft Noise Footprints



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Noise Exposure Map (NEM) Update

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Comparison of Noise Levels

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Noise Exposure Map (NEM) Update

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Important Facts About NEM Updates

- Factors That May Affect the Size or Shape of Noise Exposure Contours
  - Levels of aircraft activity
  - Significant changes in fleet mix
  - Ratio of Daytime (7:00 a.m. to 9:59 p.m.) to Nighttime (10:00 p.m. to 6:59 a.m.) activity
  - Runway use patterns
  - Flight track location and percentage of use

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Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	21.6	27.6
Airbus A320-200	A320-232	64.8	82.7
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.7*	*1,289.3*

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.6	0.9
Business Jet	CL600	3.9	5.7
Business Jet	CL601	2.6	3.9
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.3	3.4
Business Jet	CNA510	1.3	1.8
Business Jet	CNA55B	1.6	2.4
Business Jet	CNA750	1.3	1.9
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	3.9	5.7
Business Jet	GIV	4.0	6.0
Business Jet	GV	2.6	3.9
Business Jet	LEAR35	13.0	20.0
Business Jet	MU3001	12.0	16.9
Subtotal		*387.8*	*400.9*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	4.8	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	0.9
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.6
DASH 6	DHC6	4.2	4.1
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.6	4.1
Single-Engine Piston	GASEPV	4.6	2.9
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*145.9*	*149.0*
Military Aircraft			
Lockheed C130 Hercules	C130HP	2.5	3.8
Subtotal		*2.5*	*3.8*
Helicopters			
Augusta A-109	A109	1.7	1.7
Bell 407 Jet Ranger	B407	0.3	0.3
Subtotal		*2.0*	*2.0*
Grand Total		**1,517.4**	**1,879.5**

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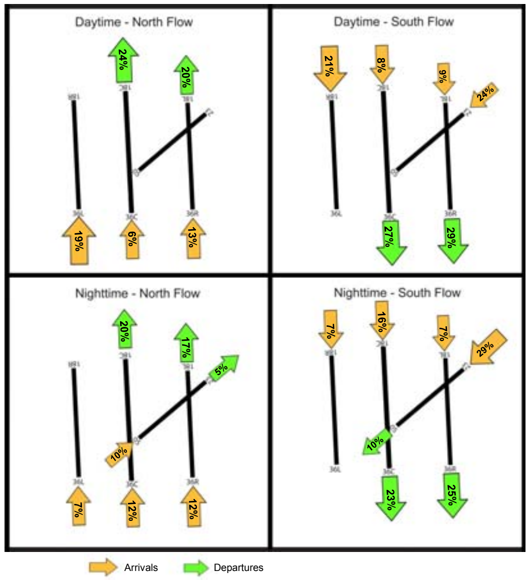
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Existing Runway Use Patterns



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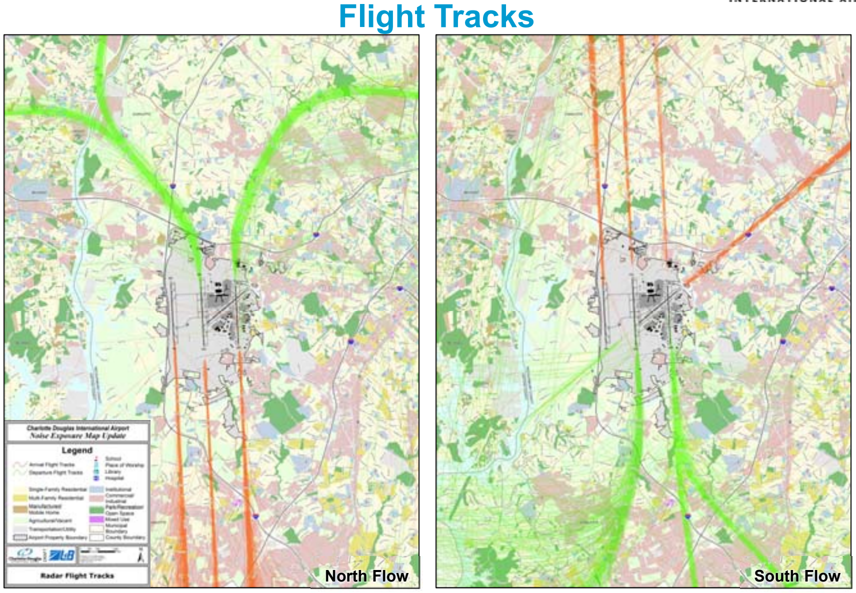
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Flight Tracks



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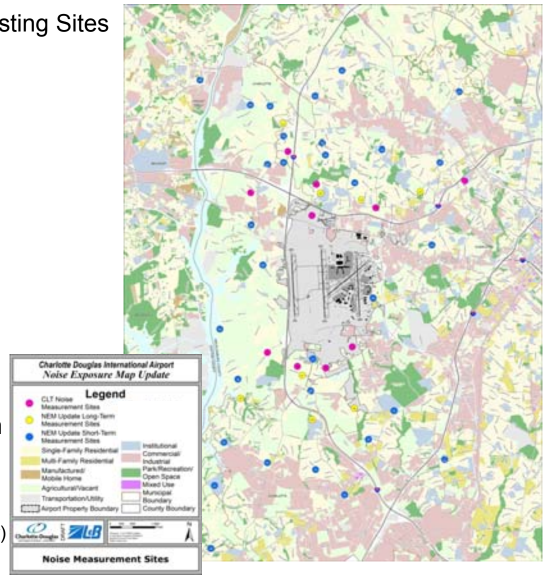
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Program

- Collected Data from 10 Existing Sites
  1. 601 Dewolfe Street
  2. 10300 Garrison Road
  3. Whippoorwill Drive
  4. 1924 Wildwood Drive
  6. 2900 Westerwood Drive
  7. Moores Lake
  8. McAlpine Drive
  9. 3515 Farhill Drive
  10. 6101 Tuckaseegee Road
  12. 9401 Markswood Road
- Conducted Monitoring from other sites
  - 8 Long-Term Sites (5 days)
  - 33 Short-Term Sites (~ 1 hour)



Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Long-Term Noise Monitoring Results

Site ID	Site Description	Date of Measurements	Time of Measurements	Ambient Noise Level	Type of Events	Average Number of Events per Hour	Loudest Event (Lmax)	Loudest Aircraft
Long-Term Sites (5+ Days)								
L1	Shady Brook Baptist Church 2940 Belmeade Drive	8/1/2014 to 8/7/2014	Continuous	51.4	Arrivals and Departures	17	90.6	Airbus A321
L2	West Mecklenburg High School 7400 Tuckaseegee Road		Continuous	56.0	Arrivals and Departures	20	94.3	Airbus A319
L3	Mulberry Baptist Church 6450 Tuckaseegee Road		Continuous	53.3	Arrivals and Departures	8	88.2	Business Jet
L4	Tuckaseegee Park 4820 Tuckaseegee Road		Continuous	55.1	Arrivals and Departures	9	93.4	Boeing 727-200
L5	Windygap Road		Continuous	47.1	Arrivals and Departures	1	93.7	Turboprop
L6	Olympic High School 4301 Sandy Porter Road		Continuous	53.5	Arrivals and Departures	16	84.9	Airbus A321
L7	Airport-Owned Property near 9209 Snow Ridge		Continuous	51.4	Arrivals and Departures	16	89.8	Airbus A321
L8	Airport-Owned Property on Shopton near Lebanon Drive		Continuous	53.5	Arrivals and Departures	21	83.6	Canadair CRJ-900

Noise Exposure Map (NEM) Update

Charlote-Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results

- The monitoring was conducted from July 31, 2014 through August 13, 2014
- Long-term noise monitoring was conducted at 8 sites for over five days at each site
  - DNL noise levels ranged from 59.1 to 64.9 DNL and were consistent with INM predictions
- Short-term noise monitoring was conducted at 33 sites for approximately on hour per site

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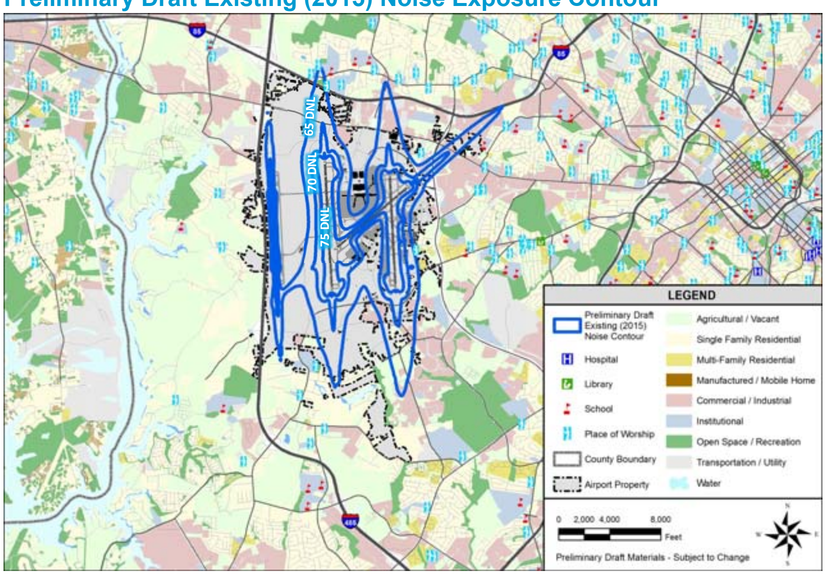
Noise Exposure Map (NEM) Update

Charlote-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Existing (2015) Noise Exposure Contour

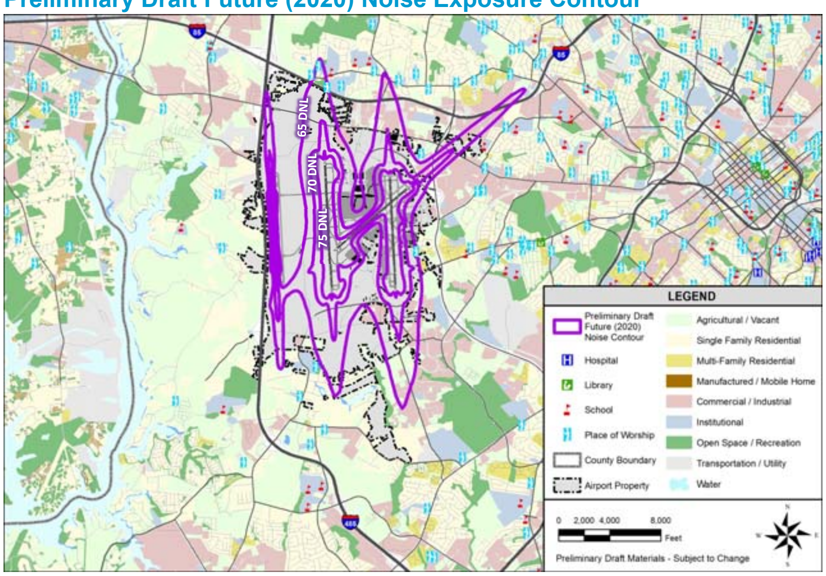
Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	0
Previously Eligible for Sound Insulation	41
Sound Insulated	3
Total Housing Units	**44**
Population	
Total Population	**113**
Noise-Sensitive Facilities	
Schools	0
Churches	0
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**0**

23

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Future (2020) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlote-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Future (2020) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	3
Previously Eligible for Sound Insulation	53
Sound Insulated	5
Total Housing Units	**61**
Population	
Total Population	**160**
Noise-Sensitive Facilities	
Schools	0
Churches	2
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**2**

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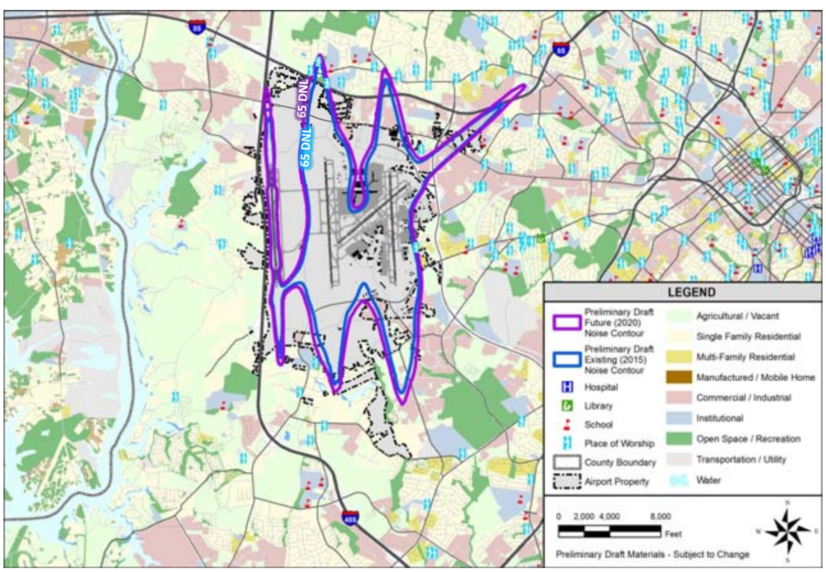
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours

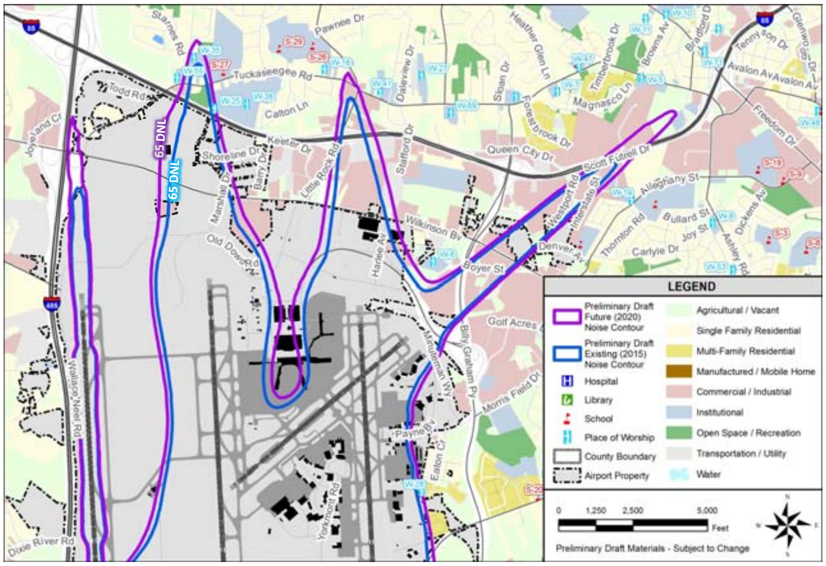


26

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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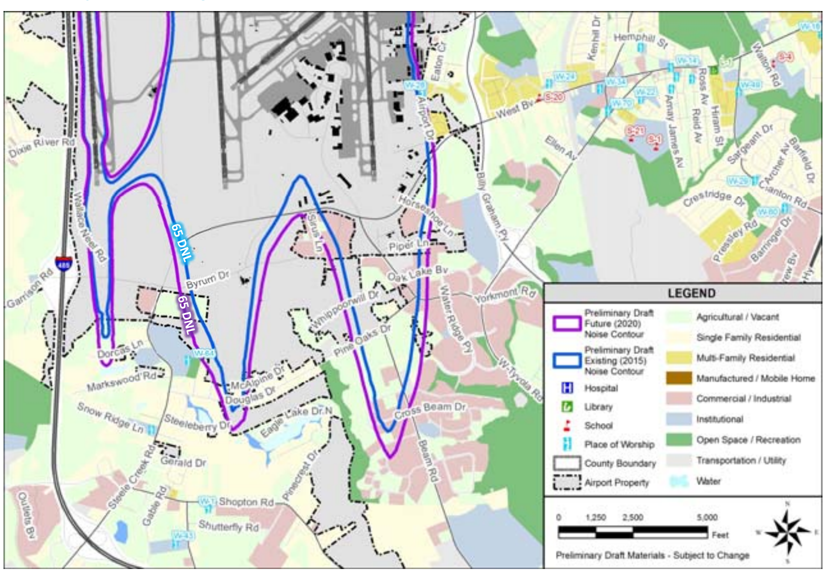
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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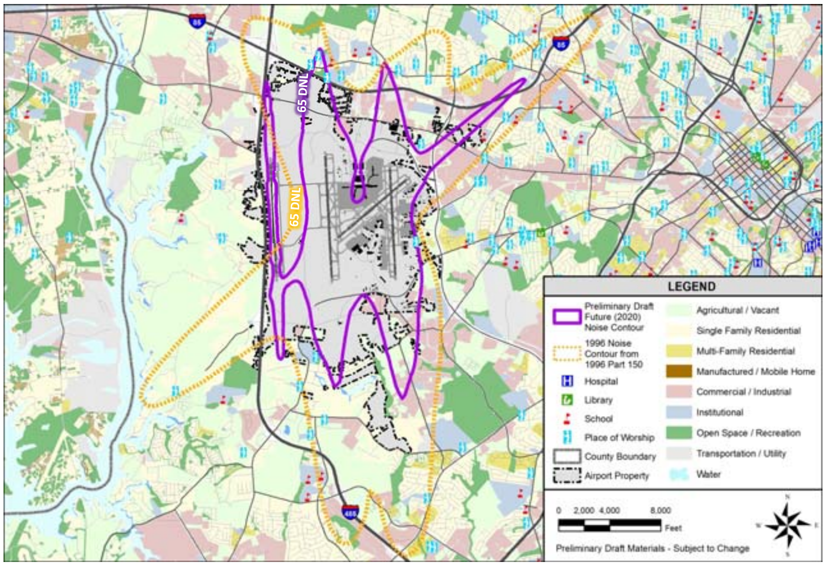
Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Preliminary Draft Future (2020) Noise Exposure Contours compared to 1996 Noise Contour



L&B

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Preliminary Draft Noise Contour / Land Use Incompatibilities

Properties by Mitigation Area	1996 Noise contour	2015 Noise Contour	2020 Noise Contour
		65+ DNL	
Housing Units			
Unmitigated	n/a	0	3
Previously Eligible for Sound Insulation	n/a	41	53
Sound Insulated	n/a	3	5
Total Housing Units	**2,773**	**44**	**61**
Population			
Total Population	**6,700**	**113**	**160**
Noise-Sensitive Facilities			
Schools	4	0	0
Churches	15	0	2
Libraries	0	0	0
Hospitals	0	0	0
Nursing Homes	0	0	0
Total Noise-Sensitive Facilities	**19**	**0**	**2**

L&B

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Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Next Meetings

- Next Public Information Meetings
  - Planned for Spring 2015

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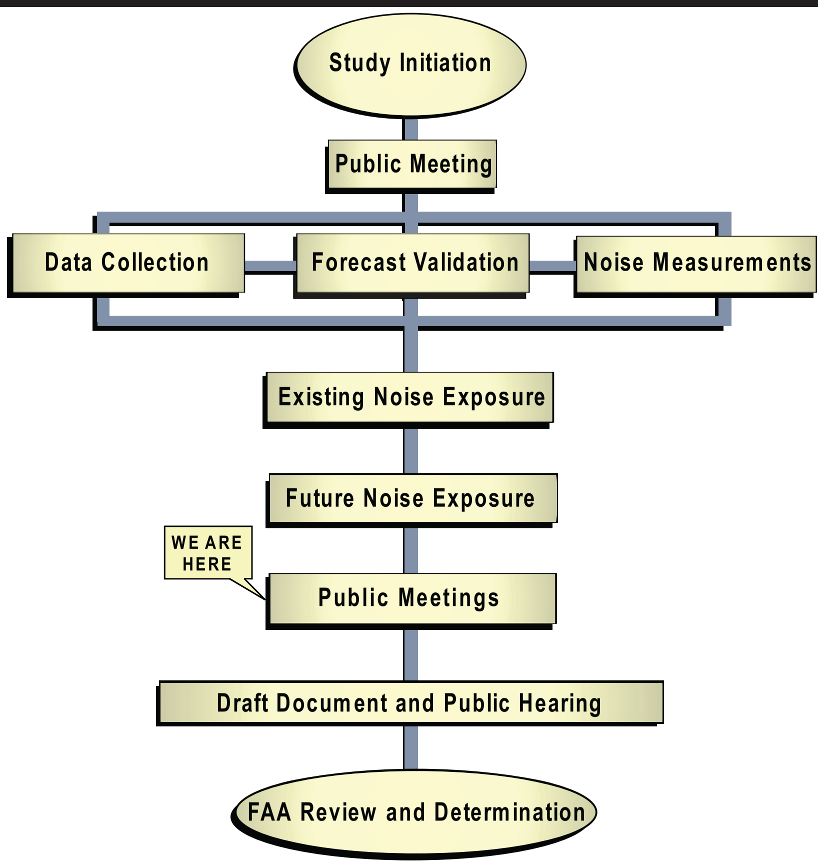
ATTACHMENT 2
PUBLIC OPEN HOUSE DISPLAY BOARDS

Noise Exposure Map Update Process



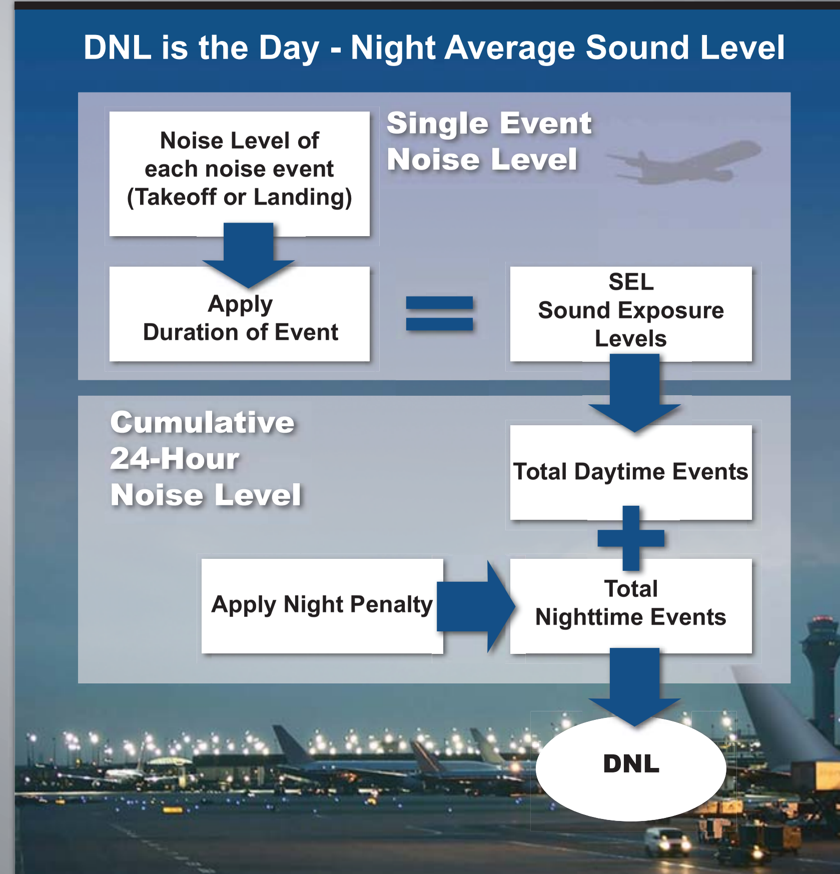
Differences Between a Noise Exposure Map Update and a Noise Compatibility Program Update

- Noise Exposure Map (NEM) Updates prepare existing and future noise exposure contours and land use compatibility analysis.
- Noise Compatibility Programs (NCPs) prepare existing and future noise exposure contours and land use compatibility analysis PLUS develop new noise abatement and land use mitigation alternatives.
- NEM Updates and NCPs BOTH include a Public Outreach component to obtain public input.

History of Noise Compatibility Planning at Charlotte Douglas International Airport (CLT)

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
- 2014/15 Noise Exposure Map (NEM) Update
  - This NEM Update will prepare NEMs for Existing (2015) and Future (2020) Conditions for CLT

What is DNL?



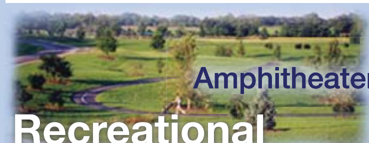
Land Use / Noise Sensitivity Matrix

Per Part 150:

Compatible | Compatible with Sound Insulation | Incompatible

OUTDOOR NOISE LEVEL

		< 65 DNL	65-75 DNL	75+ DNL
Residential	1-2 Family	Compatible	Compatible with Sound Insulation	Incompatible
	Multi-Family	Compatible	Compatible with Sound Insulation	Incompatible
	Mobile Homes	Compatible	Incompatible	Incompatible
	Dorms, etc.	Compatible	Compatible with Sound Insulation	Incompatible
Institutional	Schools	Compatible	Compatible with Sound Insulation	Incompatible
	Place of Worship	Compatible	Compatible with Sound Insulation	Incompatible
	Hospitals	Compatible	Compatible with Sound Insulation	Incompatible
	Nursing Homes	Compatible	Compatible with Sound Insulation	Incompatible
	Libraries	Compatible	Compatible with Sound Insulation	Incompatible
Recreational	Sports/Play	Compatible	Compatible	Incompatible
	Amphitheaters, Music Shells	Compatible	Incompatible	Incompatible
	Camping	Compatible	Compatible	Incompatible
Commercial	All Uses	Compatible	Compatible	Compatible
Industrial	All Uses	Compatible	Compatible	Compatible
Agricultural	All Uses	Compatible	Compatible	Compatible



How Noise Contours are Generated

User Inputs

Inputs	Source
Airport Information	Airport Layout Plan
Aircraft Flight Tracks	FAA Radar Data
Aircraft Fleet	Tower, Airport Records, Official Airlines Guide (OAG)
Number of Operations	Tower, Airport Records, OAG
Runway Utilization	Radar/Wind Data, Airport Records
Time of Day	Radar Data, OAG, Airport Records
Aircraft Climb Profiles	INM, Radar Data, Airline Records
Departure Trip Length	OAG
Meteorological Data	Climatic Data, Airport Records
Topographic Data	Airport Layout Plan, U.S. Geological Survey

Integrated Noise Model (INM)

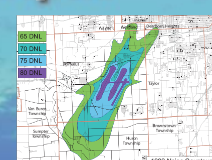
INM-Provided Information

- Aircraft Noise Levels
- Aircraft Performance Data

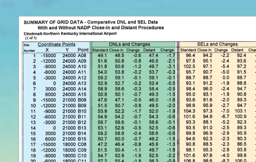
Types of Aircraft Noise Considered within INM

- Arrival
- Departure
- Flyover
- Reverse Thrust (Braking)
- Run-up Noise

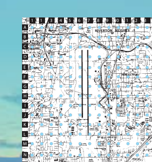
Output



Noise Contours



Tabular Reports



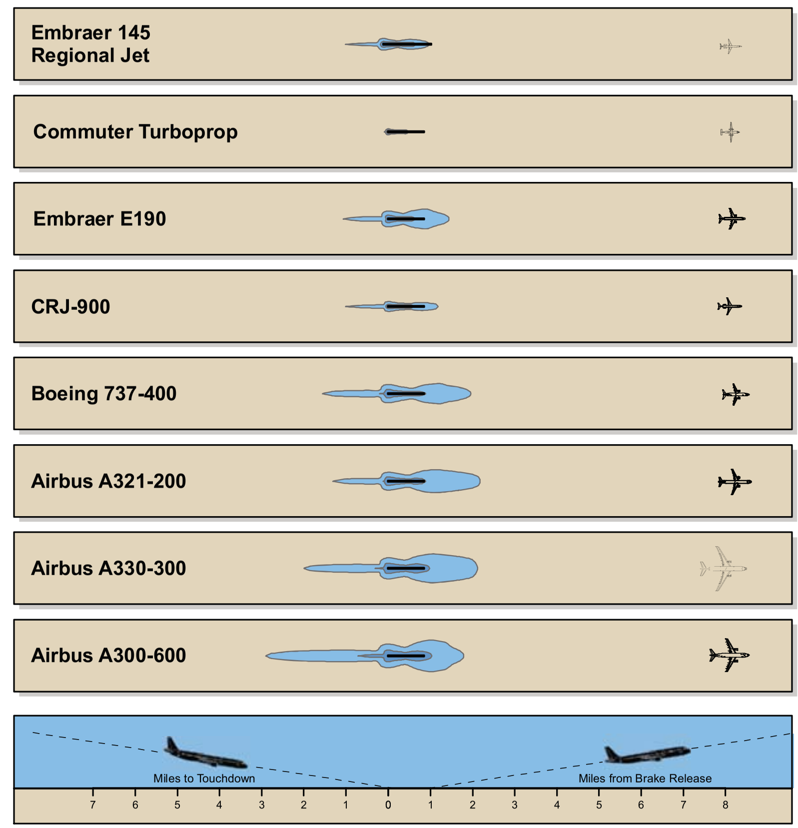
Grid Point Analysis

Note:
OAG: Official Airlines Guide

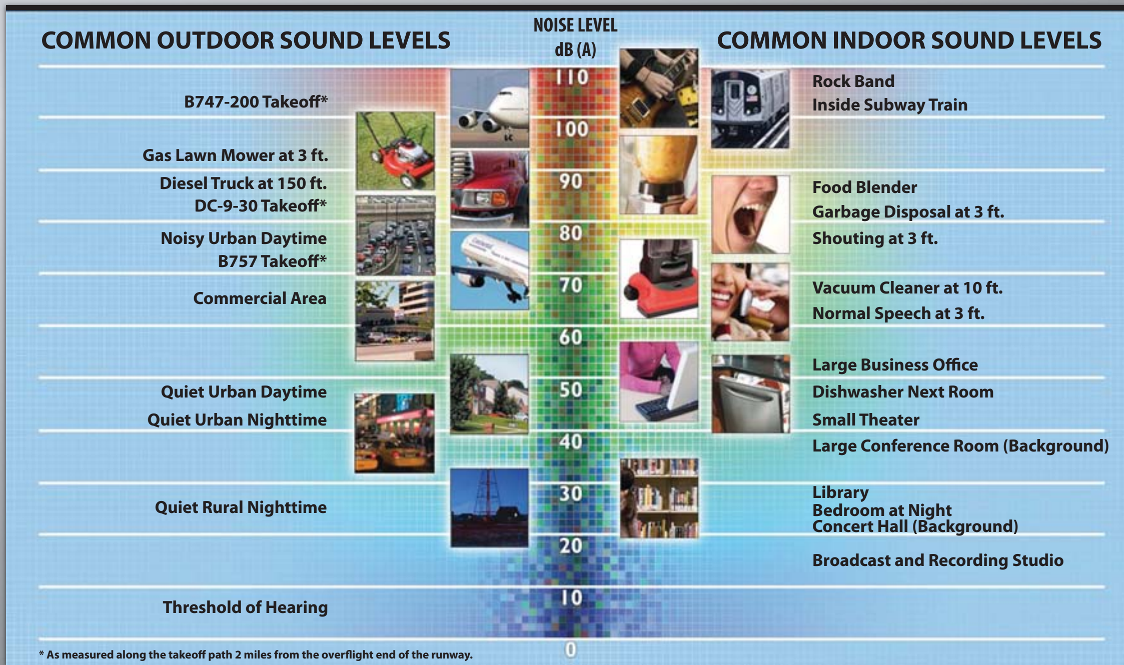
Factors That May Affect the Size or Shape of Noise Exposure Contours

- Levels of aircraft activity
- Significant changes in fleet mix
- Ratio of Daytime (7:00 a.m. to 9:59 p.m.) to Nighttime (10:00 p.m. to 6:59 a.m.) activity
- Runway use patterns
- Flight track location and percentage of use

Aircraft Noise Footprints



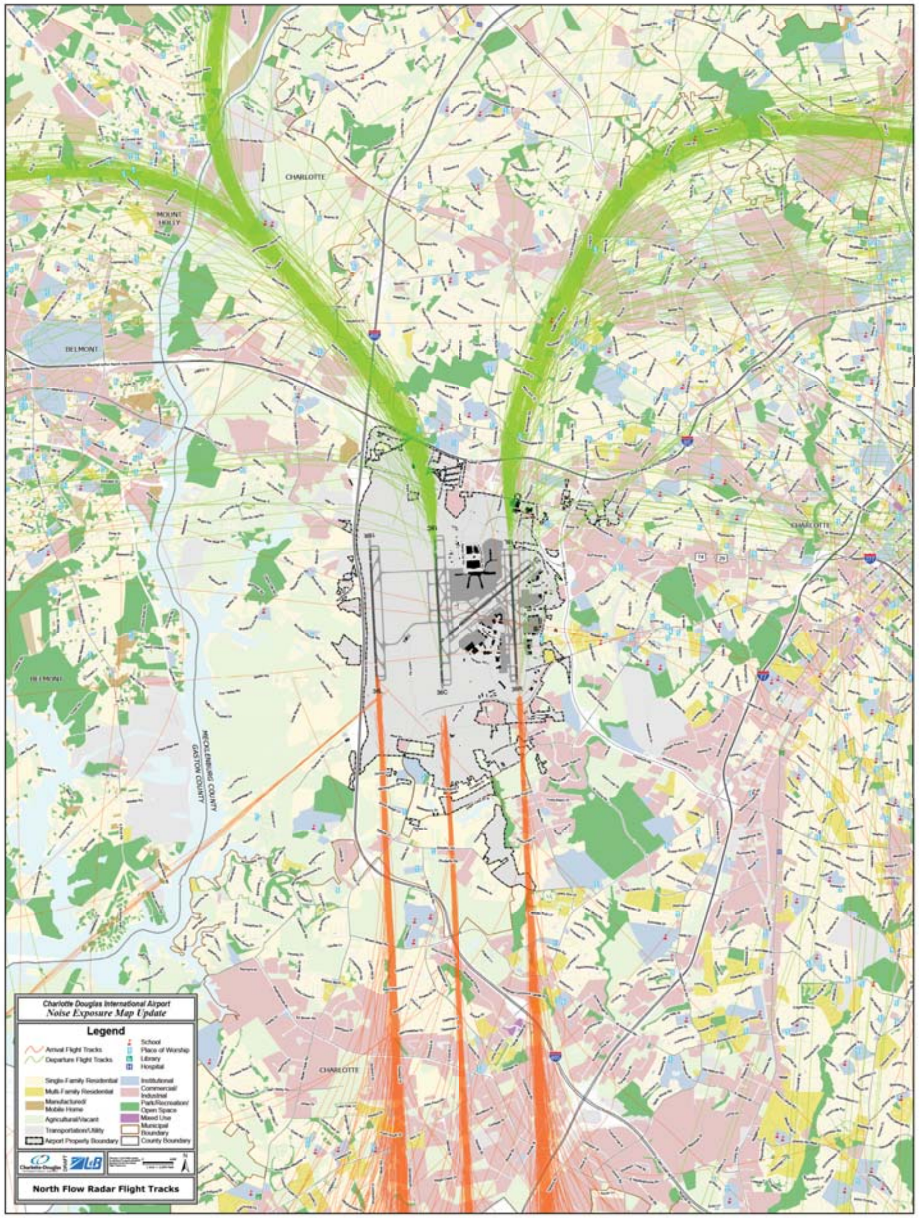
Comparison of Noise Levels

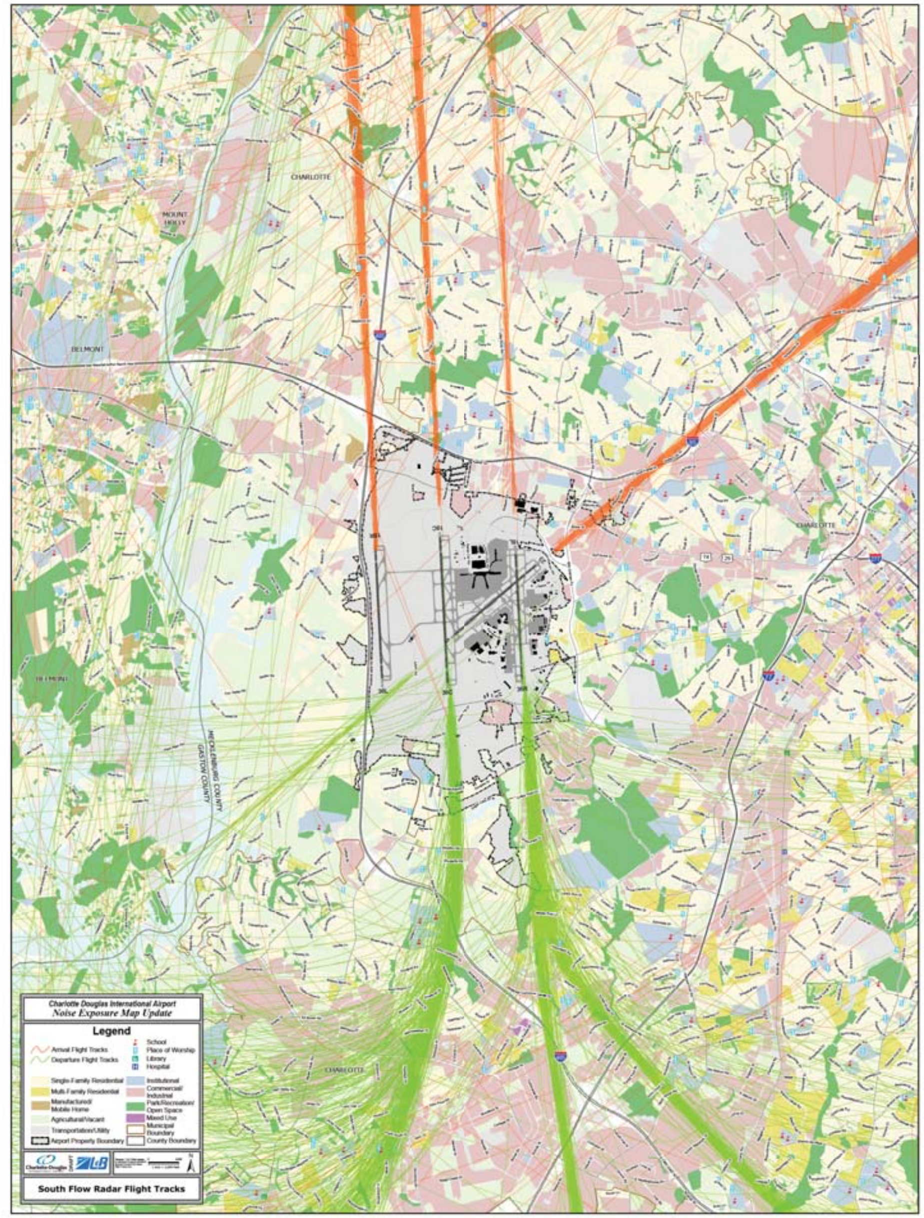


Existing Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	21.6	27.6
Airbus A320-200	A320-232	64.8	82.7
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.7*	*1,289.3*

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.6	0.9
Business Jet	CL600	3.9	5.7
Business Jet	CL601	2.6	3.9
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.3	3.4
Business Jet	CNA510	1.3	1.8
Business Jet	CNA55B	1.6	2.4
Business Jet	CNA750	1.3	1.9
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	3.9	5.7
Business Jet	GIV	4.0	6.0
Business Jet	GV	2.6	3.9
Business Jet	LEAR35	13.0	20.0
Business Jet	MU3001	12.0	16.9
Subtotal		*387.8*	*400.9*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	4.8	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	0.9
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.6
DASH 6	DHC6	4.2	4.1
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.6	4.1
Single-Engine Piston	GASEPV	4.6	2.9
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*145.9*	*149.0*
Military Aircraft			
Lockheed C130 Hercules	C130HP	2.5	3.8
Subtotal		*2.5*	*3.8*
Helicopters			
Augusta A-109	A109	1.7	1.7
Bell 407 Jet Ranger	B407	0.3	0.3
Subtotal		*2.0*	*2.0*
Grand Total		**1,517.4**	**1,879.5**


Charlotte Douglas International Airport
Noise Exposure Map Update
Legend
Arrival Flight Tracks
Departure Flight Tracks
School
Place of Worship
Library
Hospital
Single-Family Residential
Multi-Family Residential
Manufactured/ Mobile Home
Agricultural/Vacant
Transportation/Utility
Airport Property Boundary
Institutional
Commercial/ Industrial
Park/Recreation/ Open Space
Mixed Use
Municipal Boundary
County Boundary
North Flow Radar Flight Tracks
CHARLOTTE
MOUNT HOLLY
BELMONT
MECKLENBURG COUNTY
GASTON COUNTY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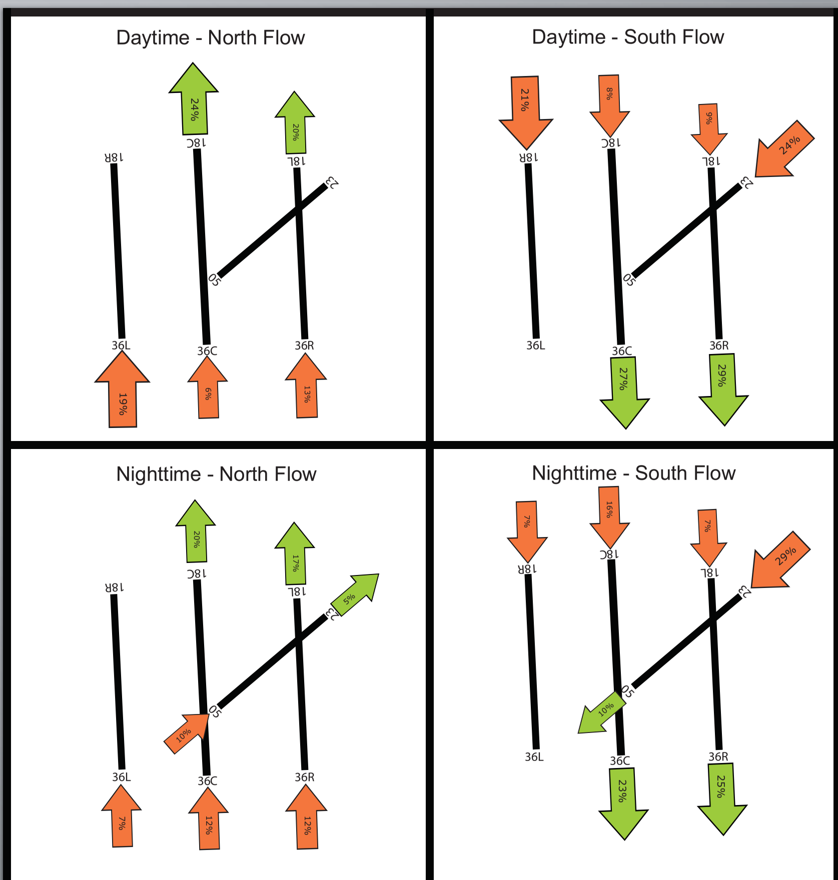
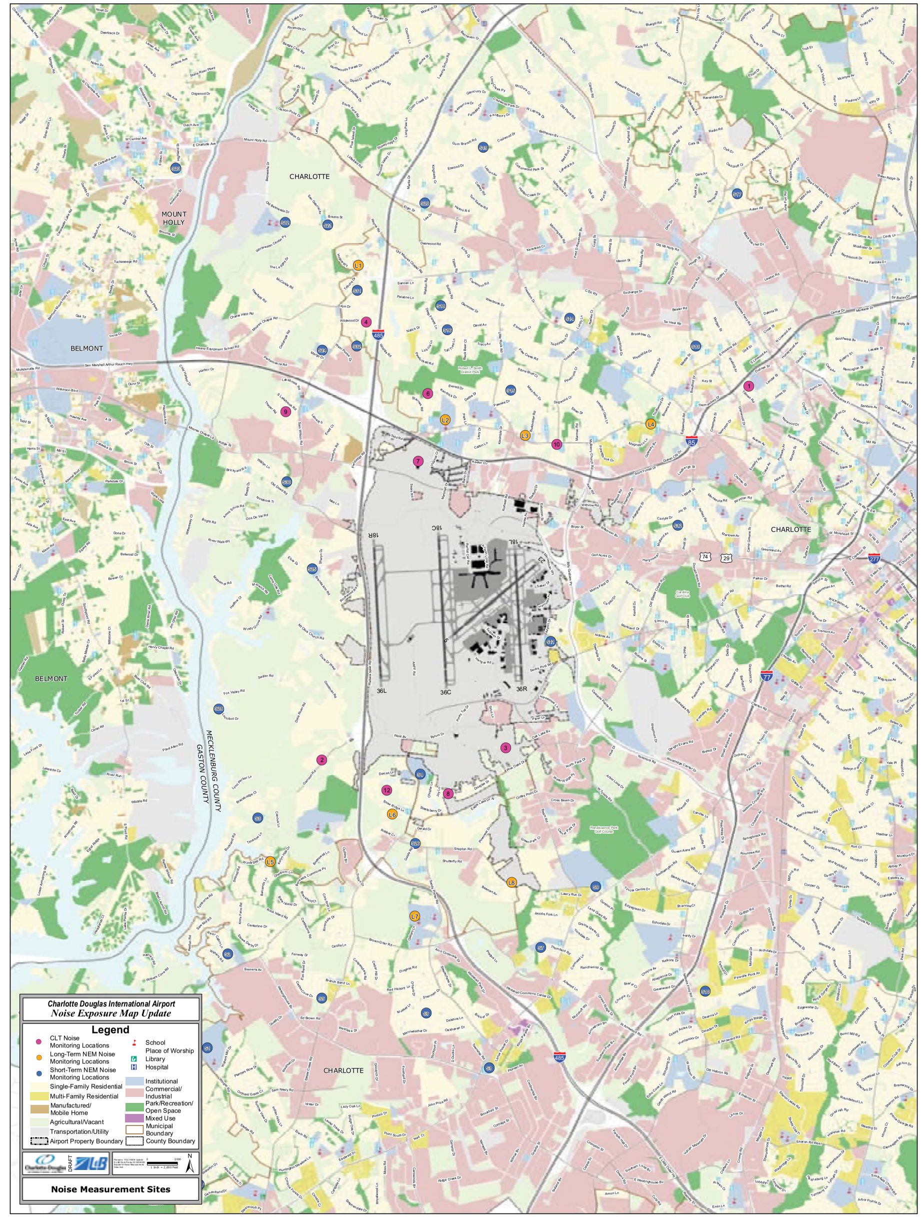
Multi-Family Residential
Manufactured/ Mobile Home
Agricultural/Vacant
Transportation/Utility
Airport Property Boundary
Institutional
Commercial/ Industrial
Park/Recreation/ Open Space
Mixed Use
Municipal Boundary
County Boundary
South Flow Radar Flight Tracks
CHARLOTTE
MOUNT HOLLY
BELMONT
MECKLENBURG COUNTY
GASTON COUNTY

Existing Runway End Utilization



Source: Flight Tracking Data from March 2013 through August 2014

% ARRIVALS % DEPARTURES



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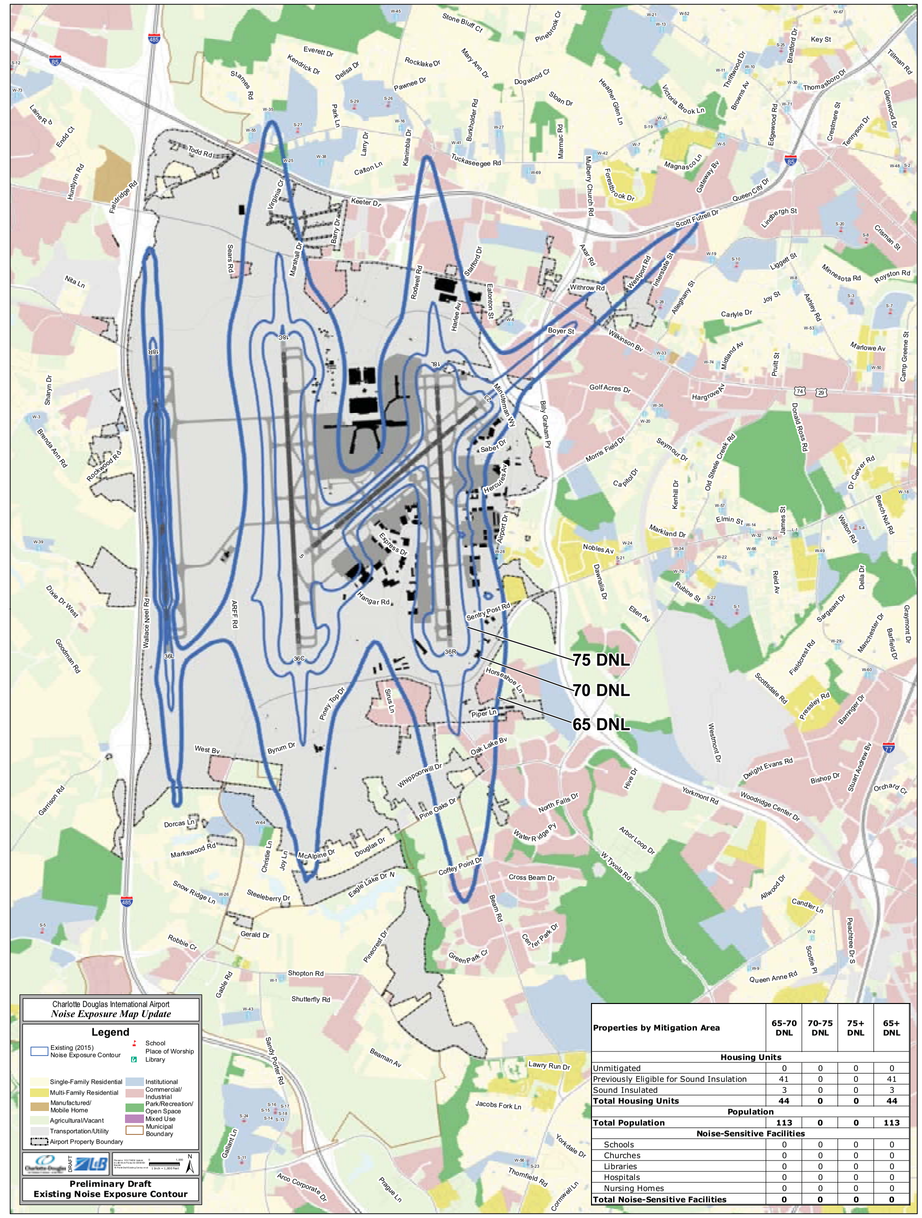
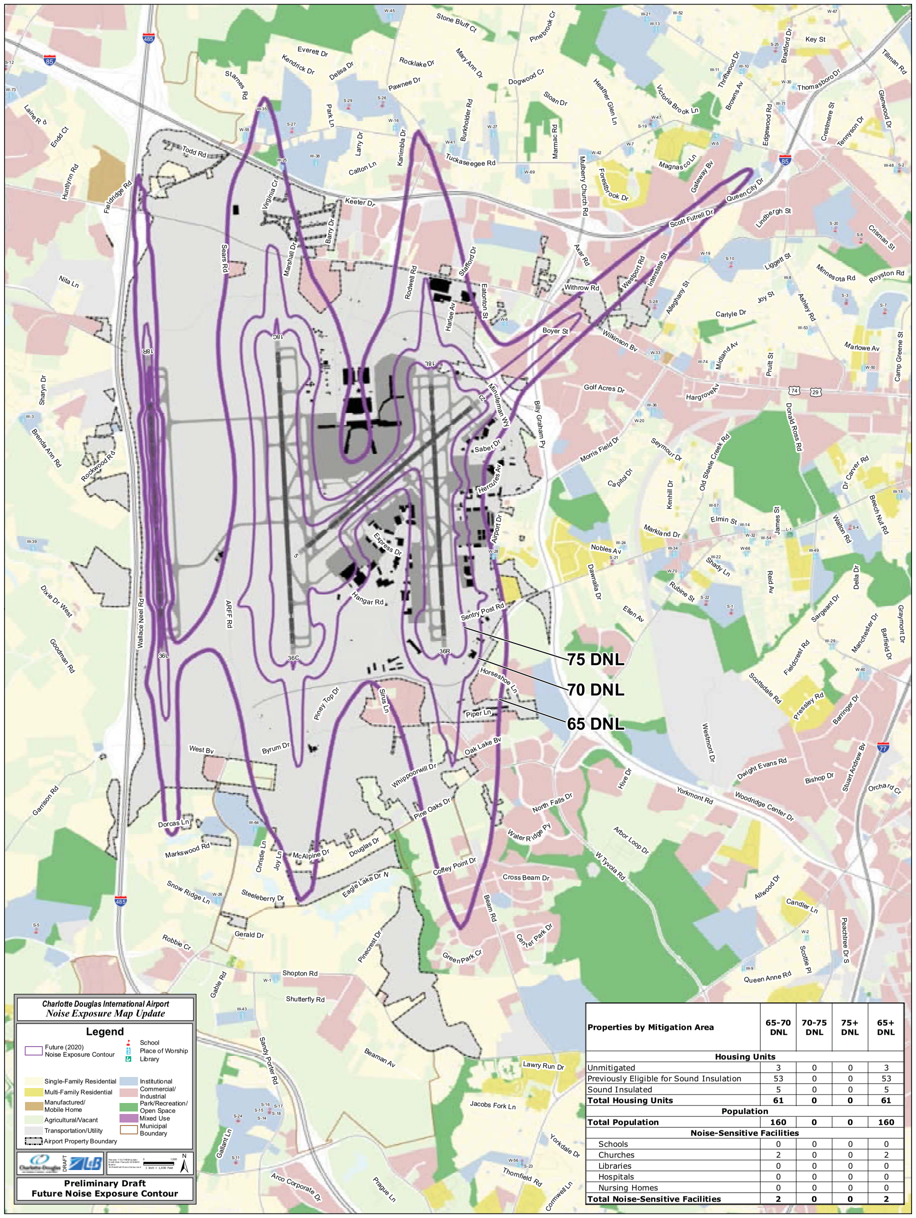
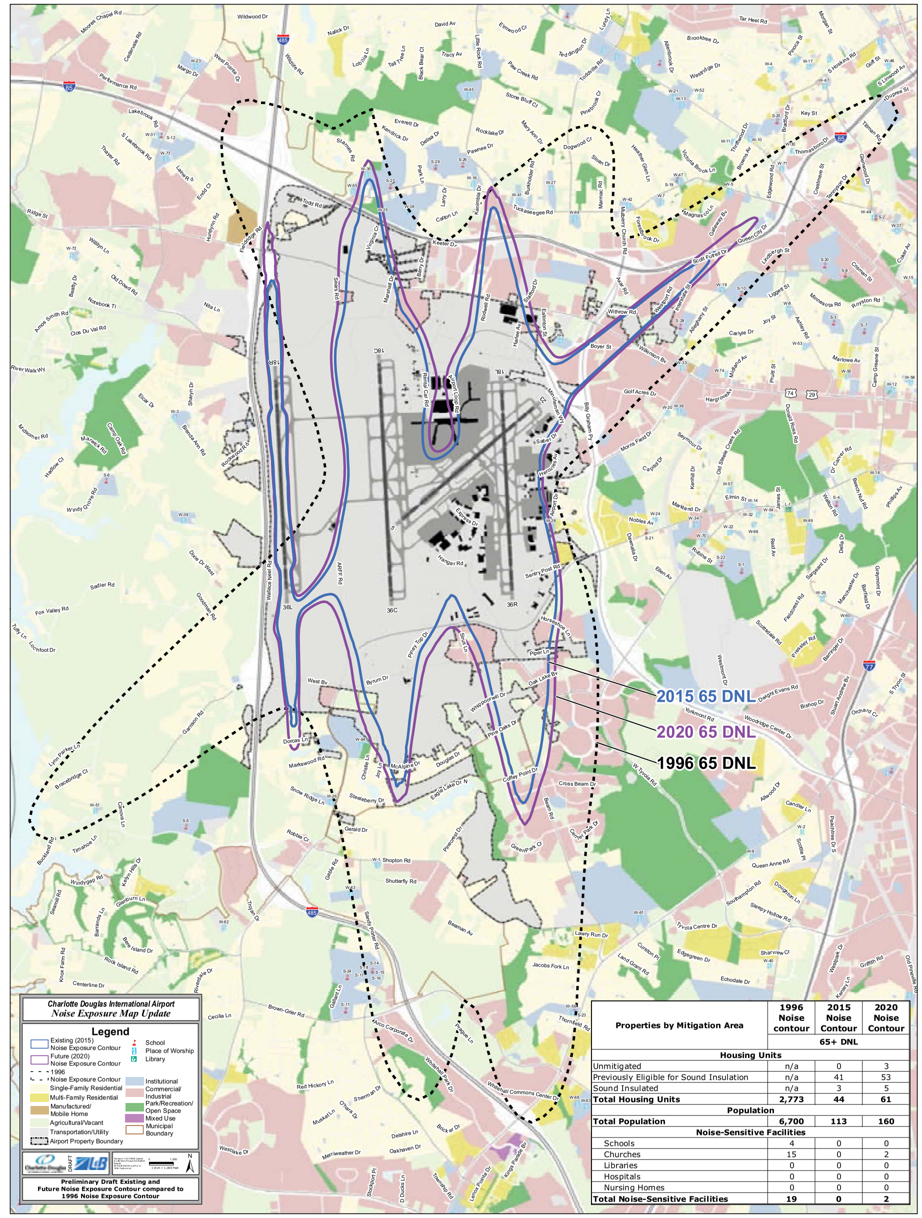
- DNL noise levels ranged from 59.1 to 64.9 DNL and were consistent with INM predictions
- Short-term noise monitoring was conducted at 33 additional sites for approximately one hour per site





Properties by Mitigation Area	65-70 DNL	70-75 DNL	75+ DNL	65+ DNL
Housing Units				
Unmitigated	3	0	0	3
Previously Eligible for Sound Insulation	53	0	0	53
Sound Insulated	5	0	0	5
Total Housing Units	**61**	**0**	**0**	**61**
Population				
Total Population	**160**	**0**	**0**	**160**
Noise-Sensitive Facilities				
Schools	0	0	0	0
Churches	2	0	0	2
Libraries	0	0	0	0
Hospitals	0	0	0	0
Nursing Homes	0	0	0	0
Total Noise-Sensitive Facilities	**2**	**0**	**0**	**2**



Properties by Mitigation Area	1996 Noise contour	2015 Noise Contour	2020 Noise Contour
	65+ DNL		
Housing Units			
Unmitigated	n/a	0	3
Previously Eligible for Sound Insulation	n/a	41	53
Sound Insulated	n/a	3	5
Total Housing Units	**2,773**	**44**	**61**
Population			
Total Population	**6,700**	**113**	**160**
Noise-Sensitive Facilities			
Schools	4	0	0
Churches	15	0	2
Libraries	0	0	0
Hospitals	0	0	0
Nursing Homes	0	0	0
Total Noise-Sensitive Facilities	**19**	**0**	**2**

Next Steps

- Prepare Draft Noise Exposure Map Update Document
  - December 2014 through January 2015
- Conduct Final Round of Public Meetings / Public Hearing to Obtain Comments on Draft Noise Exposure Contours
  - Spring 2015
- Comments may be submitted tonight or online at:

website: http://www.airportsites.net/CLT-NEM
email: CLT-NEM@Landrum-Brown.com

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ATTACHMENT 3
PUBLIC OPEN HOUSE COMMENTS

COMMENT FORM

PUBLIC INFORMATION MEETING

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

December 3 & 4, 2014, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by **December 19, 2014**.

Need to know about insulation values for house

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Patrick Evans – Gail LeRoy
Address: 2027 Pleasant Glen Rd
Char 28214
704-393-2301

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

December 3 & 4, 2014, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by **December 19, 2014**.

Thank you for your concern
I would like sound insulation, even
though my house was built in 1994.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Mike Caputo
Address: 4000 Shopton Rd
Charlotte NC 28217
704-587-0760

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

December 3 & 4, 2014, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by **December 19, 2014**.

I WOULD LIKE TO KNOW IF MY HOME
IS WITHIN THE 65 DB. AREA.

THANK YOU,
Gary A. Peck

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: GARY A. PECK
Address: 10424 WILSON GLEN DR
CHARLOTTE, NC 28214

From: Jane Howard <janemariehoward@gmail.com>
Sent: Friday, December 5, 2014 4:59 PM
To: CLT-NEM
Subject: Noise Exposure Map

If you want people to attend the public meetings it would be helpful to receiy notice BEFORE they're held. Mine was in today's mail.

For the record, my house is located at 5815 Katrine Court, 28208, right beneath the National Guard's C-130 take-off path.

Jane Howard

From: Lisa Joseph <lrj.lj60@gmail.com>
Sent: Tuesday, December 9, 2014 9:47 AM
To: CLT-NEM
Subject: Noise Exposure Map Update

Dear CLT,

Unfortunately, I missed the Public Meetings and I was wondering if my property will be affected by the updated map.

I live in the Huntlynn Acres neighborhood off of Wilkenson Blvd. I appreciate your time.

Sincerely, Ms. Lisa R. Joseph.

From: maryshabica@aol.com
Sent: Thursday, December 11, 2014 3:36 PM
To: CLT-NEM
Subject: NEM Update

I have complained about the low air traffic over our home at 6701 Pawnee Dr 28214. A friend on Sheets Circle told me that after you put in insulated windows and extra insulation in their attic the noise was much better. So I would like you to do that to our home. It would be nice to hear our TV and not to be woke up by airplanes in the mornings.
Sent from AOL Mobile Mail

From: Tom Martin <9martinzz@att.net>
Sent: Friday, December 12, 2014 9:12 PM
To: CLT-NEM
Subject: CLT Comment

You have done an unblievalby bad job of notifying people who would like to have input into the noise contour map work for CLT. Have you never heard of US Postal? You know the area of homeowers and businesses that are being affected by cross-referencing complaints filed and you can get addresses. Is the cost of a stamp that is the problem? I would be glad to contribute to the cost of my stamp if they would make it easier. It appears by my random search of the internet, after someone told me they had heard something on one local news broadcast, that my opporunity to attend one of these few meetings passed last week without me (and many others) knowing. What a farce of a process.
Tom Martin

From: Sue McCauley <sm@smimobile.com>
Sent: Sunday, December 28, 2014 9:20 AM
To: CLT-NEM
Subject: CLT Comment

We have lived on Lake Wylie for 15 years. The last several years we have been **harrassed** at an increasing rate by planes flying low and loud and next to the Catawba Nuclear plant---which terrifies us.

The danger of flying consistently and predictably next to a nuclear plant is of great concern. Catawba Nuclear stores spent fuel rods above ground on their site. It is astonishing that CLT/faa is willing to submit the nearly one million people in our area to the risk of a terrorist controlled plane attacking the plant.

It is also of great concern that although we live in York and are 8 to 10 miles from the airport we are routinely awakened at 5:30 am by dangerous and low flying planes. This danger and noise often continues all day off and on at 1.5 minute or less intervals. These planes make it impossible to enjoy our home and yard and cause great fear for our safety.

Please redirect the Charlotte airport planes to fly higher, quieter and away from the Nuclear Plant.

From: JROGRINC@aol.com
Sent: Sunday, December 28, 2014 5:01 PM
To: CLT-NEM
Subject: CLT Noise Comment

We live about five minutes from the Catawba Nuclear Plant and when we are sitting out during warm weather we have timed the planes coming over our house. It is at lest every five minutes and when we took a video of a wedding the airplane sounds could be hear above the music. We wondered what the noise was in the video and we realized it was planes. We can hear this noise in the house even when we are inside with the windows and doors closed. It can be heard early in the morning and often wakes us up.

Not much peace and quiet time living on the lake. What is the alternative route that might help this unnerving noise that happens so often over our house?

Ruth & Joe Ogrinc

From: mary shabica <maryshabica@hotmail.com>
Sent: Tuesday, December 30, 2014 8:19 PM
To: CLT-NEM
Subject: CLT Comment

We would like to know if we are going to be included in the noise reduction in 2015. Our address is 6701 Pawnee Dr. I've been trying to understand the map. Airplanes go over our house daily. It's really bad on Saturday mornings.

Sent from Windows Mail

From: JoAnn Suminguit <jmssolutions@carolina.rr.com>
Sent: Sunday, January 4, 2015 11:51 AM
To: CLT-NEM
Subject: Airport Noise Program

I understand that the airport currently is looking at noise exposure. However, when looking at the map of the areas studied it appears the areas selected are those closest to the airport. I live in the Overlook community in Northwest Charlotte. The airport noise level has been increasing to an unacceptable level. I am woken up each morning at 5:30 to the sound of nonstop aircraft flying directly overhead. In the evenings I am unable to watch TV due to the noise level of the aircraft flying overhead. I am unable to have a conversation outside of my house due to the noise.

What is being done to study the noise exposure in the Overlook area?

JoAnn M. Suminguit

Public Information Meeting 5
February 5, 2015

Newspaper Notice

Flyers/Postcards

Registration

Meeting Handout

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Thursday, February 5, 2015
6 p.m. to 8 p.m.

CLT Center
5601 Wilkinson Blvd.
Charlotte, NC 28208

Charlotte·Douglas®
INTERNATIONAL AIRPORT

Charlotte·Douglas®
INTERNATIONAL AIRPORT

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Charlotte, NC 28219
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Public Meeting Notice
On Noise Exposure Map Update Study

When: Thursday, February 5, 2015 • 6 p.m. to 8 p.m.

Where: CLT Center
5601 Wilkinson Blvd.
Charlotte, NC 28208

Charlotte Douglas International Airport has scheduled another public meeting on Thursday, February 5 for residents who were unable to attend the December meetings. Preliminary draft contours will be on display, as well as several informational graphic boards in an open house style setting. A 30-minute presentation will begin around 6:30 p.m. The open house session will occur from 6 p.m. to 8 p.m. Attendees will be encouraged to ask questions throughout the meeting.

For more information, visit: **www.airportsites.net/CLT-NEM**

CLT Center is located at the corner of Wilkinson Boulevard and Harlee Avenue – behind the Business Valet Deck.

Parking will be available in the Business Valet Deck.

CHARLOTTE.

North Carolina } ss

Mecklenburg County }

The Charlotte Observer Publishing Co.
Charlotte, NC
Affidavit of Publication

Charlotte Observer

REFERENCE: 355155 LANDRUM & BROWN

0001516276 Noise exposure map update meeeting

Before the undersigned, a Notary Public of said County and State, duly authorized to administer oaths affirmations, etc., personally appeared, being duly sworn or affirmed according to law, doth depose and say that he/she is a representative of The Charlotte Observer Publishing Company, a corporation organized and doing business under the laws of the State of Delaware, and publishing a newspaper known as The Charlotte Observer in the city of Charlotte, County of Mecklenburg, and State of North Carolina and that as such he/she is familiar with the books, records, files, and business of said Corporation and by reference to the files of said publication, the attached advertisement was inserted. The following is correctly copied from the books and files of the aforesaid Corporation and Publication.

PUBLISHED ON: 01/19/2015

AD SPACE: 9.00 INCHES

FILED ON: 01/28/2015

Public Information Meeting

On Noise Exposure Map Update Study

Thursday, February 5, 2015
6:00 pm to 8:00 pm
at the CLT Center
5601 Wilkinson Blvd.
Charlotte, NC 28208

Charlotte·Douglas INTERNATIONAL AIRPORT

Preliminary draft contours will be on display, as well as several informational graphic boards in an open house style setting. A 30-minute presentation will begin around 6:30 p.m. The open house session will occur from 6:00 p.m. to 8:00 p.m., at which attendees will be encouraged to ask questions of Airport staff, and land use and noise consultants who are in attendance before and after the presentation. The same information that was presented at the public meetings on December 3rd & 4th, 2014 will be presented on February 5th, 2015.

Parking will be available in the Business Valet Garage in front of the building at the corner of Wilkinson Boulevard and Harlee Avenue. Directions are available online at: http://www.airportsites.net/clt-nem/directions/

More information about the Noise Exposure Map Update is available online at:
http://www.airportsites.net/CLT-NEM

NAME: Judith M Sears TITLE: Acctg Clerk

DATE: JAN 29 2015

In Testimony Whereof I have hereunto set my hand and affixed my seal, the day and year aforesaid.

Notary: [signature] My commission Expires: ___/___/___

My Commission Expires May 27, 2016

CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	K.M. Jones	2211 Sam Wilson Rd.	704/393-8349	djones68@bellsouth.net
2	Susie Matthews	2227 Sam Wilson Rd	704/589-0919	mamasuzy20@aol.com
3	Tom & Jane Olson	6933 Daniel Lane	704/3921527?	THOLSON@ATT.NET
4	Gloria Massey	2220 Mary Ann Dr	704 398 9500	TEEMCDANIEL@YAHOO.com
5	Roger & Pam Walters	2408 Pruitt St.	704-399-1545	rpwalters • carolina.rr.com
6	CYNTHIA A HOLINY	2017 DOVE DRIVE 28214	704-469-1429	cynthiaaholiny@yahoo.com
7	Carroll Jenkins	4813 Lebanon Dr. 28273	704-607-3244	gm0917@aol.com
8	Scott McElyea	~~~~ 8171 Douglas Drive.	704-685-1979	S-L-MCELYEA@YAHOO.COM
9	Lisa Blackwood	8171 Douglas Drive	704-685-1979	S-L-MCELYEA@YAHOO.COM
10	ALFRED TOWNSEND	2413 Placid Lake Dr	704-392-3348	—
11	Wayne + Judy Cooper	8932 Dixie River Rd 28278-9541	704-392-5877	wpcooper@arconmfg.com
12	Zelda Keitt	5401 Green Moss Ln	704-399-6967	
13	Mr. Smyth			
14	Anthony Miranda	3132 Westerwood Dr 28214	704-477-5837	amiranda2@live.com
15	Beverly Swift	9518 Parkridge Dr 28214	980 200 7033	Swiftbeverly@yahoo.com
16	Austin Woodward	9227 River Walk Way 28214	412-877-2881	Awoodward9227@gmail.com
17	Carolyn Allen-Sims	2517 Sloan Drive 28208	704-398-2455	carolynea@bellsouth.net
18	Reginald A. Keistler	4025 Rockwood Rd 28214	704392-9524	
19	Dave Connelly	12001 Riverhaven Dr 28214	704-394-9372	dconnelly82@att.net
20	Paul Raynor	4117 Rockwood Rd 28214	704392 8827	Raynor38@yahoo.com

CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Thomas Williams	1235 Kiker Cir	704 779 2350	
2	Thelma Wright	7727 Lobilia Lane	704 996-7292	
3	Lawana Mayfield	City of Charlotte	704 ~~[illegible]~~ 336-3435	
4	Robert Cole	3803 Margaret Ln Charlotte 28214	704 560-3498	
5	Ann Wallace	3909 Marlette Dr		
6	Joel EBERHART	5417 OLD TOWN LA GASTONIA	704) 879-4000	
7	B. & W. TAYLOR	2008 WILDLIFE RD	704 399-4424	
8	Thy Baccari	8012 MCGARRY TRL	704-995-1681	
9	Gary Hunter	7629 Joy Lane	205-588-2709	hunTersenior@msn.com
10	Dorothy A Jones	2211 Sam Wilson Rd	704-393-8347	djones68@bellsouth.net
11	Linda Bell	3933 Sharyn Dr.	704-604-7178	
12	DAVID BEHNKE	1549 MT ISLE HARBOR DR.	704 995 3533	DAVID.BEHNKE@VZW.COM
13	Edna Floyd	7407 Merrily Ln 28214	980 875 9886	N/A
14	Steve & Janet Haas	8237 Laine Rd. 28214	704-393-8373	N/A
15	Edward Thompson	4407 Mapleleak LN 28208	704-373 2136	
16	James Blackwood	1418 Niagara Cir 28214	704-391-9125	N/A
17	Katherine Keith	5401 Green Moss Ln Clt 28288	704 399 6967	
18	Henry Sadler	7233 Tuckaseegee Rd. Char. 28214	704-399-3258	
19	George James	10324 Prairiegrouse Ct. CH 28214	704 567-0378	
20	Ron Whitden	3434 Dublin Rd 28208	704 6072206	

CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Pon Tieu	2208 Little Rock Rd. CLT 28214	704 615 8177	pontieu@gmail.com
2	Chris Adkins	8201 DOUGLAS DR. CHLT 28217	704 398-2029	william.adkins@cms.k12.nc.us
3	Keith Cain	7830 Douglas Dr.	980 322 5589	KeithDCain@Hotmail.Com
4	W Gosney	2125 Sam Wilson Rd	704-840 9018	Wa88ie2125@gmail.com
5	Anne Swann	8600 Stoneface Rd 28214	704-398-9839	mraswan@carolina.rr.com
6	Rick Jasinski	1533 Mt Isle Harbor Dr 28214	704.201-8976	Rick.Jasinski@Gmail.com
7	Thelma Riccard	5709 Rocbridge Lane 28208	704394-8532	triccard@bellsouth.net
8	Meg Winberg	7100 Marley Circle 28214	4157309584	meg_winberg@yahoo.com
9	RALPH SUTTLE	7800 WILKINSON BLVD. 28214	704-399-3521	NONE
10	EUGENE MOORE	3804 Margaret Ln 28214	704 392-0997	NONE
11	SALLIE & BOB CAMPBELL	7100 WHITSIDE LN 28214	704.392-6581	N/A
12	James & Linda Smeltzer	1340 Niagara Cir. Ch 28214	704.393-2467	lindasmeltzer@att.net
13	ARTHUR L. COTTON	5301 LEWHAVEN DR 28208	704 400-8100	ARTHUR.COTTON@ALLENTATE.COM
14	Dorian L. Carter	6227 Thompson Brook Ln 28211	980-522-8859	dorianlcarter@gmail.com
15	Brela James	10324 Prairiegrove ct 28214	704-567-0378	bbjames514@gmail.com
16	Paula Jones	2226 Pleasant Dale Dr 28214	704-393-2502	HPJones01@yahoo.com
17	Lisa Joseph	8000 ~~Scott~~ SCOTTVIEW DR 28214	704-965-4506	LRJ.LJ60@GMAIL.COM
18	William Oliver	2223 RYAN Ct Charlotte 28214	704-391-0370	Aliman524@AOL.com
19	Linda Christine	1200 Regal Ave, Charlotte 28214	704 604-3115	
20	MARK Chapman	14801 Lonesome Oak Ct 28278	704-588-2394	

CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Bobbie Lopez	3314 Sam Wilson Rd	(704) 392-2274	
2	Rae Corless	3216 Sam Wilson Rd	~~704~~ 223-2892	designcox@ash.com
3	DANIEL WEST	3710 SADLER RD. CHARLOTTE	704 281 3344	dwest727@aol.com
4	Paula Redfield	2104-Ayrsley Town Blvd. Charlotte	828 719 5699	paula.redfield@gmail.com
5	Frederic Guy	" "	"	"
6	Winifred L. Muhammed	5915 Thorn Hill Ln Char NC 28208	704-763-7243	wlatifah@bellsouth.net
7	Margaret Parker	2825 Lee St. Charlotte	704-399-8476	
8	Enola Lynch	6627 David Ave 28214	704-399-5171	jeanette2942@att.net
9	Ralph Clark	2326 Westerly Hills Dr 28208	704 392 0284	rlclark112@aol.com
10	BONITA LULL	2707 NEATHER GLEN LANE 28208	704 399-3419	bonitalull@Carolina.rr.com
11	Susan Flaherty	1754 Wildwood Dr., Charlotte 28214	704-860-9386	—
12	Barry Flaherty	" " " " "	704-999-7332	capt.flaherty@gmail.com
13	Kim Averitt	2421 Placid Lake Dr. Char. 28214	704-393-2493	JeffreyAveritt@bellsouth.net
14	[illegible]	2301 Rayecliff	704-724-9277	TJJCJC Gmail.com
15	David T Deed	3532 Sandy Porter Rd	704-634-8070	dbledtallt@yahoo.com
16	Edward Bank	2200 Ryan CT	704-394-7686	BAnkohene@Gmail.com
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CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.
SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Sandra Medlin	6636 Glenmoor Dr	704-277-5653	sandramedlin84@gmail.com
2	Evonne Starling	7023 Flintrock Rd	704-394-9718	Starling1637@Yahoo.Com
3	Steven Boyd	7328 old wright lane	704-492-4323	STEVEBoyd80@Bellsouth.net
4	Jane Armour	12601 Moores Chapel Rd	704-393-7096	jarmour@uncc.edu
5	Jennifer Passantino	6066 Tribune Dr	704 258 6510	JP17@MSN.COM
6	Steve Parker	3919 Amerigo St.	704-942-6867	sparker7@outlook.com
7	Dianne Helms	7000 Lakeland Dr	704-394-2077	diannehelms@bellsouth.net
8	Tommy Helms	7000 Lakeland Dr	704-394-2077	
9	Joann Johnson	11225 Moores Chapel Road	704 399-0723	joann38ok@yahoo.com
10	Eliza M Davis	4000 Whitehall Dr	704 391-885	daviseliza16@yahoo.com
11	Lou Williamson	1915 Wildlife Rd.	704-582-1803	lou.r@spectrumnc.com
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CLT Noise Exposure Map Update
Public Open House #2
February 5, 2015, 6:00-8:00 p.m.

SIGN-IN SHEET - PLEASE PRINT

	Name	Address	Phone Number	E-Mail Address
1	Katie H. Simmons	2103 O'Hara DR CLT, 28273	704-588-0831	
2	JEFF TODD	9507 BRENDA HAWK RD CLT 28214	704-430-7654	NCFAN1@YAHOO.COM
3	Martha Eppes	12601 MOORES CHAPEL Rd 28214	704 393 7096	meppes@uncc.edu
4	Jake Armour	"	"	volksheads@yahoo.com
5	Sandra Sopher	3831 Allwood Dr. CLT 28217	704-525-7569	sandysopher@gmail.com
6	KENT MAIN	5509 EAGLE LAKE DR CLT 28217	704-336-5721	KMAIN@ci.CHARLOTTE.NC.US
7	Russell Pitt	2210 RYAN Ct CLT	704-906-3867	Russell.Pitt@yahoo
8	CLARA BLANDING	10617 North Canyon Rd		melasnow_1@yahoo.
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Charlotte Douglas International Airport
Noise Exposure Map Update
Public Information Meeting #5

February 5, 2015 - 6:00 pm to 8:00 pm at the CLT Center, 5601 Wilkinson Blvd.

Format and Purpose of the Meeting

A fifth Public Information Meeting was held on February 5, 2015 to provide an additional opportunity for the public to obtain information that was presented at Public Information Meetings #3 and #4 that were held in December 2014.

Staff in Attendance	
Name	**Organization**
Brent Cagle	City of Charlotte
Jack Christine	City of Charlotte
Jeff McSwain	City of Charlotte
Kathy Dennis	City of Charlotte
Lauren Scott	City of Charlotte
Kevin Hennessey	City of Charlotte
Rob Adams	Landrum & Brown
Chris Sandfoss	Landrum & Brown
Sarah Potter	Landrum & Brown
Chuck Lang	Landrum & Brown

Public Attendance

Based on sign-in sheets, approximately 102 people attended the meeting on February 5, 2015. The Exhibit on the following page shows the locations of the addresses listed by each attendee on the sign-in sheets.

INSERT MAP

Presentation

A brief presentation was given that included information similar to the information on the display boards. The presentation is included as **Attachment 1**.

Display Boards

Display boards were presented to provide information regarding the specific methodology and inputs into a Noise Exposure Map (NEM) Update. Information presented on the display boards included the following topics:

- Introduction to Noise Exposure Map Update
- Aircraft Noise Modelling Methodology
- Input Data Collection
- Noise Measurement Program
- Preliminary Noise Contour Modeling Results
- Next Steps

The display boards were the same as those presented at Public Information Meetings 3 and 4.

Summary of Comments Received

There were a total of 6 people (or couples together) that submitted comments on the comment forms provided or via email. In many cases, individuals commented on more than one topic. In general, a total of 15 comments were made by the 6 people. The chart below summarizes the comments by topic.

Comment Topic	Number of Comments
General Noise	2
Vibration	2
Aircraft Operations / Frequency of Overflights	1
Meeting Format	1
Flight Tracks / Altitude	2
Property Value	1
Study Area / Noise Contour	3
Noise Measurements	1
Safety	1
Federal Threshold of Significant Noise	1
Total	15

A copy of all the comments received is included as **Attachment 2**.

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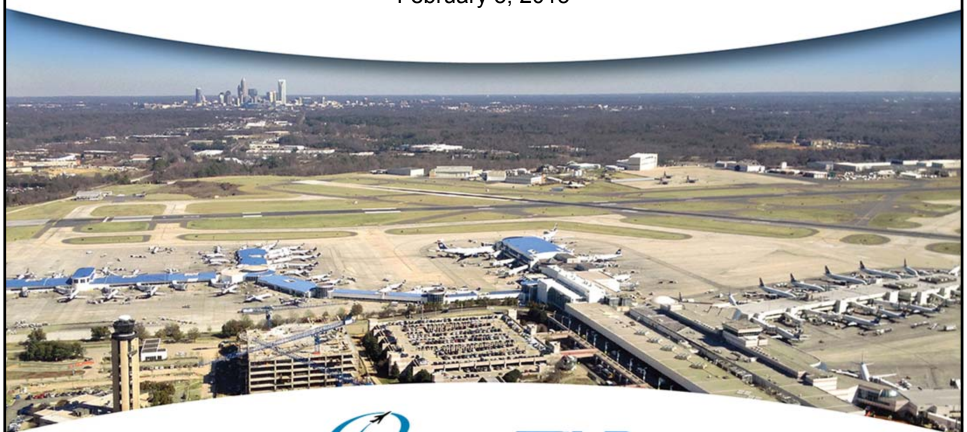
ATTACHMENT 1
PUBLIC MEETING PRESENTATION

CLT Noise Exposure Map Update

Public Information Meeting

February 5, 2015



Charlotte·Douglas INTERNATIONAL AIRPORT

Aviation Planning at the Leading Edge

Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Welcome and Introductions

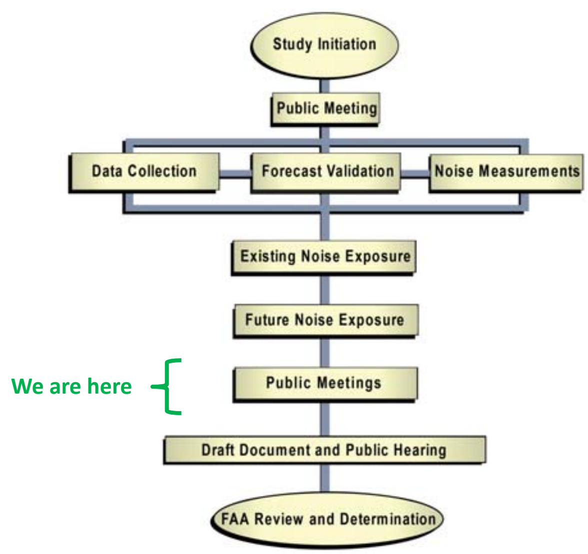
- Charlotte Douglas International Airport
  - Sponsor of the Noise Exposure Map (NEM) Update
  - Certify the NEMs are accurate
  - NEM Team: Jack Christine, Katherine Dennis, Lauren Scott, Kevin Hennessey
- Consultant Team
  - Landrum & Brown is the lead consultant for the NEM Update
  - 60 years of aviation planning
  - Experts in aircraft noise and land use planning
  - Rob Adams, Principal-in-Charge
- Federal Aviation Administration
  - Developed guidelines for NEMs that must be followed
  - Review NEMs for accuracy and determination that guidelines were met
  - Provide technical support for noise modeling

2

Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

NEM Update Process



L&B

3

Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

NEM Update General Overview

- NEM Updates Document Noise Levels
  - The focus of the NEM Update is to quantify noise and identify land use incompatibilities that exist today and in the future
- NEM Updates must Follow FAA Guidelines
- NEM Updates do not:
  - Recommend changes to airport or runway, or implementing mandatory restrictions on aircraft
  - Recommend levying fines for not following procedures
  - Limit access to the airport based on size, type, or noise created by aircraft
  - Alter the noise compatibility measures already in place at the airport

L&B

4

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Previous NEMs at CLT

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
  - Prepared NEMs for 1996 and 2001 conditions
  - 2001 NEM included construction of the third parallel runway

L&B 5

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Important Facts About NEM Updates

- Developing Noise Exposure Maps
  - FAA has established land use compatibility guidelines for identifying aircraft noise impacts
  - Based on Day-Night Average Sound Level (DNL)
  - Required to use Integrated Noise Model (INM)
  - Noise-sensitive uses are considered non-compatible at or above 65 DNL
    - Residential
    - Schools
    - Places of worship
    - Hospitals
    - Nursing homes
    - Daycare facilities where licensed education occurs
    - Libraries

L&B 6

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	21.6	27.6
Airbus A320-200	A320-232	64.8	82.7
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.7*	*1,289.3*

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.6	0.9
Business Jet	CL600	3.9	5.7
Business Jet	CL601	2.6	3.9
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.3	3.4
Business Jet	CNA510	1.3	1.8
Business Jet	CNA55B	1.6	2.4
Business Jet	CNA750	1.3	1.9
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	3.9	5.7
Business Jet	GIV	4.0	6.0
Business Jet	GV	2.6	3.9
Business Jet	LEAR35	13.0	20.0
Business Jet	MU3001	12.0	16.9
Subtotal		*387.8*	*400.9*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	4.8	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	0.9
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.6
DASH 6	DHC6	4.2	4.1
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.6	4.1
Single-Engine Piston	GASEPV	4.6	2.9
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*145.9*	*149.0*
Military Aircraft			
Lockheed C130 Hercules	C130HP	2.5	3.8
Subtotal		*2.5*	*3.8*
Helicopters			
Augusta A-109	A109	1.7	1.7
Bell 407 Jet Ranger	B407	0.3	0.3
Subtotal		*2.0*	*2.0*
Grand Total		**1,517.4**	**1,879.5**

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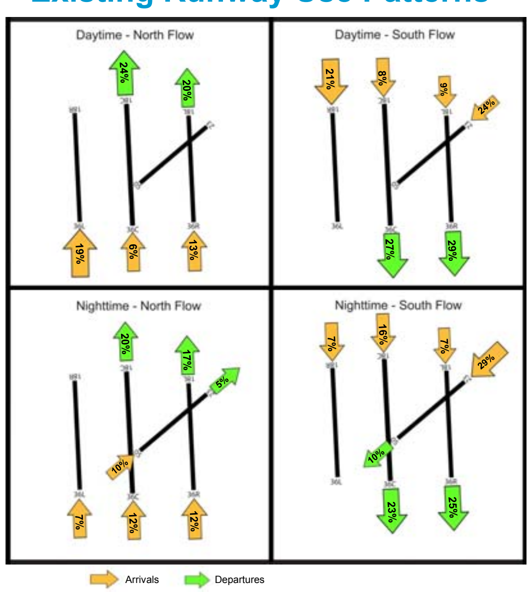
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Existing Runway Use Patterns



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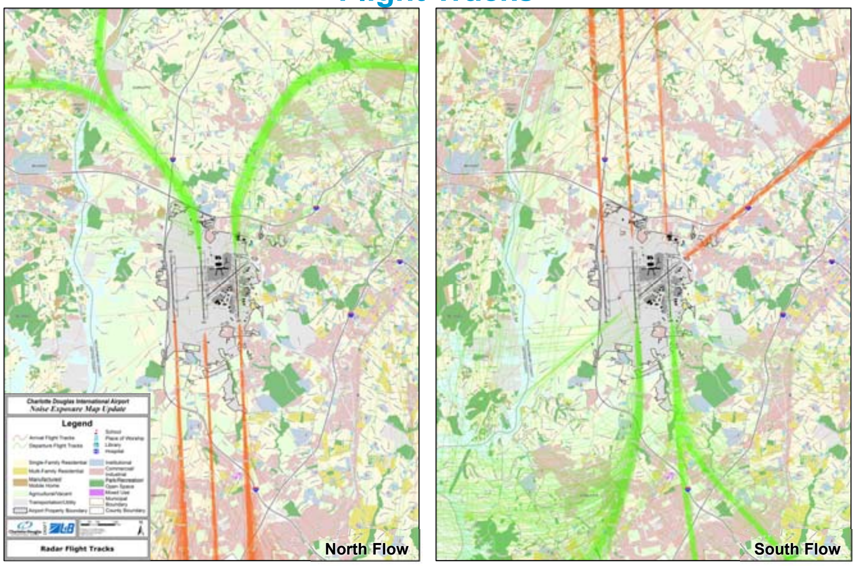
8

Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Flight Tracks



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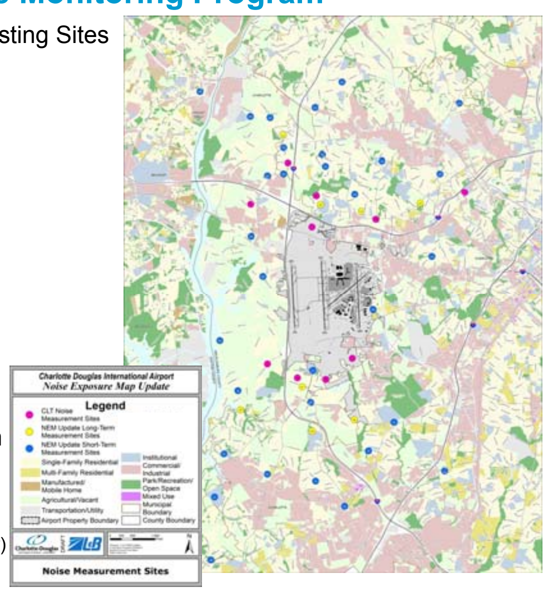
Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Noise Monitoring Program

- Collected Data from 10 Existing Sites
  1. 601 Dewolfe Street
  2. 10300 Garrison Road
  3. Whippoorwill Drive
  4. 1924 Wildwood Drive
  6. 2900 Westerwood Drive
  7. Moores Lake
  8. McAlpine Drive
  9. 3515 Farhill Drive
  10. 6101 Tuckaseegee Road
  12. 9401 Markswood Road
- Conducted Monitoring from other sites
  - 8 Long-Term Sites (5 days)
  - 33 Short-Term Sites (~ 1 hour)



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Noise Exposure Map (NEM) Update

Charlote·Douglas INTERNATIONAL AIRPORT

Noise Monitoring Results

- The monitoring was conducted from July 31, 2014 through August 13, 2014
- Long-term noise monitoring was conducted at 8 sites for over five days at each site
  - DNL noise levels ranged from 59.1 to 64.9 DNL and were consistent with INM predictions
- Short-term noise monitoring was conducted at 33 sites for approximately on hour per site

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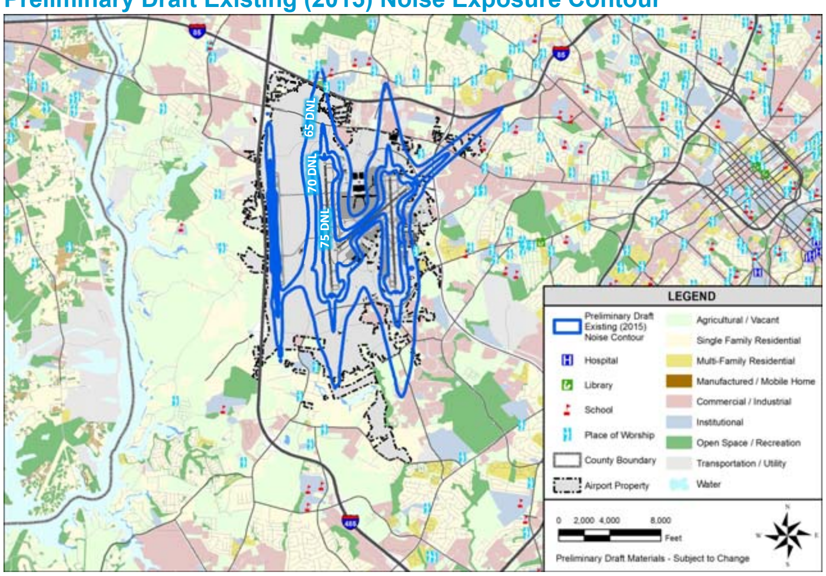
Noise Exposure Map (NEM) Update

Charlotte·Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Existing (2015) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	0
Previously Eligible for Sound Insulation	41
Sound Insulated	3
Total Housing Units	**44**
Population	
Total Population	**113**
Noise-Sensitive Facilities	
Schools	0
Churches	0
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**0**

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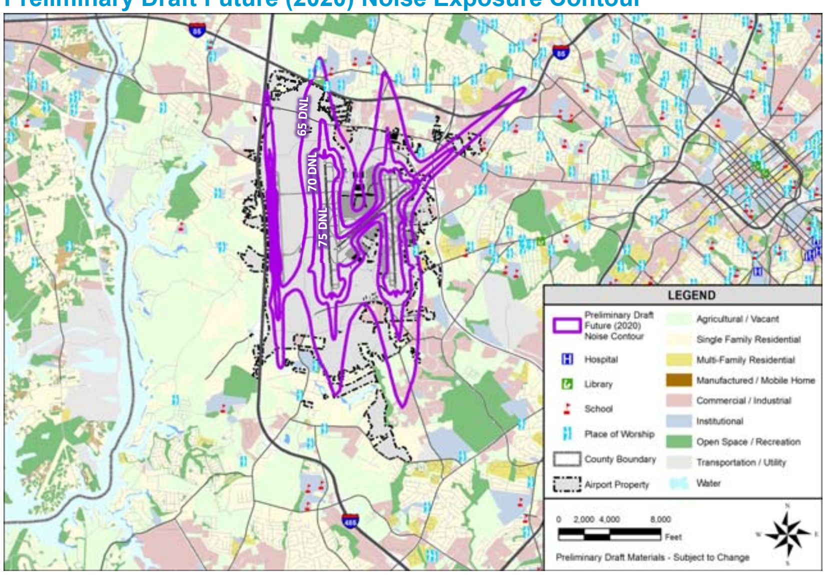
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Future (2020) Noise Exposure Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities
Future (2020) Noise Exposure Contour

Properties by Mitigation Area	**65+ DNL**
Housing Units	
Unmitigated	3
Previously Eligible for Sound Insulation	53
Sound Insulated	5
Total Housing Units	**61**
Population	
Total Population	**160**
Noise-Sensitive Facilities	
Schools	0
Churches	2
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**2**

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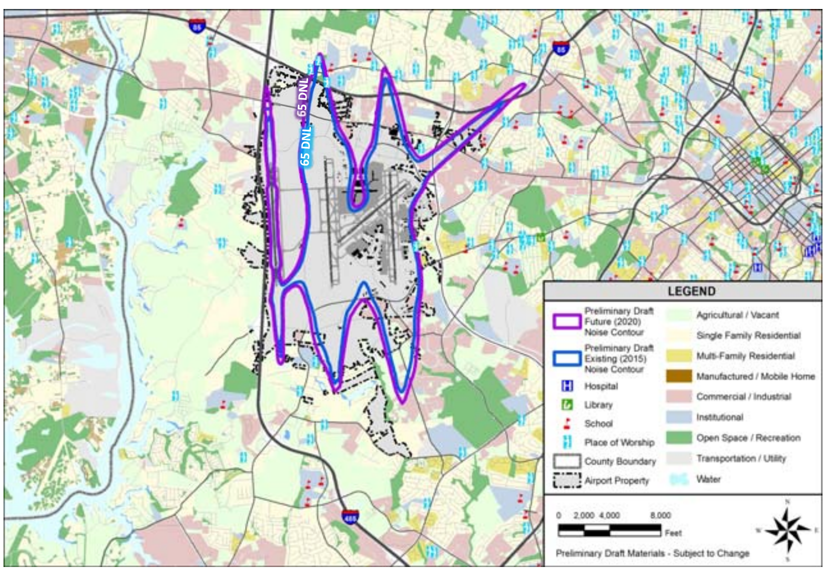
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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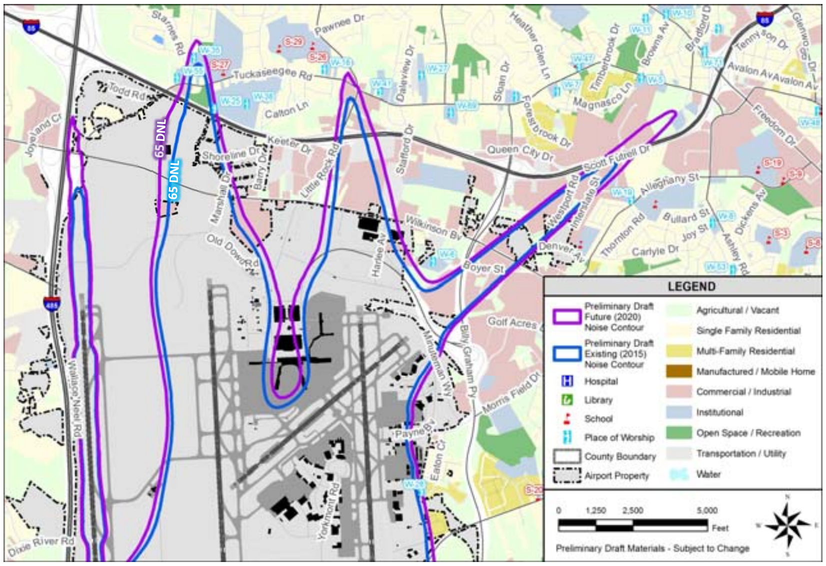
Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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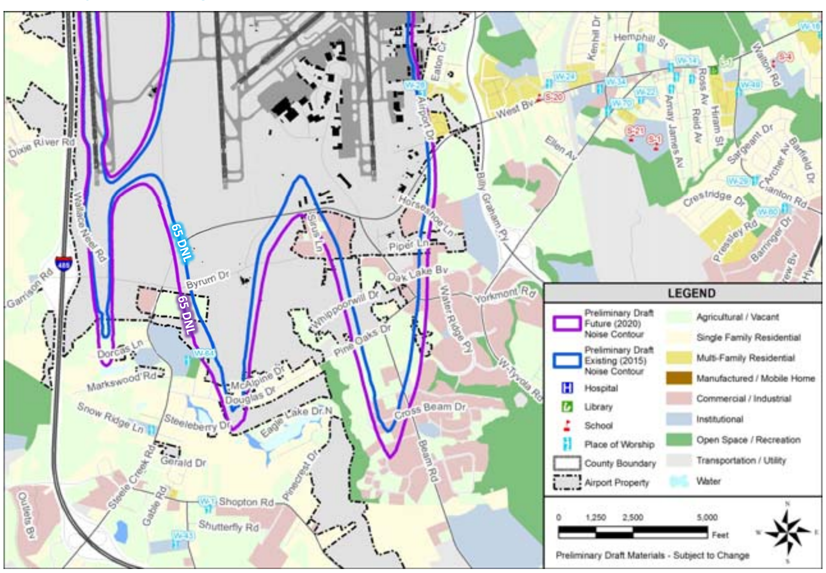
L&B

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



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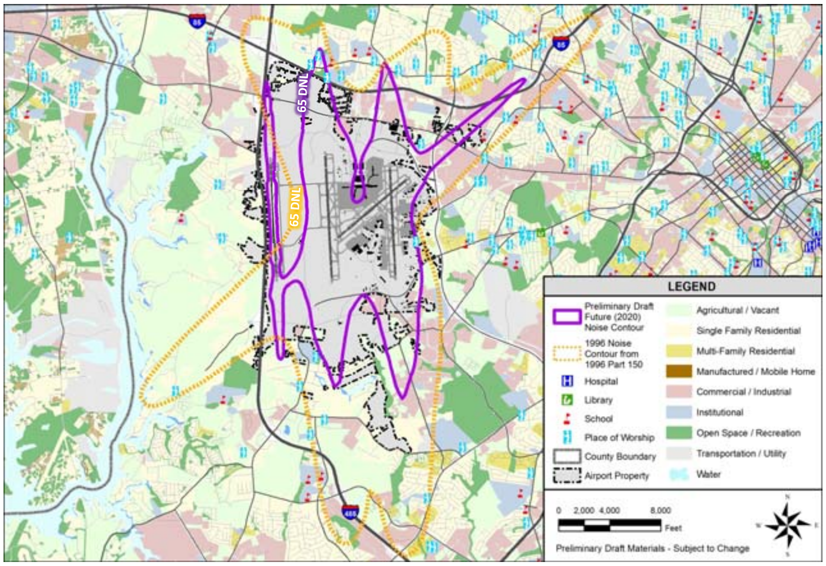
L&B

Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Future (2020) Noise Exposure Contours compared to 1996 Noise Contour



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Noise Exposure Map (NEM) Update

Charlotte-Douglas INTERNATIONAL AIRPORT

Preliminary Draft Noise Contour / Land Use Incompatibilities

Properties by Mitigation Area	1996 Noise contour	2015 Noise Contour	2020 Noise Contour
	65+ DNL		
Housing Units			
Unmitigated	n/a	0	3
Previously Eligible for Sound Insulation	n/a	41	53
Sound Insulated	n/a	3	5
Total Housing Units	**2,773**	**44**	**61**
Population			
Total Population	**6,700**	**113**	**160**
Noise-Sensitive Facilities			
Schools	4	0	0
Churches	15	0	2
Libraries	0	0	0
Hospitals	0	0	0
Nursing Homes	0	0	0
Total Noise-Sensitive Facilities	**19**	**0**	**2**

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Noise Exposure Map (NEM) Update

Charlotte-Douglas International Airport

Next Meetings

- Next Public Information Meetings
  - Planned for Spring 2015

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ATTACHMENT 2
PUBLIC MEETING COMMENTS

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

February 5, 2015, 6:00 p.m. to 8:00 p.m.

Welcome to the Public Information Meeting for the Noise Exposure Map (NEM) Update for the Charlotte Douglas International Airport. Public comments are an integral part of the NEM Update process. This comment form is provided to receive your input and ensure that your concerns are considered. Please use this form to submit written comments, attaching additional pages if necessary. Either place the form in the comment box, provided here at the meeting, or mail to the address below. Comments may also be submitted via e-mail to CLT-NEM@landrum-brown.com. Please submit comments by **February 13, 2015**.

Noise is not the only thing that exposure to my house. There also vibration to ~~the~~ wall of the house every ~~the~~ time the air plane take off. The air plane come directley above the house for their Landing. I have no experience any less noise now then before. I would appreciate if you can conduct further ~~s~~tudy.

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Pon Tieu

Address: 2208 Little Rock Rd.
Charlotte NC 28214

COMMENT FORM

PUBLIC INFORMATION MEETING

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

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Dear Mr. Adams,

This is not a comment, but, more of a compliment on how you and the airport staff handled the meeting. You and the staff were very perfessional in handling some rather ridiculous questions. I.E.: The lack of knowledge of how sound travels, or how an average is derived. Unfortunately I had to leave the meeting early, but, it is worth my stamp to give you this compliment.

I look forward to reading my ~~air~~ airport newsletters.

Sincerely, Ms. Lisa R. Joseph

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Lisa R. Joseph

Address: 8000 Scottview Dr.
Charlotte, N.C.
28214

E-mail: LRJ.LJ60@GMAIL.COM

COMMENT FORM

PUBLIC INFORMATION MEETING
CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT
NOISE EXPOSURE MAP UPDATE

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We moved here in 2002 and had no idea that there would be a runway built so close. Since that time the noise has become very loud, At times the house + windows (Manfct. home) viberate and our property value is down. All this from the 3rd paralelle runway. You say the noise contour doesn't include us, but the rumbleing say's different

Submit comments to:

Mr. Rob Adams
CLT NEM Project Manager
Landrum & Brown, Inc.
11279 Cornell Park Drive
Cincinnati, OH 45242

CLT-NEM@landrum-brown.com

Name: Eugene Moore
Address: 3804 Margaret Ln.
Charlotte, N.C. 28214

From: Steve Haas <shaas918@yahoo.com>
Sent: Friday, February 6, 2015 6:45 PM
To: CLT-NEM
Subject: Comment Form

Gentlemen,
The following are my comments for review:

1- Conduct a follow up DNL test during the Winter months so as to eliminate any question as to whether tree foliage would interfere with test results. You already have test results during the Summer months. Tests should be conducted during the day as well as the night.

2- Provide a countywide map of those DNL test results to show homeowners where their particular property falls in regard to the 65 DNL test results.

3- Petition the FAA to lower the existing 65 DNL as the accepted level to 55 DNL in regards to home insulation or property purchases.

Steve Haas
8237 Laine Road
Charlotte N.C. 28214

From: Ethan MAHNESMITH <e.mahnesmith@gmail.com>
Sent: Wednesday, February 11, 2015 3:52 PM
To: CLT-NEM
Subject: Mountain Island Lake Area

Hi,

I live at 2520 nance cove rd in Charlotte. I recently moved to the area and was not aware of the prevalent air traffic over my house and surrounding area. I've written many complaints to the airport but get the same form response each time.

I'm writing to you in hopes that you all are taking a close look at the mountain island lake area and the impact caused by the disproportionate amount of air traffic compared to other areas of Charlotte.

I've read some articles describing updates to how planes will arrive into the airport from a stair step approach to a more steep approach. This would do wonders for my area as well as spreading out the flight paths so that there isn't a funnel over the lake.

Are the updated maps and guidance part of your recommendations to the FAA? If so, please take mountain island into account. It is a great place to live that is ruined by noise; constant noise every 90 seconds most days.

Thank you for your time and consideration, Ethan Mahnesmith

Katherine Williams
628 Wilderness Trail Drive
Charlotte, NC 28214

704-398-3183
williams41@post.harvard.edu

January 20, 2015

Mr. Brent Cagle
Airport Director
Charlotte Douglas International Airport
P.O. Box 19066
Charlotte, NC 28219

Dear Mr. Cagle:

My neighbors and I thank you for keeping us abreast of your plans to update your Noise Exposure Maps (NEMs) which presumably include flight corridors (arrivals and departures).

We would like to remind you that our area, known as Tank Town, lies less than 10 miles from your airport. Further, our area is relatively close to several oil and gas storage tanks (less than a minute flying time). In addition, there are several manufacturing/processing plants within a five mile radius of where we live.

We know you cannot guarantee that a plane can never fall out of the sky during take-off or landing, for any reason, including wildlife strikes, weather, or human error. We urge you therefore, to take into account the very real possibility/hazard of accidents happening at takeoffs/landings. While we don't have a river (e.g. Hudson/ New York, Potomac/Washington, DC), we do have Lake Norman in which to ditch a plane, but an airplane in trouble may not get to Lake Norman in time, which leaves us vulnerable to being incinerated in our homes if an airplane gets into difficulty shortly after takeoff or on approach. The remotest possibility of our community in flames is not a good thing.

And finally, while a Noise Exposure Map for the Charlotte Airport has not been updated since 1996 (your Public Meeting Notice v 26.4 November 2014), your flight patterns have in fact changed slightly, in our area, beginning in December 2010, with a small increase in noise and vibration. We understand that the airport is growing and listed in the top ten airports in the country, nevertheless, we are here, and our lives and property should be protected from any possible hazard associated with incidents in the air. Ours is but a small section of the more than five million square miles of U.S. airspace. We should not have to cringe whenever a plane thunders overhead, and hope that it will (a) stay aloft and not incinerate us and our highly flammable neighborhood in the process and/or (b) shake our houses down to the foundations. We should be exempt.

We thank you for bearing the above in mind as you balance convenience, safety and risk in updating your Noise Exposure Maps, flight corridors and processes.

Sincerely,

Katherine Williams

Katherine Williams

cc Mr. Phillip Braden, FAA
Mr. Ely Portillo, Charlotte Observer
Neighbors

Public Information Meetings 6 & 7
Information to be provided in Final NEM Update

Meeting materials to be provided in the final document:

Newspaper Notice

Flyers/Postcards

Registration

Meeting Handout

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Public Hearings #1 and #2
Information to be provided in Final NEM Update

Meeting Materials to be provided in the final document:

Public Hearing Transcripts

Written Comments

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Appendix F

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APPENDIX F
FORECAST OF AVIATION ACTIVITY

This Appendix contains the aviation activity forecast that was prepared for the planning period for this NEM Update and the Federal Aviation Administration (FAA) approval of the forecast.

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Charlotte Douglas International Airport

Airfield Capacity Enhancement Plan

Forecast of Aviation Demand

March 2014

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FORECAST OF AVIATION DEMAND

This document presents a comprehensive forecast of aviation demand for Charlotte Douglas International Airport (CLT or the Airport) to support the Airfield Capacity Enhancement Plan (ACEP). Activity levels are forecast for the years 2018, 2023, 2028, and 2033. Future activity levels are projected for annual passenger enplanements, air cargo volumes, and aircraft operations. In addition, peak period (monthly, daily, and hourly) forecasts are also presented to guide the planning process.

U.S. Airways and American Airlines closed their $17.7 billion merger in December 2013, creating the world's largest airline. The merged airline inherits the American Airlines name and the U.S. Airways CEO. The new American Airlines Group is instantly bigger than Chicago-based United Airlines with a global network with nearly 6,700 daily flights to more than 330 destinations in more than 50 countries and more than 100,000 employees worldwide, including 7,500 based in Charlotte. CLT will be the combined airline's second-busiest hub, behind only Dallas/Fort Worth in the airline's number of daily flights. The new carrier will be headquartered in Fort Worth, Texas.

The airlines will operate separately for a year and a half to two years. U.S. Airways is leaving the Star Alliance on March 30, 2014 and joining the American-led oneworld alliance the next day. The oneworld alliance includes airlines such as British Airways, Iberia and Japan Airlines. The combined airline will operate about 650 flights a day – more than 90 percent of the airport's total making Charlotte Douglas one of the most concentrated hub airports in the country. U.S. Airways CEO Doug Parker has called CLT one of the best hub airports due to its low cost for the airline. "The Charlotte hub is going to be an important part of a bigger airline now." U.S. Airways' current 30-year master lease with CLT runs through 2016. Most of the references in this document are to U.S. Airways even though it is technically American Airlines now.

The forecast presented herein reflects market-driven demand for air service. The forecast is "unconstrained" and as such does not take facility constraints or other outside limiting factors into consideration. In other words, for purposes of estimating future demand, the forecast assumes facilities can be provided to meet the demand. The forecast assumes the continued growth of the U.S. Airways' connecting hub operation at CLT. The development of the forecast begins with analyses of the economic base for air travel and historical aviation activity at the Airport.

1. ECONOMIC BASE FOR AIR TRAVEL

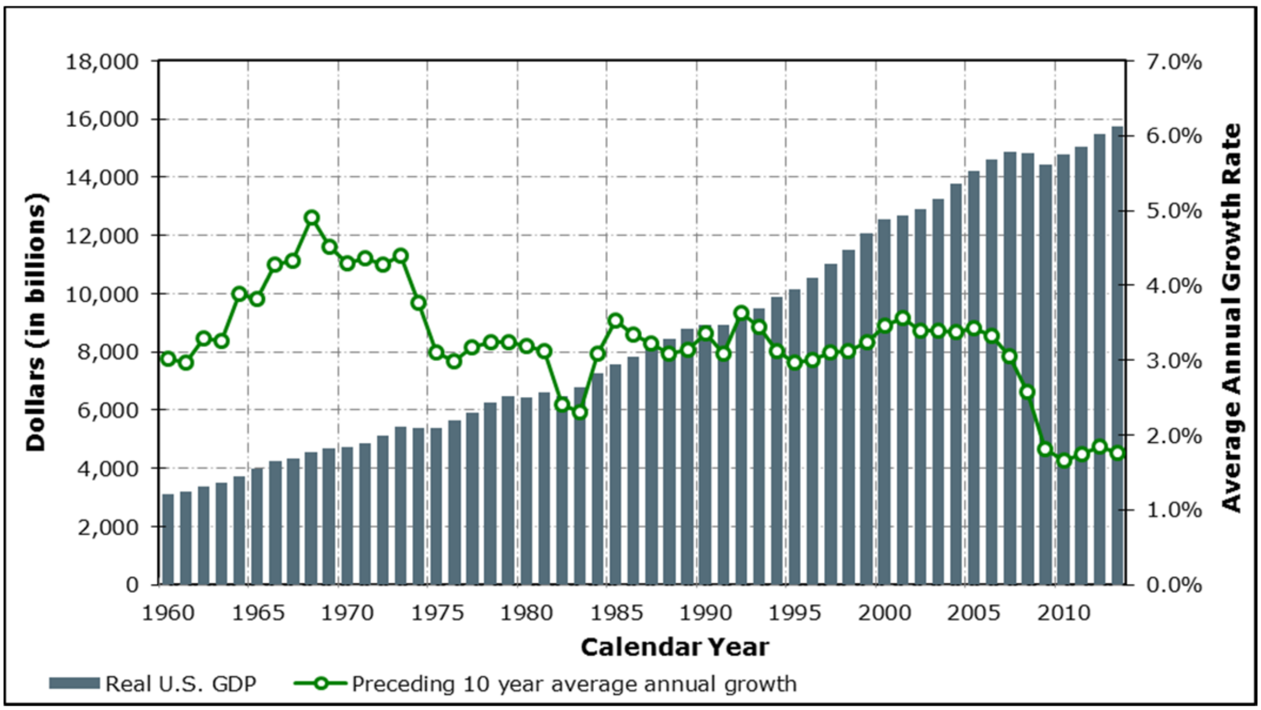
The intrinsic links between the level of aviation activity and economic growth are well documented. Simply put, growth in population, employment, income, and tourism activity typically lead to increased demand for air travel both for business and leisure purposes. An individual's demand for air travel is often referred to as "underlying demand" in that it cannot be realized without the presence of air service at a price that results in the decision to fly.

Air transportation demand at CLT depends on the combination of trends in the airline industry, national and international economic conditions, and the socioeconomic conditions within the region. As an influential global business location as well as a vacation destination market in the United States, changes in the broader U.S. economy and global economy have the potential to impact passenger volumes at CLT. This section provides an overview of the global, national, and local economic factors that generate the underlying demand for air travel.

1.1 UNITED STATES ECONOMY

Historically, the U.S. economy, as measured by Gross Domestic Product (GDP), has grown at a relatively steady rate; averaging 3.1 percent per year between 1960 and 2013 (see **Exhibit 1-1, *Historical Trends in U.S. Gross Domestic Product***). The rate of growth, particularly since 1985, has been remarkably stable, reflecting both the size and maturation of the U.S. economy. Individual years have fluctuated around the long-term trend for a variety of reasons including pure macro-economic factors, fuel shocks, war, and terrorist attacks.

Exhibit 1-1
HISTORICAL TRENDS IN U.S. GROSS DOMESTIC PRODUCT



Source: U.S. Department of Commerce, Bureau of Economic Analysis.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 1-1

Tourism plays a moderate role in the national economy. In 2012, tourism was recognized as 2.8 percent of the nation's GDP, as it had generated 2.0 trillion dollars by domestic and international visitors. This amount included an $855 billion impact in direct travel expenditures and an additional 1.1 trillion in other industries. As a result, 14.6 million jobs are actively employed, including 7.7 million directly in the travel industry and another 6.9 million in other industries.[1]

There have been two official economic recessions in the U.S. thus far in the 21st century. The first occurred between March and November of 2001 and was compounded by the September 11, 2001 terrorist attacks. The negative impact of these events on the airline industry is well documented. The recession itself was short-lived by historical standards and the economy returned to more normal growth rates quite quickly, fueled in large part by a gradual but prolonged reduction in interest rates.

The second recession, often referred to as the Great Recession, occurred between December 2007 and June 2009. The Great Recession was the worst financial crisis to affect the United States since the Great Depression and it was the longest recession since airline deregulation[2] in 1978. The nation's unemployment rate rose from 5.0 percent in December of 2007 to a high of 9.9 percent in the fourth quarter of federal fiscal year (FFY) 2009. In 2009, the American Recovery and Reinvestment Act (ARRA), was implemented in response to the economic crisis. This stimulus plan invested over $800 billion, with over half of it being spent during 2010. The economy grew at an average annual rate of 1.8 percent in FFY 2011 and 2.2 percent in FFY 2012.

According to projections published by the Federal Reserve in December 2013, annual GDP growth is expected to continue and peak between 3.0 to 3.4 percent in 2015 before slowing down to between 2.2 and 2.4 percent average annual growth in the long-term. **Table 1-1, *Forecast of U.S. Real Gross Domestic Product***, displays the forecast growth in the near and long term.

Table 1-1
FORECAST OF U.S. REAL GROSS DOMESTIC PRODUCT

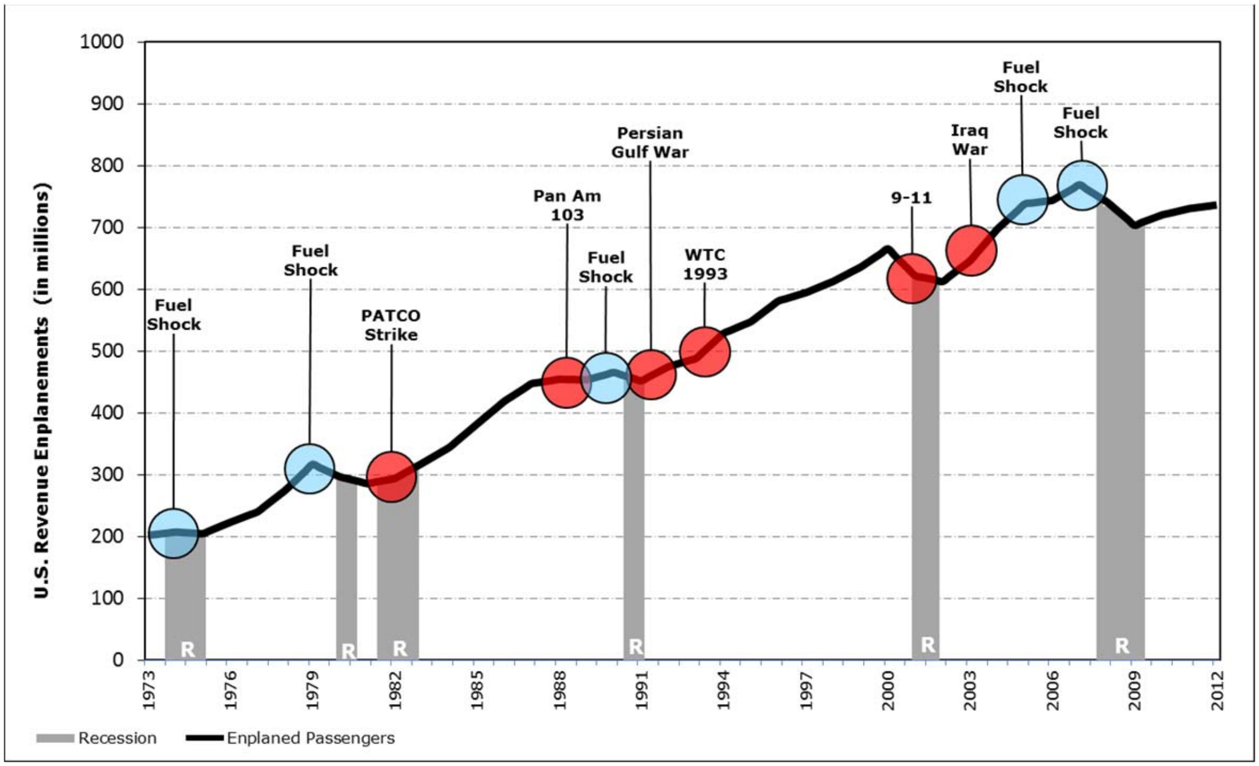
Fiscal Year	Low	High
2013	2.2	2.3
2014	2.8	3.2
2015	3.0	3.4
2016	2.5	3.2
Longer Run	2.2	2.4

Source: Federal Reserve projections as of December 2013
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\1-Source Data\Federal Reserve\[Federal Reserve GDP Projections 12-18-13.xlsx]Sheet1

1 U.S. Travel Association
2 Deregulation refers to the Airline Deregulation Act of 1978 which reduced government control over the commercial aviation industry.

Demand for air travel in the U.S. correlates strongly with fluctuations in the economy. As shown in **Exhibit 1-2, *Aviation System Shocks and Recoveries (1973-2012)***, passenger traffic has typically declined during economic contractions and returned to positive growth during subsequent economic expansions. The combined impact of a slowing economy and rapidly rising fuel prices resulted in a 3.6 percent decline in U.S. revenue enplanements in 2008 and a 5.1 percent decline in 2009.[3] Since the economic recession officially ended, aviation traffic has shown slow positive growth, however not as strong as historical shocks and recoveries.

Exhibit 1-2
AVIATION SYSTEM SHOCKS AND RECOVERIES (1973-2012)



Sources: Air Transport Association of America, Landrum & Brown analysis.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 1-2

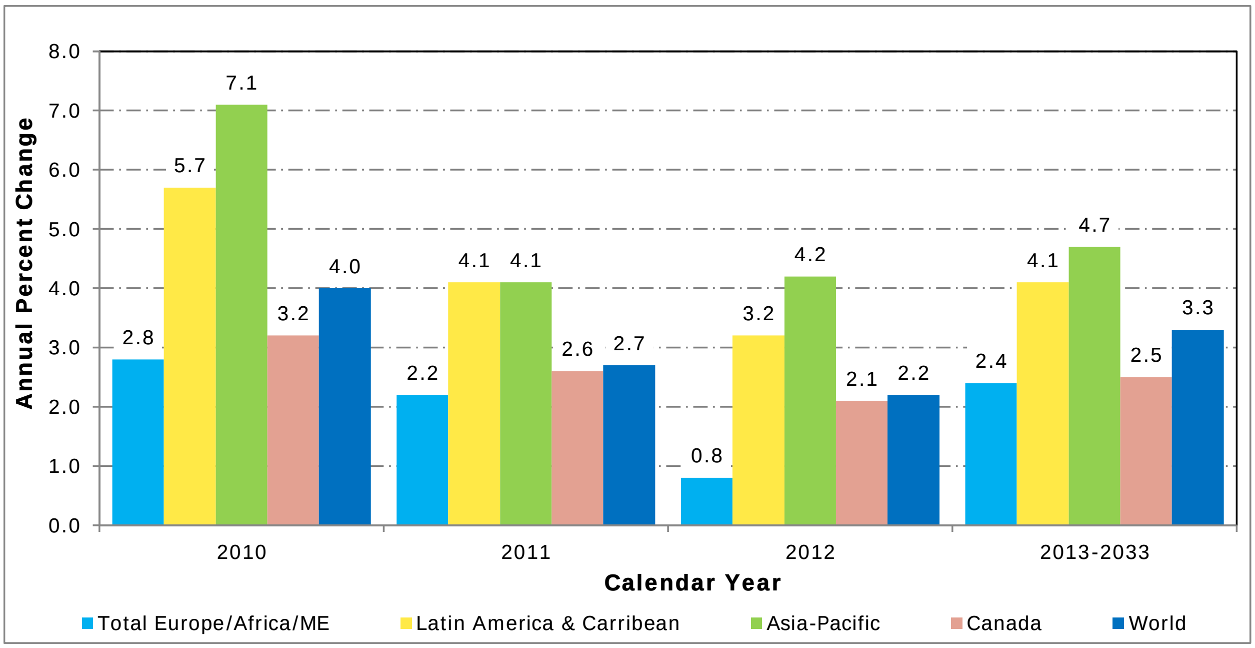
As more and more air travel is for discretionary (leisure) purposes, the variability of air travel with economic cycles should increase. Historically, the level of business travel (measured by passenger counts) has been relatively stable. This exhibit displays how air travel has been relatively resilient in weathering fuel-price shocks and terrorist attacks. Importantly, the long term trends in passenger traffic volumes in the United States have been positive, averaging growth of 3.0 percent per year, since airline deregulation in 1978.

[3] U.S. Department of Transportation, Bureau of Transportation Statistics.

1.2 WORLD ECONOMY

The 2008-2009 U.S. economic crises affected the whole world. The near-term economic picture is showing slow positive growth for the world economy. Economic forecasts published in the FAA's 2013 Aerospace Forecasts for the years 2013 through 2033 call for world GDP to grow 3.3 percent annually over the forecast period. The Latin America and Asia/Pacific regions are expected to experience the highest growth rates (4.1 and 4.7 percent average annual growth, respectively), while the more mature economies of Canada and Europe are expected to experience slower growth rates of 2.5 and 2.4 percent per year, respectively. These positive growth rates in the world economy will support the demand for air travel (see **Exhibit 1-3, *Real Gross Domestic Production by World Region***).

Exhibit 1-3
REAL GROSS DOMESTIC PRODUCT BY WORLD REGION



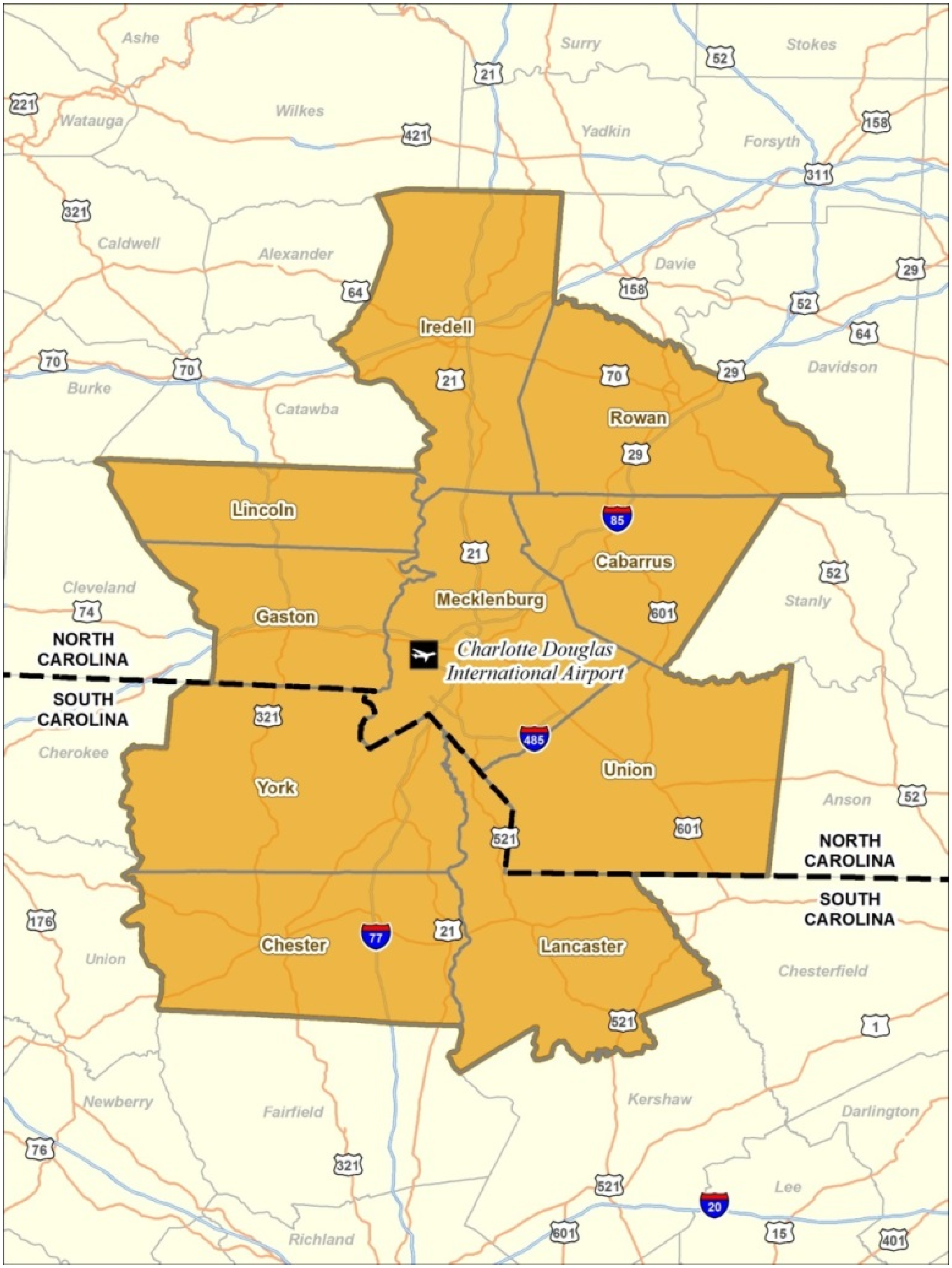
Source: FAA *Aerospace Forecast 2013-2033*
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 1-3

1.3 AIRPORT SERVICE AREA

The air service area of the airport is centered around the Charlotte metropolitan area, as defined by the Charlotte-Concord-Gastonia, NC-SC Metropolitan Statistical Area (Charlotte MSA). According to the U.S. Census Bureau, an MSA is a combination of metro and/or micro areas that consist of one or more counties which have a high degree of social and economic integration.[4] The Charlotte MSA, as defined by the U.S. Census Bureau, includes 7 counties of North Carolina (Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, Union) and 3 counties in South Carolina (Chester, Lancaster, York). The Charlotte MSA is the 23rd most populated area of the 381 MSAs in the United States, hosting a population of over 2.3 million people, according to the 2012 Census estimate. **Exhibit 1-4, *Charlotte Air Service Area (Charlotte MSA)***, graphically depicts the Charlotte MSA and surrounding region. The majority of population from the MSA is from Mecklenburg County, which is the county where the Airport is located.

[4] United States Census Bureau 2013

Exhibit 1-4
CHARLOTTE AIR SERVICE AREA (CHARLOTTE MSA)



Source: Landrum & Brown
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1.4 CHARLOTTE SOCIOECONOMIC TRENDS

This section summarizes recent trends and future forecasts of population, per capita personal income (PCPI), gross regional product (GRP), and employment for the U.S., the State of North Carolina, Charlotte MSA, and Mecklenburg County. Tourism information is also provided. Historical and forecast socioeconomic variables were obtained from Woods & Poole Economics, Inc. of Washington D.C. Woods & Poole provides forecasts for 2013 through 2040. All economic variables are presented in constant dollars to eliminate any distortions resulting from inflation.

1.4.1 Population

Mecklenburg County and the Charlotte MSA have shown steady growth over the last 23 years. From 1990 to 2000, population in Mecklenburg County grew 3.1 percent annually, almost 3 times faster than the national average. Over the past 13 years, Mecklenburg County population increased 2.8 percent annually, surpassing North Carolina and national annual averages. This steady growth is expected to continue over the forecast period at 2.4 percent annually.

According to the 2012 Census Estimate, the MSA was ranked the 23rd most populated area of the 381 MSAs in the United States. The Charlotte MSA has shown steady population growth since 1990 at a rate of 2.7 percent annually through 2013. The MSA is expected to experience stable growth over the forecast period at a rate of 2.0 percent annually, twice the forecast national annual average growth. See **Table 1-2, *Historical and Forecast Populations Trends (in Thousands)***.

Table 1-2
HISTORICAL AND FORECAST POPULATIONS TRENDS (IN THOUSANDS)

Calendar Year	Mecklenburg County	Charlotte MSA	State of North Carolina	United States
1990	516	1,031	6,664	249,623
1995	596	1,161	7,345	266,278
2000	700	1,340	8,082	282,162
2005	799	1,519	8,705	295,517
2006	832	1,583	8,917	298,380
2007	862	1,648	9,118	301,231
2008	888	1,702	9,309	304,094
2009	909	1,740	9,450	306,772
2010	923	1,764	9,560	309,330
2011	944	1,795	9,656	311,592
2012	975	1,842	9,799	314,659
2013	1,006	1,889	9,944	317,791
2018	1,162	2,125	10,681	333,953
2023	1,313	2,357	11,423	350,439
2028	1,469	2,595	12,175	367,035
2033	1,624	2,831	12,922	383,510
CAGR				
1990-00	3.1%	2.7%	1.9%	1.2%
2000-13	2.8%	2.7%	1.6%	0.9%
2013-23	2.4%	2.0%	1.3%	0.9%
2023-33	2.2%	1.9%	1.2%	0.9%
2013-33	2.4%	2.0%	1.3%	0.9%

Note: CAGR= Compound Annual Growth Rate

Source: Woods & Poole Economics, Inc., 2013

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1.4.2 Per Capita Personal Income (PCPI)

Income statistics are broad indicators of the relative earning power and wealth of an area and inferences can be made relative to an individual's or community's ability to purchase air travel. Mecklenburg County has shown to have had a greater per capita personal income (PCPI) than the state and the national averages over the past 20 years. The MSA's historical PCPI has also been greater than state averages and consistent with the national averages. See **Table 1-3, *Historical and Forecast per Capital Personal Income (PCPI) Trends (in 2005$)***. Current projections indicate continued growth in real PCPI for Mecklenburg County and Charlotte MSA, averaging 1.7 percent and 1.6 percent, respectively, per year through 2033, in line with state and national benchmarks.

Table 1-3
HISTORICAL AND FORECAST PER CAPITAL PERSONAL INCOME (PCPI) TRENDS (IN 2005$)

Calendar Year	Mecklenburg County	Charlotte MSA	State of North Carolina	United States
1990	32,055	27,732	23,821	26,814
1995	35,228	30,642	26,335	28,342
2000	42,915	36,998	31,070	33,756
2005	43,569	37,678	31,905	35,452
2006	44,655	38,493	32,488	36,726
2007	43,868	38,083	32,950	37,447
2008	42,949	37,366	32,807	37,586
2009	38,740	34,459	31,326	35,637
2010	39,503	35,014	31,513	35,951
2011	39,905	35,627	32,048	36,663
2012	39,297	35,274	31,954	36,741
2013	39,478	35,609	32,184	36,907
2018	42,136	37,882	34,336	39,094
2023	45,823	41,051	37,290	42,176
2028	50,137	44,799	40,738	45,774
2033	55,130	49,188	44,727	49,926
CAGR				
1990-00	3.0%	2.9%	2.7%	2.3%
2000-13	-0.6%	-0.3%	0.3%	0.7%
2013-23	1.8%	1.7%	1.7%	1.6%
2023-33	1.9%	1.8%	1.8%	1.7%
2013-33	1.7%	1.6%	1.7%	1.5%

Note: CAGR= Compound Annual Growth Rate

Source: Woods & Poole Economics, Inc., 2013

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1.4.3 Employment

Growth in employment is an important indicator of the overall health of the local economy. Population changes and employment changes tend to be closely correlated as people migrate in and out of areas largely depending on their ability to find work in the local economy.

Major Employers

Charlotte is increasingly developing as a center of finance, ranking as the second-largest banking capital in the United States (second to New York City). Bank of America, Wells Fargo, TIAA-CREF, LendingTree, and Fifth Third Bank are among largest employers in Charlotte.[5]

The Charlotte region is the home to 14 Fortune 1000 companies including Bank of America, Duke Energy, Sonic Automotive, Nucor, Goodrich, Family Dollar, SPX, Domtar, Resolute Forest Products, Belk, Carlisle, American Tire Distributors Holdings, Babock & Wilcox, and Chiquita Brands International.[6]

Employment Growth

Employment growth in Mecklenburg County has surpassed both state and national averages over the last 23 years. See **Table 1-4, *Employment Growth Trends (in Thousands of Jobs)***. Mecklenburg County and the Charlotte MSA employment levels are expected to grow at a rate of 2.2 and 2.0 percent annually from 2013 to 2033, respectively. This forecast growth rate is higher than the expected state and national average growth.

[5] Charlotte Regional Partnership 2013, Business Info
[6] Fortune 1000, 2013 List of Companies by Region

Table 1-4
EMPLOYMENT GROWTH TRENDS (IN THOUSANDS OF JOBS)

Calendar Year	Mecklenburg County	Charlotte MSA	State of North Carolina	United States
1990	434	696	3,902	138,331
1995	496	784	4,355	147,916
2000	609	930	4,887	165,371
2005	645	997	5,093	172,551
2006	676	1,042	5,251	176,125
2007	711	1,094	5,437	179,900
2008	720	1,105	5,425	179,645
2009	692	1,063	5,229	174,209
2010	693	1,061	5,202	173,767
2011	710	1,087	5,268	175,363
2012	719	1,103	5,340	177,066
2013	736	1,125	5,423	179,451
2018	822	1,245	5,858	191,872
2023	914	1,374	6,328	205,148
2028	1,019	1,520	6,843	219,347
2033	1,135	1,681	7,403	234,528
CAGR				
1990-00	3.5%	2.9%	2.3%	1.8%
2000-13	1.5%	1.5%	0.8%	0.6%
2013-23	2.2%	2.0%	1.6%	1.3%
2023-33	2.2%	2.0%	1.6%	1.3%
2013-33	2.2%	2.0%	1.6%	1.3%

Note: CAGR= Compound Annual Growth Rate

Source: Woods & Poole Economics, Inc., 2013

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1.4.4 Gross Regional Product (GRP)

GRP is a measure of the value of goods and services produced in a state or county. The Charlotte MSA accounted for 24.0 percent of North Carolina's GRP in 2013. As shown in **Table 1-5, *Gross Regional Product (in Millions of 2005$)***, GRP for Mecklenburg County and the Charlotte MSA experienced faster growth than the state of North Carolina and the nation from 1990-2013. GRP began to decline in 2008 due to the recession, but began to recover in 2011. The GRP for Mecklenburg County and the Charlotte MSA is expected to grow 3.1 and 3.0 percent annually through 2033, respectively, faster than the average rates forecast for the state and the nation.

Table 1-5
GROSS REGIONAL PRODUCT (IN MILLIONS OF 2005$)

Calendar Year	Mecklenburg County	Charlotte MSA	State of North Carolina	United States
1990	28,342	40,998	200,000	7,815,305
1995	36,176	51,368	243,647	8,878,396
2000	52,670	71,157	313,458	11,004,665
2005	63,071	84,626	354,664	12,539,116
2006	67,184	89,569	368,215	12,936,968
2007	68,760	91,534	376,060	13,209,790
2008	68,041	90,332	373,920	13,028,025
2009	66,478	88,286	377,504	12,691,919
2010	66,532	88,149	375,823	12,666,042
2011	68,174	90,342	380,887	12,787,312
2012	69,090	91,620	386,342	12,911,575
2013	71,101	94,336	396,839	13,295,453
2018	82,959	109,140	449,277	14,868,994
2023	96,692	126,255	508,788	16,630,855
2028	112,601	146,036	576,326	18,603,692
2033	130,983	168,875	653,009	20,813,763
CAGR				
1990-00	6.4%	5.7%	4.6%	3.5%
2000-13	2.3%	2.2%	1.8%	1.5%
2013-23	3.1%	3.0%	2.5%	2.3%
2023-33	3.1%	3.0%	2.5%	2.3%
2013-33	3.1%	3.0%	2.5%	2.3%

Note: CAGR= Compound Annual Growth Rate
Source: Woods & Poole Economics, Inc., 2013
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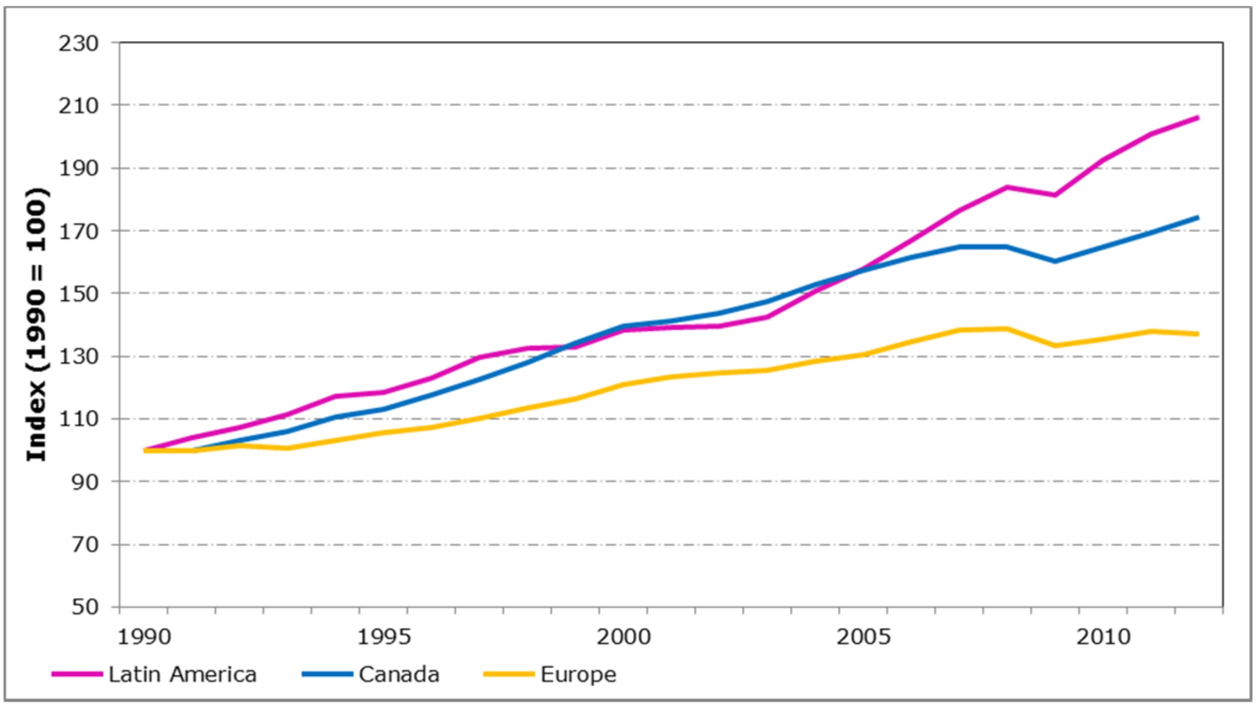
1.5 ECONOMIC GROWTH IN INTERNATIONAL DESTINATION REGIONS

International passenger traffic at CLT accounts for approximately 7.0 percent of total passenger traffic at the Airport. Currently, CLT provides service to 30 international destinations in Canada, Europe, and Latin America. International traffic at the Airport is affected by the economic conditions of these international destinations. Historically, positive economic growth in these international regions has resulted in increased demand for international travel at CLT.

Since 2000, economic growth in Canada and Europe has been slower than the growth experienced in the Charlotte MSA and Latin American region. See **Exhibit 1-5, *Real GDP Index (2005 USD)***. In part this reflects the maturity of the Canadian and European economics, but also reflects the effects of the most recent global economic recession which were particularly severe in these markets.

Exhibit 1-5
REAL GDP INDEX (2005 USD)



Source: Moody's Analytics, 2013
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 1-4

Over the forecast period, it is expected that demand for international air travel will continue to be closely tied to economic growth in these regions. **Table 1-6, *Summary of Real GDP Forecasts***, presents the year-over-year economic growth rates by region that will be used as inputs to the international passenger forecast for CLT.

TABLE 1-6
SUMMARY OF REAL GDP FORECASTS

Calendar Year	GROSS DOMESTIC PRODUCT (in millions of 2005 dollars)		
	Latin America	**Canada**	**Europe**
2000	4.0%	4.1%	3.9%
2001	0.4%	1.1%	1.9%
2002	0.3%	1.8%	0.9%
2003	2.1%	2.5%	0.8%
2004	6.0%	3.6%	2.2%
2005	4.7%	3.0%	1.7%
2006	5.7%	2.7%	3.1%
2007	5.8%	1.9%	2.8%
2008	4.2%	0.0%	0.4%
2009	-1.5%	-2.6%	-4.1%
2010	6.2%	2.8%	1.7%
2011	4.5%	2.8%	1.6%
2012	2.7%	2.8%	-0.6%
2013	2.8%	1.6%	-0.2%
2014	3.9%	3.1%	1.2%
2015	4.4%	4.0%	1.6%
2016	5.3%	2.9%	1.9%
2017	4.7%	2.4%	1.7%
2018	5.7%	1.9%	1.5%
2019	4.6%	1.9%	1.5%
2020	5.9%	1.9%	1.6%
2021	5.5%	1.9%	1.6%
2022	5.7%	1.9%	1.6%
2023	4.4%	1.9%	1.6%
2024	5.5%	1.8%	1.6%
2025	5.5%	1.8%	1.6%
2026	5.5%	1.8%	1.6%
2027	5.5%	1.9%	1.6%
2028	5.5%	1.9%	1.6%
2029	5.5%	1.9%	1.6%
2030	5.5%	1.9%	1.6%
2031	5.5%	1.9%	1.6%
2032	5.5%	1.9%	1.6%
2033	5.5%	1.9%	1.6%

Notes: Growth rates reflect Real GDP (i.e., net of inflation) expressed in 2005 U.S. Dollars for Canada, Eurozone, and Latin America.

Sources: Moody's Analytics; Landrum & Brown.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 1-6

2. HISTORICAL AVIATION ACTIVITY

This section provides a discussion of CLT's role in the region and the U.S. transportation system in terms of serving aviation demand. This section also provides a summary of historical activity levels and current domestic and international passenger air service. The purpose of this section is to start building a context for the forecast. The past is not always a good predictor of the future, however, analysis of historical data provides the opportunity to understand those factors which have either caused traffic to increase or decrease and how they may change in the future, thus influencing the forecast. While the socioeconomic base is one of the fundamental underpinnings of the forecast, demand cannot be realized without air service at a price that induces demand. Ultimately, understanding the historical relationships between the economy and aviation activity at CLT will form the building blocks of the forecast.

2.1 AIRPORT ROLE

CLT is one of the busiest commercial passenger airports in the U.S. It is one of 29 U.S. airports which enplane at least one percent of total U.S. enplanements and is consequently designated as a "Large Hub Primary Commercial Service Airport" by the FAA.[7] CLT was the eighth busiest airport in North America in 2012 as measured by total passengers (see **Table 2-1, *North American Airports ranked by 2012 Passengers***), 34th highest in cargo tonnage, and 6th busiest airport for aircraft movements. At CLT there are more than 700 departures and landings each day, served by seven domestic carriers and three foreign flag carriers. CLT has been the largest hub for U.S. Airways (now American Airlines) and serves as a major connecting airport for the airline. CLT will be the second largest hub in the merged American Airlines system.

Table 2-1
NORTH AMERICAN AIRPORTS RANKED BY 2012 PASSENGERS

Rank	Code	City	Passengers
1	ATL	Atlanta, GA	95,513,828
2	ORD	Chicago, IL	66,633,503
3	LAX	Los Angeles, CA	63,688,121
4	DFW	Dallas/Fort Worth, TX	58,621,369
5	DEN	Denver, CO	53,156,278
6	JFK	New York, NY	49,291,765
7	SFO	San Francisco, CA	44,399,885
8	CLT	Charlotte, NC	41,228,372
9	LAS	Las Vegas, NV	40,799,830
10	PHX	Phoenix, AZ	40,421,611

Note: 2012 Final Results

Source: ACI, 2012 World Annual Traffic Report.

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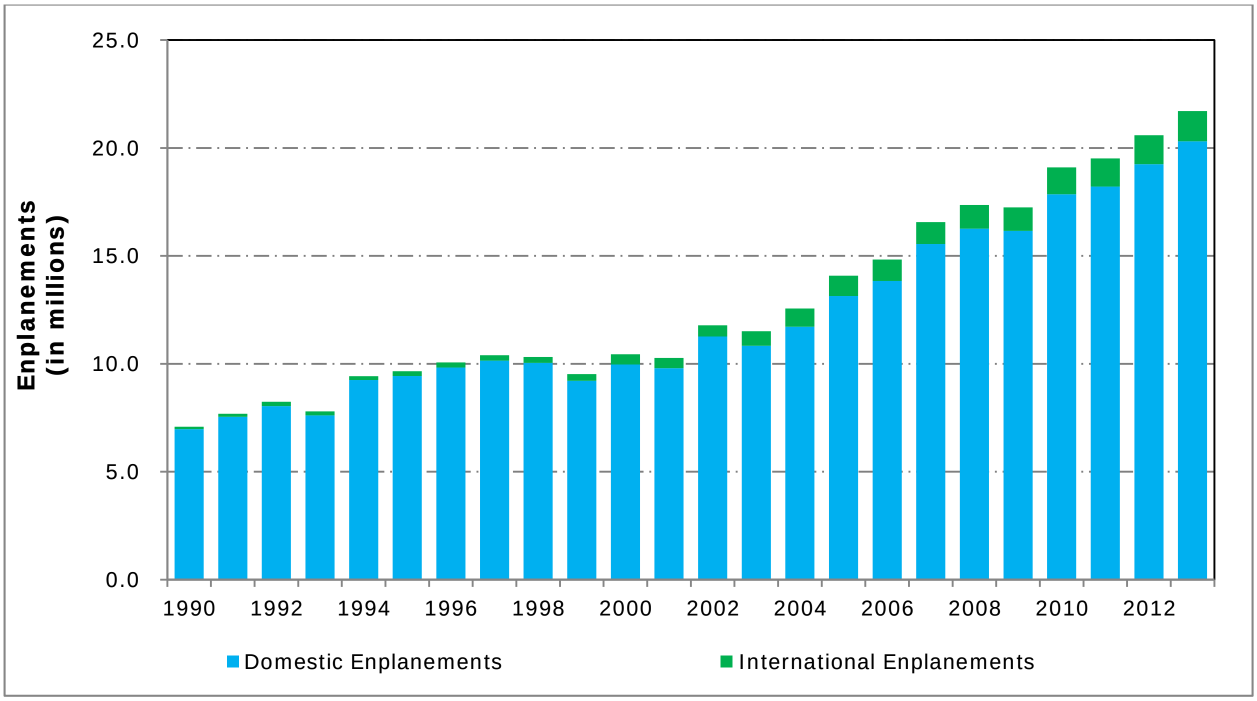
[7] FAA National Plan of Integrated Airport Systems (NPIAS)

In 2013, CLT handled 43.5 million passengers, 129,800 short tons of air cargo (including mail), and 557,948 total aircraft operations. CLT provided weekly service to 110 domestic and 30 international destinations worldwide with an additional five seasonal international destinations in 2013.

2.2 CLT HISTORICAL PASSENGER VOLUMES

Enplanement volumes at CLT have generally exhibited an upward trend, driven in large part by growth in domestic traffic (see **Exhibit 2-1, *CLT Historical Enplanements***). Domestic enplanements at CLT increased 4.8 percent annually between 1990 and 2013, growing from 7.0 million to 20.3 million. This was primarily driven by domestic connections which has increased 4.9 percent annually from 1990. International enplanements increased from 107,070 enplanements in 1990 to more than 1.4 million in 2013, representing an average annual growth rate of 11.8 percent. Positive trends in growth are largely due to the influence of U.S. Airways, utilizing Charlotte as their primary hub.

Exhibit 2-1
CLT HISTORICAL ENPLANEMENTS



Source: CLT Annual Traffic; U.S. DOT, T-100
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 2-1

Total enplanement volumes at CLT increased from 7.1 million enplanements in 1990 to 21.7 million enplanements in 2013, representing average annual growth of 5.0 percent. The 2001-2002 economic recession; the September 11, 2001 terrorist attacks; the Iraq War; and the Severe Acute Respiratory Syndrome (SARS) outbreak all served to dampen demand for air travel between 2001 and 2003, both at CLT and nationwide. However, these factors have generally had a relatively short transitory impact on air travel. CLT weathered the Great Recession well, with flat traffic from 2008 to 2009, and then a resumption of strong growth by 2010.

Table 2-2, *CLT Historical Enplanements by Segment*, provides a comparison of origin and destination (O&D) and connecting traffic growth since 1990. Connecting traffic has grown faster than O&D traffic since 1990 (5.2 percent vs. 4.4 percent).

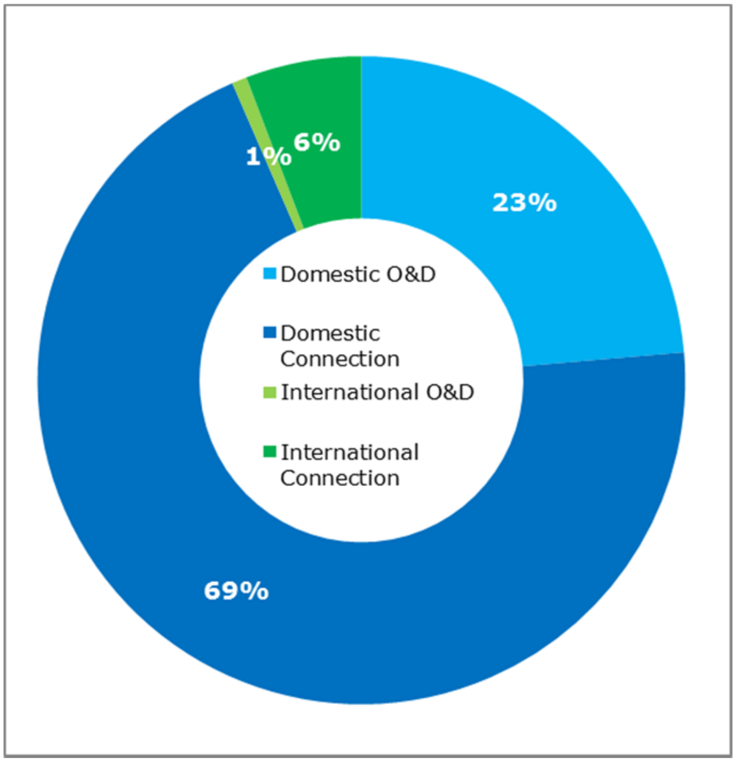
Table 2-2
CLT HISTORICAL ENPLANEMENTS BY SEGMENT

Calendar Year	Originating Enplanements			Connecting Enplanements			Total Enplanements		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
1990	1,927,710	42,480	1,970,190	5,049,863	64,590	5,114,453	6,977,573	107,070	7,084,643
1991	1,812,100	47,397	1,859,497	5,733,716	94,020	5,827,736	7,545,816	141,417	7,687,233
1992	1,890,350	67,843	1,958,193	6,151,486	131,750	6,283,236	8,041,836	199,593	8,241,429
1993	2,076,620	65,697	2,142,317	5,531,834	120,360	5,652,194	7,608,454	186,057	7,794,511
1994	2,184,320	78,223	2,262,543	7,066,070	96,930	7,163,000	9,250,390	175,153	9,425,543
1995	2,185,500	100,931	2,286,431	7,248,501	124,800	7,373,301	9,434,001	225,731	9,659,732
1996	2,429,250	89,361	2,518,611	7,400,803	142,820	7,543,623	9,830,053	232,181	10,062,234
1997	2,859,870	90,138	2,950,008	7,285,616	166,430	7,452,046	10,145,486	256,568	10,402,054
1998	2,894,900	94,761	2,989,661	7,146,800	179,780	7,326,580	10,041,700	274,541	10,316,241
1999	3,008,290	114,211	3,122,501	6,203,345	199,610	6,402,955	9,211,635	313,821	9,525,456
2000	2,987,300	174,751	3,162,051	6,984,759	293,960	7,278,719	9,972,059	468,711	10,440,770
2001	2,676,240	150,519	2,826,759	7,125,447	318,030	7,443,477	9,801,687	468,549	10,270,236
2002	2,689,590	141,311	2,830,901	8,577,767	375,480	8,953,247	11,267,357	516,791	11,784,148
2003	2,785,810	137,813	2,923,623	8,052,122	535,720	8,587,842	10,837,932	673,533	11,511,465
2004	3,149,040	203,911	3,352,951	8,569,572	639,610	9,209,182	11,718,612	843,521	12,562,133
2005	3,594,120	227,695	3,821,815	9,547,476	714,730	10,262,206	13,141,596	942,425	14,084,021
2006	4,296,810	245,119	4,541,929	9,540,190	746,030	10,286,220	13,837,000	991,149	14,828,149
2007	4,725,960	245,126	4,971,086	10,821,283	776,220	11,597,503	15,547,243	1,021,346	16,568,589
2008	4,513,190	210,714	4,723,904	11,750,419	883,670	12,634,089	16,263,609	1,094,384	17,357,993
2009	4,418,800	193,874	4,612,674	11,737,830	896,090	12,633,920	16,156,630	1,089,964	17,246,594
2010	4,627,390	177,894	4,805,284	13,228,889	1,062,790	14,291,679	17,856,279	1,240,684	19,096,963
2011	4,735,640	147,241	4,882,881	13,477,380	1,157,600	14,634,980	18,213,020	1,304,841	19,517,861
2012	4,910,870	153,757	5,064,627	14,338,117	1,186,140	15,524,257	19,248,987	1,339,897	20,588,884
2013	5,132,526	160,730	5,293,255	15,174,004	1,239,929	16,413,934	20,306,530	1,400,659	21,707,189
CAGR									
1990-2000	4.5%	15.2%	4.8%	3.3%	16.4%	3.6%	3.6%	15.9%	4.0%
2000-2013	4.3%	-0.6%	4.0%	6.1%	11.7%	6.5%	5.6%	8.8%	5.8%
1990-2013	4.3%	6.0%	4.4%	4.9%	13.7%	5.2%	4.8%	11.8%	5.0%

Sources: CLT Annual Traffic; U.S. DOT, *Air Passenger Origin-Destination Survey*; U.S. DOT, T-100
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\1-Source Data\[Mastersheet.xlsx]Tables for Document

As shown in **Exhibit 2-2, *CLT Passenger Traffic by Segment - 2013***, domestic connecting traffic (those passengers transferring from a domestic or international flight to a domestic flight) accounted for the largest segment of traffic (69 percent) at CLT in 2013. Domestic O&D traffic was the second largest segment of traffic with 23 percent of the total traffic. International connections (those passengers transferring from a domestic or international flight to an international flight) was the third largest segment with six percent of the traffic. International O&D was the smallest segment with one percent of the traffic.

Exhibit 2-2
CLT PASSENGER TRAFFIC BY SEGMENT - 2013



Source: U.S. DOT Passenger Ticket Survey
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 2-2

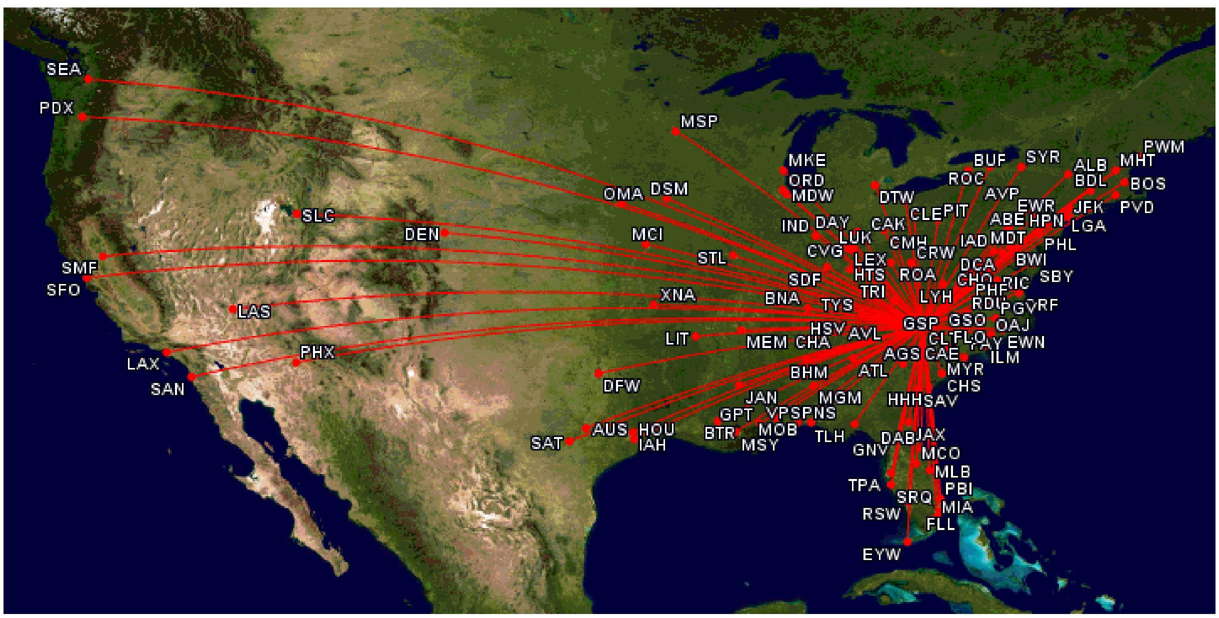
2.3 CLT SCHEDULED PASSENGER AIR SERVICE

According to airline schedule filings with the *Official Airline Guide (OAG)*, the airlines operating scheduled commercial passenger service at CLT provided at least weekly service to 110 domestic and 30 international destinations with an additional five seasonal international destinations in 2013. In 2013, scheduled domestic air service accounted for 94.9 percent of total scheduled passenger flights and 80.3 percent of scheduled seats at CLT. The difference in the share of flights versus seats reflects the higher percentage of large aircraft deployed in the international segment.

2.3.1 Domestic Destinations Served

Exhibit 2-3, *CLT Map of Scheduled Domestic Air Service – 2013*, displays a map of the 110 weekly domestic air service points scheduled at CLT in 2013.

Exhibit 2-3
CLT MAP OF SCHEDULED DOMESTIC AIR SERVICE - 2013



Sources: *Official Airline Guide*; Great Circle Mapper.
Y:\CLT\2012 Planning Forecast\E-L&B Work Product\10-Source Data\Circle Mapper\Domestic.gi

Table 2-3, *CLT Top 25 Domestic O&D Markets 12 Months Ending September 2013*, provides the top 25 domestic O&D markets from CLT for the 12 months ended September 2013. During this timeframe, the top 25 markets represented 67 percent of domestic O&D service.

Table 2-3
CLT TOP 25 DOMESTIC O&D MARKETS 12 MONTHS ENDING SEPTEMBER 2013

Rank	Market	Passengers	% of Total
1	New York	613,200	12.9%
2	Washington DC	255,440	5.4%
3	Boston	222,110	4.7%
4	Chicago	196,390	4.1%
5	Fort Lauderdale/Miami	174,570	3.7%
6	Los Angeles	158,310	3.3%
7	Dallas/Ft.Worth	135,790	2.9%
8	San Francisco	126,290	2.7%
9	Orlando	121,340	2.5%
10	Las Vegas	113,390	2.4%
11	Philadelphia	103,010	2.2%
12	Denver	86,690	1.8%
13	Atlanta	82,510	1.7%
14	Phoenix	80,110	1.7%
15	Minneapolis/St. Paul	78,550	1.6%
16	Tampa	78,240	1.6%
17	Detroit	72,670	1.5%
18	Houston	72,410	1.5%
19	Providence	67,750	1.4%
20	Hartford	62,870	1.3%
21	Seattle	60,350	1.3%
22	Pittsburgh	61,650	1.3%
23	St. Louis	55,480	1.2%
24	Indianapolis	53,250	1.1%
25	Kansas City	51,730	1.1%
	Top 25 Markets	3,184,100	66.9%
	All Others	1,577,460	33.1%
	Total	4,761,560	100.0%

Notes: New York includes JFK, EWR, LGA, HPN, ISP
Washington DC includes BWI, IAD, DCA
Chicago includes ORD and MDW
Miami/Ft. Lauderdale includes: MIA, FLL and PBI
Los Angeles includes LAX, SNA, BUR, and ONT
San Francisco includes SFO, SJC, OAK

Sources: U.S. DOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 2-3

2.3.2 International Destinations Served

In 2013, 6.5 percent of total scheduled movements at CLT were international. The majority of this international traffic (65.0 percent) was scheduled to destinations in Latin America (including Caribbean). **Table 2-4, *CLT Scheduled International Air Service by World Region – 2013***, displays CLT scheduled international flights and seats by region for 2013.

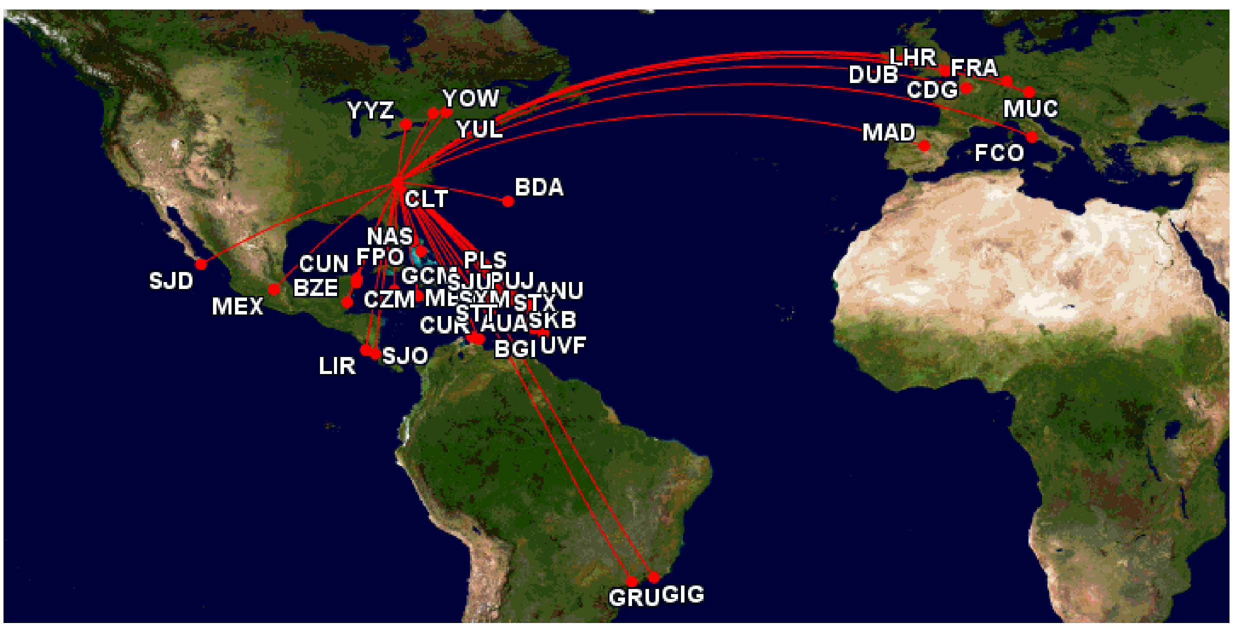
Table 2-4
CLT SCHEDULED INTERNATIONAL AIR SERVICE BY WORLD REGION - 2013

Region	Departing Flights	Departing Seats	% of Flights	% of Seats
Latin America	17,411	190,618	65.0%	79.2%
Canada	5,532	7,744	20.7%	3.2%
Europe	3,846	42,244	14.4%	17.6%
Total	26,789	240,606	100.0%	100.0%

Source: *Official Airline Guide*.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\1-Source Data\OAG\[CLT - Monthly Movements.xlsx]Pvt

Exhibit 2-4, *CLT Map of Scheduled International Air Service – 2013*, displays a map of the 30 weekly and five seasonal international air service points as scheduled in 2013.

Exhibit 2-4
CLT MAP OF SCHEDULED INTERNATIONAL AIR SERVICE - 2013

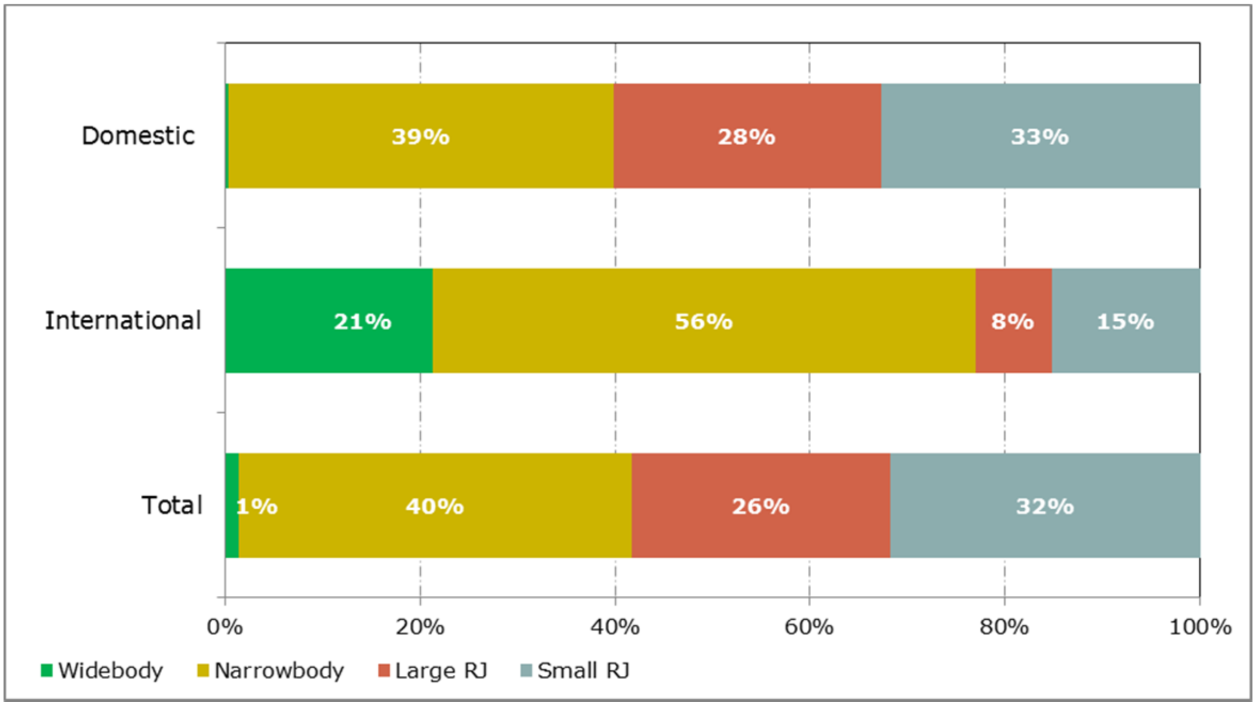


Sources: *Official Airline Guide*; Great Circle Mapper.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\1-Source Data\Great Circle Mapper

2.3.3 Passenger Aircraft Fleet Mix

Exhibit 2-5, *CLT Aircraft Fleet Mix by Classification 2013*, presents the share of passenger flights by aircraft classification for domestic, international, and total scheduled passenger traffic in 2013. Regional aircraft were the most utilized aircraft, accounting for 58 percent of total scheduled passenger flights (61 percent of total domestic and 23 percent of total international). Narrowbody aircraft accounted for the second most utilized scheduled passenger air service aircraft classification (40 percent of total scheduled operations) and the primary international aircraft (56 percent of international scheduled operations).

Exhibit 2-5
CLT AIRCRAFT FLEET MIX BY CLASSIFICATION 2013



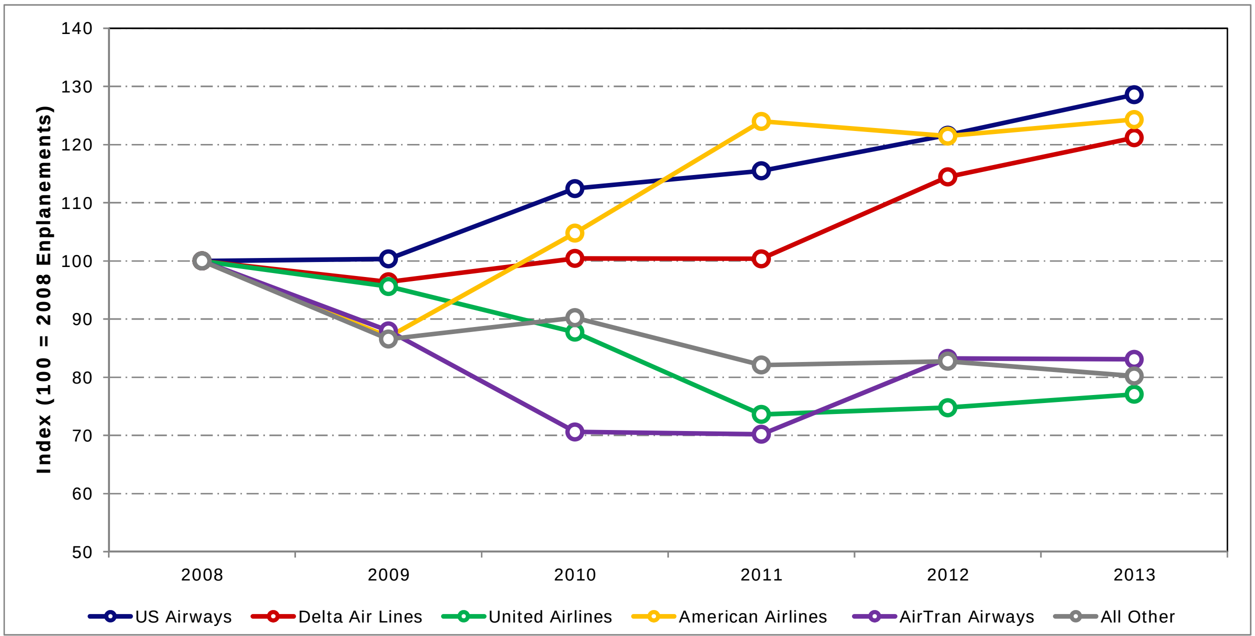
Note: Small regional jets have 50 seats or less. Large regional jets generally have 60-90 seats.
Source: *Official Airline Guide*.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 2-5

2.3.4 Passenger Airline Market Share

U.S. Airways currently maintains their largest hub at CLT and is the largest carrier at the Airport. In 2013, U.S. Airways handled 19.5 million enplanements at CLT, accounting for 89.9 percent of total passenger traffic. U.S. Airways operates weekly scheduled flights to 107 domestic destinations and 30 international destinations in Canada, Europe, and Latin America.

Exhibit 2-6, *CLT Historical Enplanement Market Share by Airline Group*, displays enplanement growth of the top carriers' passenger traffic at CLT from 2008 to 2013. U.S. Airways has shown continuous growth at CLT since 2008. U.S. Airways enplanements have increased from 15.2 million enplanements in 2008 to 19.5 million enplanements in 2013, representing an annual growth rate of 5.2 percent per year.

Exhibit 2-6
CLT HISTORICAL ENPLANEMENT MARKET SHARE BY AIRLINE GROUP



Carrier	2008	2009	2010	2011	2012	2013	CAGR 2008-13
US Airways	15,170,469	15,223,377	17,059,050	17,520,280	18,451,898	19,504,655	5.2%
Delta Air Lines	763,436	735,953	766,834	766,202	873,711	925,154	3.9%
United Airlines	550,724	526,488	483,240	405,434	411,722	424,420	-5.1%
American Airlines	329,663	286,667	345,443	408,787	400,450	409,792	4.4%
AirTran Airways	245,439	215,954	173,282	172,285	204,278	203,927	-3.6%
All Other	298,262	258,155	269,114	244,873	246,825	239,241	-4.3%
Total	17,357,993	17,246,594	19,096,963	19,517,861	20,588,884	21,707,189	4.6%

Notes: All Other = "Other Airlines"
U.S. Airways includes Midwest
Delta Air Lines includes Northwest
United Airlines includes Continental

Source: CLT Monthly Passenger Data Statistics
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 2-6

2.4 CLT HISTORICAL AIR CARGO

For purposes of this study, air cargo is segmented into air mail and air freight categories. Air cargo is shipped to and from airports by two methods:

1) In the cargo compartment, or belly, of passenger aircraft
2) Aboard freighter aircraft

Most passenger airlines accommodate air cargo as a by-product to the primary activity of carrying passengers. It fills belly space in their aircraft that would otherwise be empty. The incremental costs of carrying cargo in a passenger aircraft are negligible, and include only ground handling expenses and a modest increase in fuel consumption.

Table 2-5, *CLE Historical Air Cargo (in Short Tons)*, summarizes historical cargo tonnage at CLT. Total air cargo tonnage peaked in 2006 at 170,749 tons, before declining to 129,800 tons in 2013.

Table 2-5
CLT HISTORICAL AIR CARGO (IN SHORT TONS)

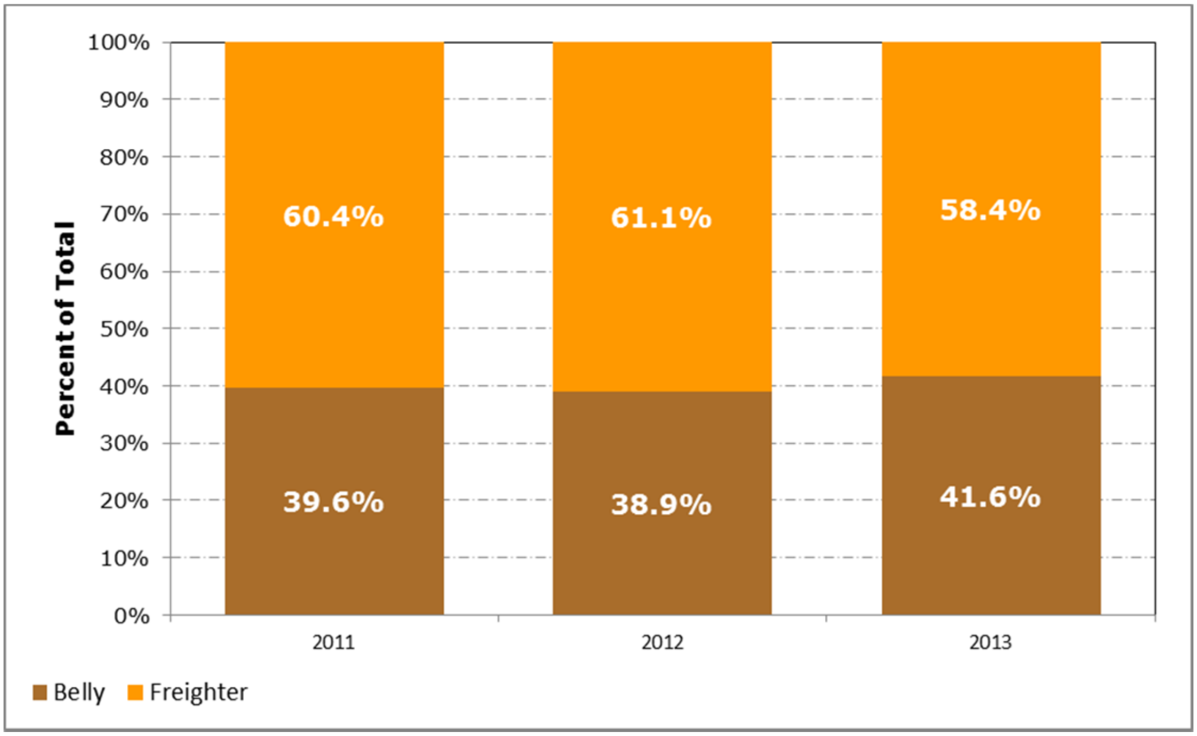
Year	Domestic Freight	International Feight	Mail	Total
2006	132,706	15,755	22,288	170,749
2007	112,120	10,031	20,668	142,819
2008	99,742	15,174	17,093	132,009
2009	86,236	17,510	15,806	119,552
2010	93,143	17,303	23,893	134,339
2011	95,638	18,366	23,941	137,945
2012	88,966	17,167	21,095	127,228
2013	87,886	18,079	23,835	129,800
CAGR				
2006-09	-13.4%	3.6%	-10.8%	-11.2%
2009-13	0.5%	0.8%	10.8%	2.1%
2006-13	-5.7%	2.0%	1.0%	-3.8%

Note: CAGR=Compound Annual Growth Rate

Source: CLT Year End Traffic Reports.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 2-5

The majority of cargo at CLT is currently shipped by freighter operations. In 2013, 58.4 percent of cargo was shipped in by freighter operations. **Exhibit 2-7, *CLT Domestic Belly Freighter Split***, displays the historical belly/freighter split at CLT.

Exhibit 2-7
CLT DOMESTIC BELLY FREIGHTER SPLIT



Source: Airport.
Y:\CLT\2012 Planning Forecast\E-L&B Work Product\14-Cargo Forecast\[Cargo Forecast.xlsx]airport stats

2.5 CLT HISTORICAL AIRCRAFT OPERATIONS

For purposes of developing the operations forecast, historical aircraft operations at CLT were provided in four key segments: (1) air carrier; (2) air taxi; (3) general aviation; and (4) military. Air carrier and air taxi operations include commercial passenger operations, non-commercial air taxi operations, and freighter operations. **Table 2-6, *CLT Historical Operations***, details historical aircraft operations at CLT.

Table 2-6
CLT HISTORICAL OPERATIONS

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
2002	234,364	177,692	41,225	2,235	455,516
2003	207,374	196,708	37,339	1,973	443,394
2004	214,050	214,421	38,106	1,887	468,464
2005	257,971	226,184	36,034	1,689	521,878
2006	259,300	215,552	32,665	2,042	509,559
2007	289,755	199,062	32,011	1,713	522,541
2008	315,081	189,343	30,027	1,802	536,253
2009	319,271	164,829	23,481	1,867	509,448
2010	331,110	171,836	24,414	1,741	529,101
2011	329,680	184,122	24,131	1,909	539,842
2012	343,121	183,870	23,400	1,702	552,093
2013	356,079	175,051	25,426	1,392	557,948
CAGR					
2002-07	4.3%	2.3%	-4.9%	-5.2%	2.8%
2007-13	3.5%	-2.1%	-3.8%	-3.4%	1.1%
2002-13	3.9%	-0.1%	-4.3%	-4.2%	1.9%

Note: CAGR=Compound Annual Growth Rate
Source: Airport.
Y:\CLT\2012 Planning Forecast\E-L&B Work Product\10-Source Data\[CLT - Historical Activity Tables & Charts for Doc.xlsx]Table 2-6

The following table shows the breakdown by type of the aircraft based at the Airport.

Table 2-7
CLT BASED AIRCRAFT

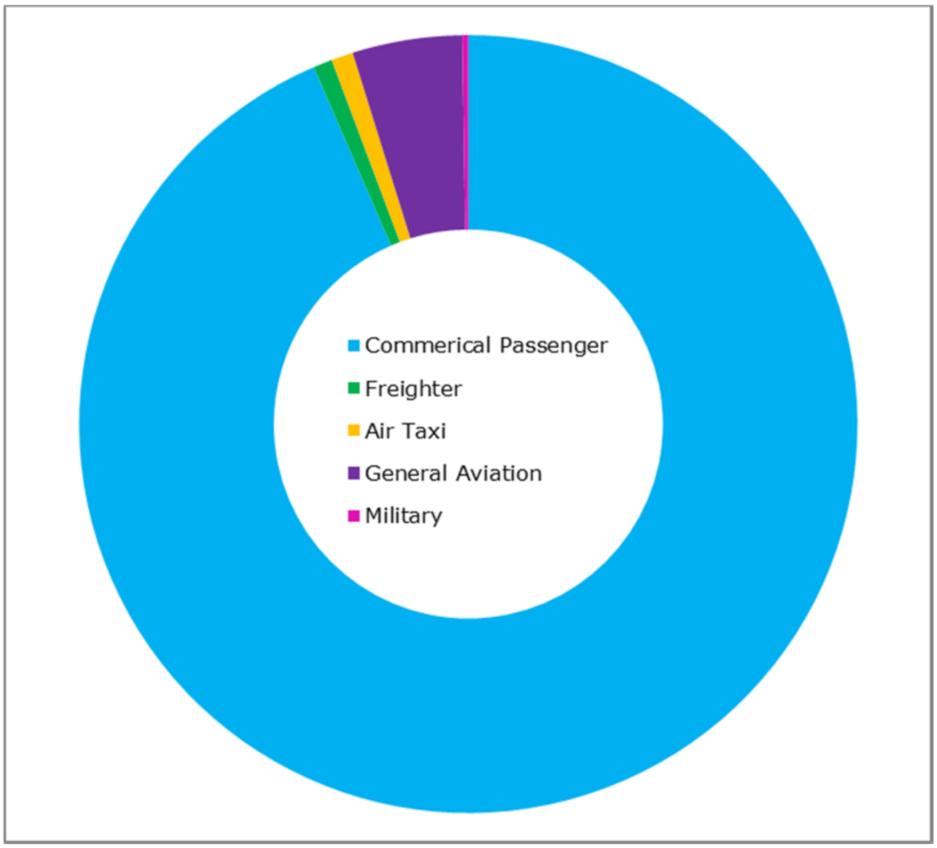
Single engine piston	14
Multi-engine piston	19
Turbofan	48
Helicopter	1
Military	10
Total Based Aircraft	92

Source: FAA Form 5010

Total aircraft operations at CLT have increased from 455,516 in 2003 to 557,948 in 2013, representing average annual growth of 1.9 percent. During this span, air carrier operations experienced the fastest growth, averaging growth of 3.9 percent. Air Taxi operations at CLT have remained relatively flat during the period while general aviation and military operations have decreased.

Exhibit 2-8, *CLT Aircraft Operations by Segment – 2013*, displays the distribution of aircraft operations by segment in 2013. Commercial passenger operations were the largest segment of aircraft activity, accounting for 93.5 percent of total operations. General aviation and air taxi operations accounted for 4.6 and 0.9 percent of total operations in 2013, respectively. The remaining operations were cargo and military operations accounting for 0.8 and 0.2 percent, respectively.

Exhibit 2-8
CLT AIRCRAFT OPERATIONS BY SEGMENT - 2013



Sources: Official Airline Guide, L&B Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 2-8

2.6 FORECAST IMPACT FACTORS

Forecasting future aviation activity is an inexact science and there are many factors that may influence future activity levels both industry-wide and specifically at CLT. This section discusses factors or trends which could potentially affect activity volumes at CLT over the forecast period

- **U.S. Airways and American Airlines merger** is not expected to negatively affect passenger growth at CLT.
- **Growth in the Latin American economies** will be the primary driver of continued growth in international air travel at CLT. Europe and Canada are the other relevant world regions.
- **Low Cost Carriers** – When low cost carriers enter air markets, prices tend to decline, and travel (especially leisure travel) increases. Low cost carriers do not have a significant market share at CLT.
- **New aircraft types** – The principal new aircraft type expected to operate at CLT in the foreseeable future is the Airbus 350. This aircraft is targeted to replace aging Boeing 767- aircraft. Introduction of the A350 aircraft will not materially affect passenger demand. This forecast assumes that this replacement will occur on a small scale starting in 2017 as certain Boeing 767 aircraft are forecast to remain a part of the airline industry's fleet throughout the forecast period.
- **Fuel prices** will continue to be elevated by historical standards putting upward pressure on airline costs. As a result, significant fare discounting is not anticipated over the forecast period.
- **The effect of economic upturns and downturns** – Air travel varies with the health of the economy. This forecast describes long-term trends and does not forecast variations due to short-term economic spurts and recessions. These short-term events produce variability for the long-term trends identified in the forecast. History has shown that air travel tends to recover after short-term economic and political events.

3. PASSENGER ACTIVITY FORECAST

This section presents the forecast of passenger enplanements for CLT through 2033 including the methodology and assumptions used to develop these forecasts. The passenger enplanement forecasts reflect the economic outlook for the local, national, and global economy; historical airline activity trends; the economic base for air travel demand; as well as other factors that may affect the demand for air travel over the forecast period.

The enplanement forecast facilitates the planning process, in that it allows for the evaluation of the airside, terminal, landside, and access roadways. The enplanement forecast provides the critical path for the commercial passenger operations forecast, which is derived based on assumptions related to average aircraft size and load factor. The passenger forecast is presented for the horizon years of 2018, 2023, 2028, and 2033, with 2013 as the base year.

3.1 FORECAST METHODOLOGY

Below is a summary of the overall methodology used to develop the forecast of aviation demand.

- First, historical and forecast demographic and socioeconomic data was collected and analyzed as described in Section 1, *Economic Base for Air Travel.* Historical traffic and yields at CLT were also reviewed and analyzed.
- Historical domestic O&D scheduled passenger traffic was examined in light of the socioeconomic variables. Linear regression models were developed to quantify the relationship between the dependent variable being forecast (local passengers) and the independent variables, while taking into consideration the impact factors. Historical domestic connecting passengers were examined in order to project future connecting passenger levels.
- Historical international passengers (O&D and connecting) were examined in order to project future passenger levels. Linear regression models were developed to quantify the relationship between the dependent variable being forecast (total international passengers) and the independent variables (socio-economic impact factors). The sum of the domestic O&D, international, and domestic connecting passenger demand resulted in the total enplaned passenger forecasts.

3.2 FORECAST ASSUMPTIONS

The enplaned passenger forecast for CLT is projected based on the following key assumptions:

- Economic indicators such as population, employment, and PCPI for the Charlotte MSA will continue to display positive growth over the forecast period.
- Growth in Europe, Canada, and Latin America economies will drive continued growth in international air travel at CLT.

- Key businesses headquartered in the Charlotte MSA are expected to continue to display positive growth over the forecast period.
- There will be no significant disruption in air travel at CLT due to an act of terrorism, war, or for reasons of public health and safety.
- Fuel prices will continue to be elevated by historical standards putting upward pressure on airline costs. As a result, significant fare discounting is not anticipated over the forecast period.
- U.S. Airways, the largest carrier at CLT, has continually added service over the past few years. The U.S. Airways and American Airlines merger is not expected to negatively affect the growth of the U.S. Airways (now American Airlines) hub at CLT.

3.3 DOMESTIC O&D PASSENGER FORECAST

The domestic O&D forecast was guided by an econometric approach that quantifies the relationship between local domestic passengers and independent demographic economic variables. The forecast models were developed using the classical technique of linear regression, where the relationship of the dependent variable (domestic O&D enplanements) to one or more independent variables is modeled through a linear function. The methodology for preparing the O&D forecasts recognizes that key parameters or independent variables such as population and GRP will change over time. However, it assumes that the fundamental mathematical relationships between the independent variables and domestic O&D passenger traffic will persist and support the development of realistic forecasts.

The first step in developing the domestic passenger forecast model was to test the independent variables against the dependent variable. A 24-year history (1990 to an estimate for 2013) of domestic O&D enplanements for CLT was used in the regression models. Several regressions of various combinations of the independent variables were tested but ultimately rejected for various reasons, such as:

- Inadequate test statistics (i.e. low r-squared values or other inadequate regression statistics) which indicates the independent variables are not good predictors of CLT traffic.
- Poor forecast results. A regression model produces predicted values for historical data. A satisfactory model will generate predicted values with low residuals (predicted values minus actual values).
- Theoretical contradictions (e.g. the model indicates that GDP growth is negatively correlated with traffic growth).
- Overly aggressive or low forecast results that are incompatible with historical averages.

The selected independent variables utilized were the Charlotte MSA's GRP and a dummy variable. The regression inputs used in the model are displayed in **Table 3-1, *Domestic Regression Inputs***.

Table 3-1
DOMESTIC REGRESSION INPUTS

Calendar Year	MSA GRP	Dummy Variable	Domestic O&D Enplanements
1990	40,998	0	1,927,710
1991	42,888	0	1,812,100
1992	44,866	0	1,890,350
1993	46,935	0	2,076,620
1994	49,099	0	2,184,320
1995	51,368	0	2,185,500
1996	54,826	0	2,429,250
1997	58,518	0	2,859,870
1998	62,458	0	2,894,900
1999	66,663	0	3,008,290
2000	71,157	0	2,987,300
2001	73,329	1	2,676,240
2002	77,165	1	2,689,590
2003	77,459	0	2,785,810
2004	79,400	0	3,149,040
2005	84,626	0	3,594,120
2006	89,569	0	4,296,810
2007	91,534	0	4,725,960
2008	90,332	0	4,513,190
2009	88,286	0	4,418,800
2010	88,149	0	4,627,390
2011	90,342	0	4,735,640
2012	91,620	0	4,910,870
2013E	94,336	0	5,132,526

Note: 2013 Domestic O&D is estimated.

Sources: Woods & Poole Economics; Landrum & Brown Analysis.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-1

The summary output from the regression model is shown below. The model exhibits strong regression statistics (R square, T-statistics, and P-values) compared to the models with other combinations of independent variables.

Regression Statistics	
Multiple R	0.954
R Square	0.910
Adjusted R Square	0.902
Standard Error	344986.534
Observations	24

ANOVA

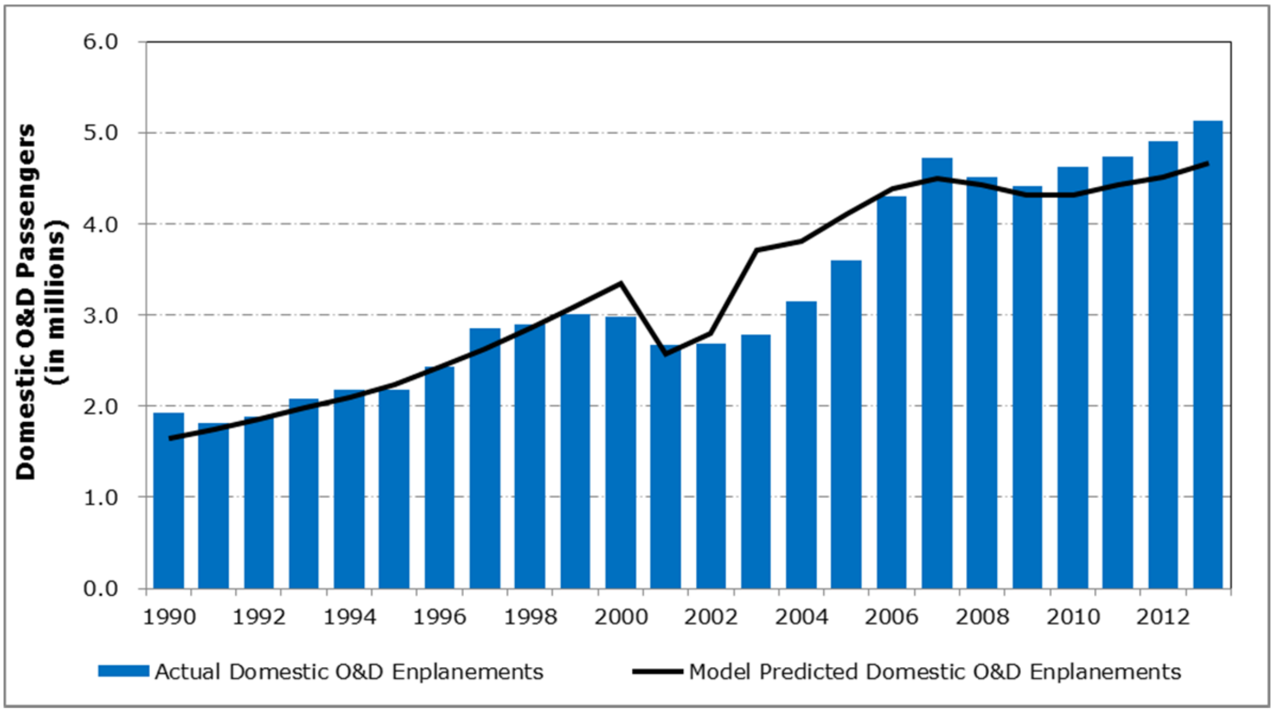
	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.54E+13	1.27E+13	1.07E+02	9.96E-12
Residual	21	2.50E+12	1.19E+11		
Total	23	2.79E+13			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-674887.0	287404.7	-2.3	0.03	-1272577.8	-77196.2	-1272577.8	-77196.2
Dummy Variable	-897666.7	255414.9	-3.5	0.00	-1428830.9	-366502.4	-1428830.9	-366502.4
GRP	56.6	3.9	14.4	0.00	48.4	64.7	48.4	64.7

Exhibit 3-1, ***CLT Domestic O&D Enplanement Regression Model***, illustrates the model fit when plotted against the actual historical traffic at the CLT. The model-predicted traffic compares well to actual traffic.

The regression statistics and model-predicted traffic comparison indicate that the model provides a reasonable basis from which to forecast the passenger traffic for CLT. The model equation applied independent variables of GRP for the Charlotte MSA and a dummy variable to determine the growth rates to apply to the Airport's domestic O&D demand. A dummy variable is used in the absence or presence of some categorical effect that may be expected to shift the outcome and cannot be explained by the other variables in the model. In this instance, the dummy variable was primarily used to explain the sharp decline in demand in 2001-2003 that occurred after the 9-11 terrorist attacks.

Exhibit 3-1
CLT DOMESTIC O&D ENPLANEMENT REGRESSION MODEL



Sources: Woods & Poole Economics; Landrum & Brown.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\2-Passenger Forecast\[CLT - Domestic Forecast Workbook.xlsx]O&D_Forecast_POP

Based on the model, domestic O&D passenger enplanements for the airport are forecast to increase from an estimated 5.1 million in 2013 to 9.8 million by 2033, an average annual growth of 3.3 percent. **Table 3-2,** ***CLT Domestic O&D Enplaned Passenger Forecast***, and **Exhibit 3-2,** ***CLT Domestic O&D Enplaned Passenger Forecast***, display the results of the domestic O&D passenger forecast.

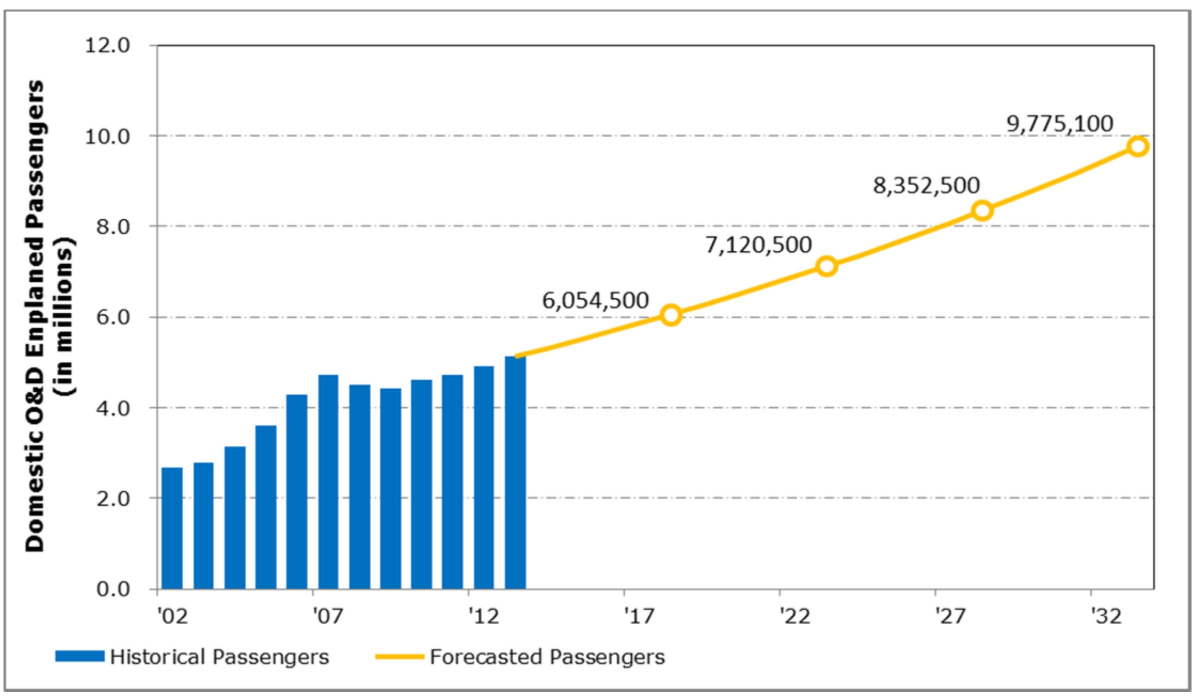
Table 3-2
CLT DOMESTIC O&D ENPLANED PASSENGER FORECAST

Calendar Year	Domestic O&D Enplanements	Year-Over-Year Percent Growth
2002	2,689,590	
2003	2,785,810	3.6%
2004	3,149,040	13.0%
2005	3,594,120	14.1%
2006	4,296,810	19.6%
2007	4,725,960	10.0%
2008	4,513,190	-4.5%
2009	4,418,800	-2.1%
2010	4,627,390	4.7%
2011	4,735,640	2.3%
2012	4,910,870	3.7%
2013E	5,132,526	4.5%
2018	6,054,500	3.3%
2023	7,120,500	3.3%
2028	8,352,500	3.2%
2033	9,775,100	2.1%
CAGR		
2002-13	6.1%	
2013-33	3.3%	

Note: 2013 Domestic O&D is estimated.

Sources: Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-2

Exhibit 3-2
CLT DOMESTIC O&D ENPLANED PASSENGER FORECAST



Sources: Charlotte-Douglas International Airport; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-2

3.4 CONNECTING DOMESTIC PASSENGER FORECAST

Historical domestic connecting passengers were examined at CLT in order to project future domestic connecting passenger levels. The volume of domestic connecting passengers occurs largely as a result of airline network management strategies rather than through any unique characteristic of the airport's local market. The geographic location of Charlotte and existing infrastructure at the Airport encourages a large proportion of domestic connecting activity at CLT.

The connecting traffic forecast was derived from the domestic O&D enplanements forecast. Since 2002, connecting domestic enplanements have accounted for approximately 73.0 percent of the total domestic enplanements. This increased to 74.7 percent in 2013. Therefore, it was assumed that connecting domestic enplanements would account for 75.0 percent of the total domestic enplanements throughout the forecast period.

Connecting domestic enplanements are expected to increase 3.3 percent annually from 15.2 million in 2013 to 29.3 million in 2033. **Table 3-3, *CLT Connecting Enplaned Passenger Forecast***, and **Exhibit 3-3, *CLT Connecting Enplaned Passenger Forecast***, display the total domestic connecting passenger forecast results.

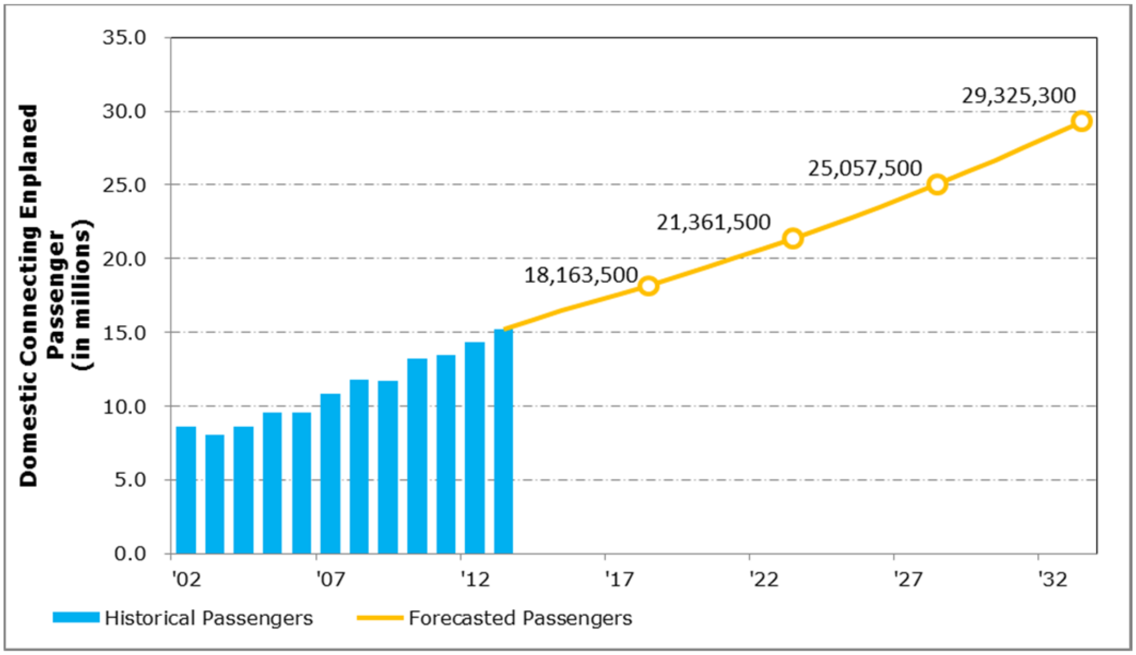
Table 3-3
CLT CONNECTING ENPLANED PASSENGER FORECAST

Calendar Year	Domestic Connecting Enplanements	Year-Over-Year Percent Growth
2002	8,577,767	
2003	8,052,122	-6.1%
2004	8,569,572	6.4%
2005	9,547,476	11.4%
2006	9,540,190	-0.1%
2007	10,821,283	13.4%
2008	11,750,419	8.6%
2009	11,737,830	-0.1%
2010	13,228,889	12.7%
2011	13,477,380	1.9%
2012	14,338,117	6.4%
2013	15,174,004	5.8%
2018	18,163,500	3.3%
2023	21,361,500	3.3%
2028	25,057,500	3.2%
2033	29,325,300	3.2%
CAGR		
2002-13	5.3%	
2013-33	3.3%	

Note: 2013 domestic connecting is estimated.

Sources: Charlotte-Douglas International Airport; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-3

Exhibit 3-3
CLT CONNECTING ENPLANED PASSENGER FORECAST



Sources: Charlotte-Douglas International Airport; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-3

3.5 INTERNATIONAL PASSENGER FORECAST

International enplanements refer to a passenger that boards an international flight at CLT and flies to an international destination. Similar to the domestic O&D passenger forecast, the full range of regression analyses was conducted. As a result of running various regressions for CLT, the independent variable used in the final model was a blended international GDP rate. This blended rate was based on GDP for the three main international regions traveled at CLT: Latin America, Canada, and Europe. The rate was blended based on the percent of 2013 international passengers to and from each region. The regression inputs used in the model are displayed in **Table 3-4, *International Regression Inputs***.

Table 3-4
INTERNATIONAL REGRESSION INPUTS

Calendar Year	Blended GDP	International Enplanements
1990	3,422	107,070
1991	3,433	141,417
1992	3,526	199,593
1993	3,587	186,057
1994	3,718	175,153
1995	3,807	225,731
1996	3,921	232,181
1997	4,076	256,568
1998	4,223	274,541
1999	4,377	313,821
2000	4,553	468,711
2001	4,611	468,549
2002	4,673	516,791
2003	4,762	673,533
2004	4,925	843,521
2005	5,065	942,425
2006	5,226	991,149
2007	5,368	1,021,346
2008	5,406	1,094,384
2009	5,248	1,089,964
2010	5,404	1,240,684
2011	5,548	1,304,841
2012	5,646	1,339,897
2013	5,717	1,400,659

Sources: Moody's Analytics; Charlotte-Douglas International Airport; Landrum & Brown
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The summary output from the regression model is shown below. The model exhibits strong regression statistics (R square, T-statistics, and P-values) compared to the models with other combinations of independent variables.

Regression Statistics	
Multiple R	0.965
R Square	0.931
Adjusted R Square	0.928
Standard Error	120718.939
Observations	24

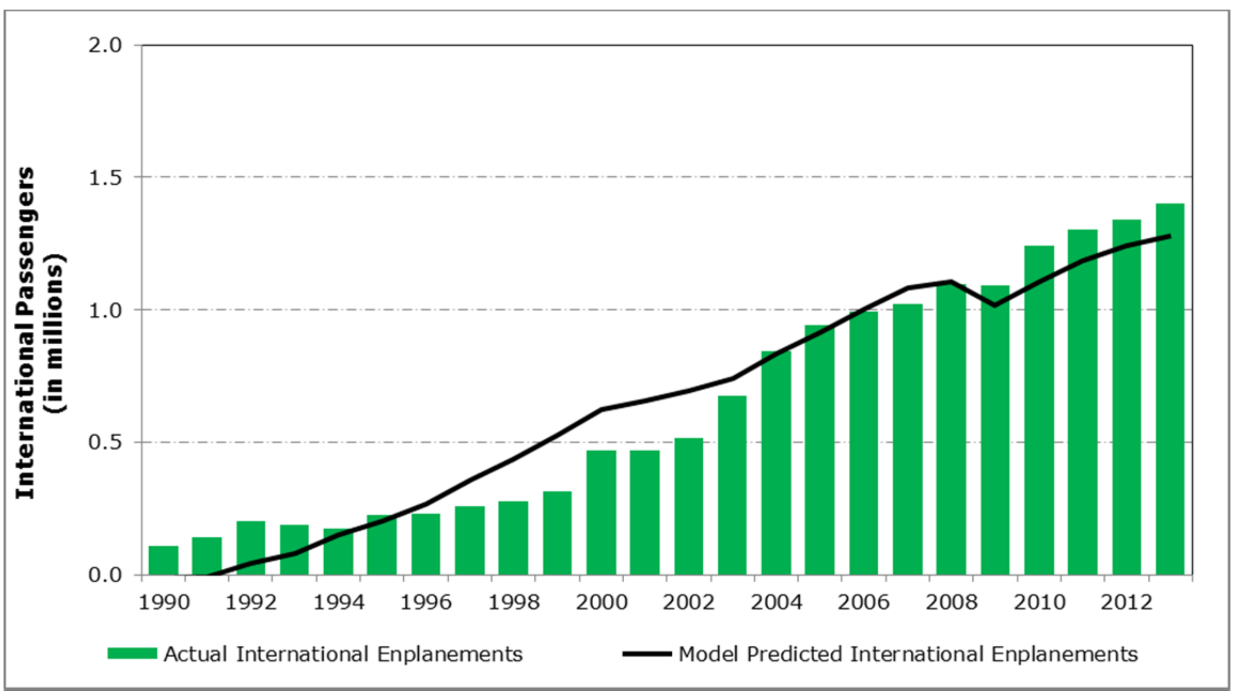
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4.32E+12	4.32E+12	2.97E+02	2.95E-14
Residual	22	3.21E+11	1.46E+10		
Total	23	4.64E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1947382.9	152601.6	-12.8	0.00	-2263859.2	-1630906.7	-2263859.2	-1630906.7
GDP (X1)	564.7	32.8	17.2	0.00	496.7	632.7	496.7	632.7

Exhibit 3-4, *CLT International Enplanement Regression Model*, illustrates the model fit when plotted against the actual historical traffic at CLT. The model-predicted traffic compares well to actual traffic. The regression statistics and model-predicted traffic comparison indicate that the model provides a reasonable basis from which to forecast the passenger traffic for CLT.

Exhibit 3-4
CLT INTERNATIONAL ENPLANEMENT REGRESSION MODEL



Sources: Landrum & Brown.
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\2-Passenger Forecast\[CLT - International Forecast Workbook.xlsx]Forecast_GDP_Blended

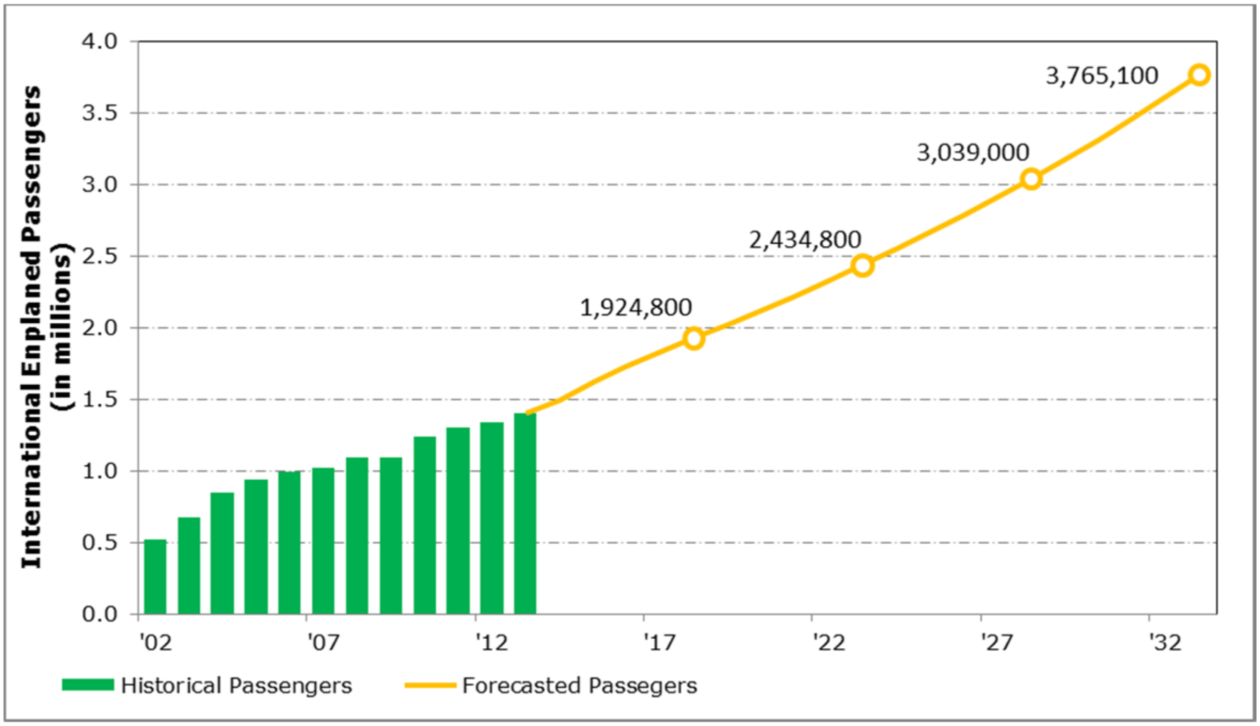
Total international enplanements are expected to increase 5.1 percent annually from 1.4 million in 2013 to 3.8 million in 2033. **Table 3-5, *CLT International Enplaned Passenger Forecast***, and **Exhibit 3-5, *CLT International Enplaned Passenger Forecast***, display the international passenger forecast results.

Table 3-5
CLT INTERNATIONAL ENPLANED PASSENGER FORECAST

Calendar Year	International Enplanements	Year-Over-Year Percent Growth
2002	516,791	
2003	673,533	30.3%
2004	843,521	25.2%
2005	942,425	11.7%
2006	991,149	5.2%
2007	1,021,346	3.0%
2008	1,094,384	7.2%
2009	1,089,964	-0.4%
2010	1,240,684	13.8%
2011	1,304,841	5.2%
2012	1,339,897	2.7%
2013	1,400,659	4.5%
2018	1,924,800	5.2%
2023	2,434,800	4.4%
2028	3,039,000	4.5%
2033	3,765,100	4.3%
CAGR		
2002-13	9.5%	
2013-33	5.1%	

Sources: CLT Airport Data; Moody's; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-5

Exhibit 3-5
CLT INTERNATIONAL ENPLANED PASSENGER FORECAST



Sources: Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-5

3.6 PASSENGER ACTIVITY FORECAST SUMMARY

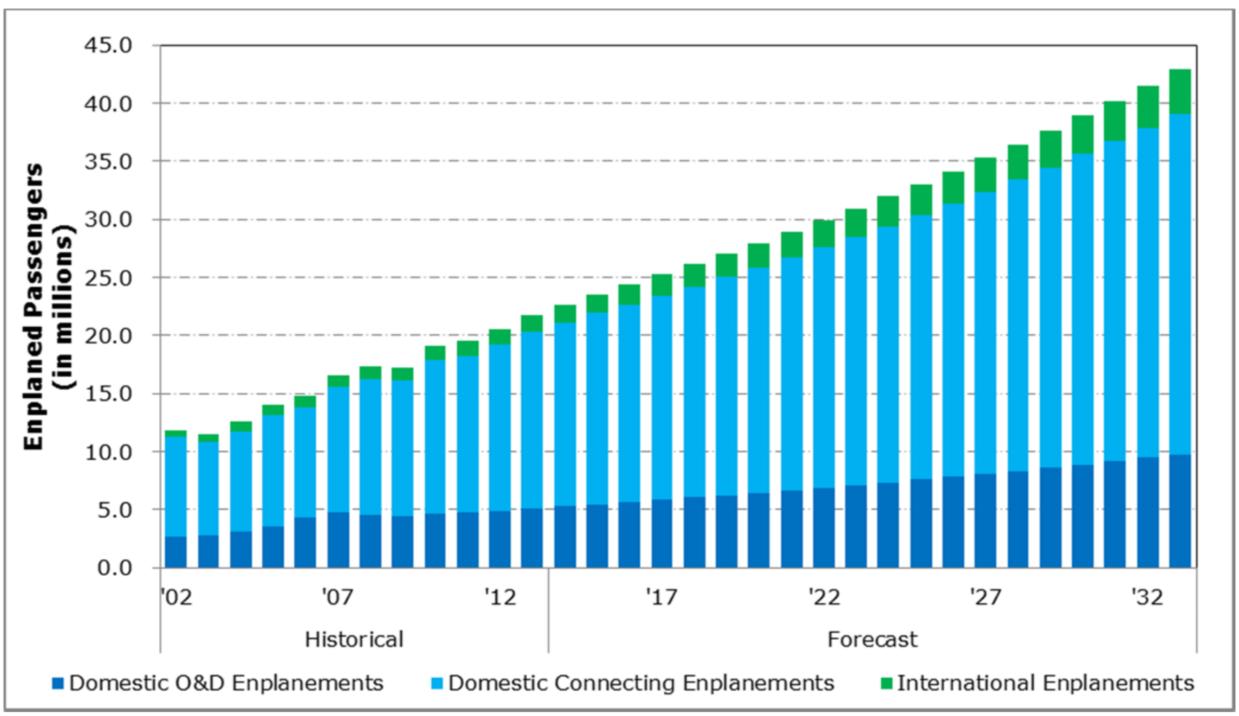
The sum of the domestic O&D, domestic connecting, and international enplaned passenger demand forecast results in the total enplaned passenger forecasts for CLT. Overall, the results of the passenger forecasts include 3.3 percent annual gain in domestic enplanements over the forecast period. International enplanements are forecast to grow at 5.1 percent annually, primarily reflecting recent historical trends and relatively strong economic growth projected for the Latin American economy. The share of international enplanements is expected to grow from 6.5 percent of total enplanements in 2013 to 8.8 percent in 2033. Overall, total enplaned passengers at CLT are forecast to increase from 21.6 million in 2013 to 42.7 million by 2033, averaging growth of 3.5 percent per year (see **Table 3-6, *CLT Enplanement Forecast Results***, and **Exhibit 3-6, *CLT Enplanement Forecast Results***).

Table 3-6
CLT ENPLANEMENT FORECAST RESULTS

Calendar Year	Domestic O&D Enplanements	Domestic Connecting Enplanements	International Enplanements	Total Enplanements	Year-Over-Year Percent Growth
2002	2,689,590	8,577,767	516,791	11,784,148	0.5%
2003	2,785,810	8,052,122	673,533	11,511,465	3.6%
2004	3,149,040	8,569,572	843,521	12,562,133	13.0%
2005	3,594,120	9,547,476	942,425	14,084,021	14.1%
2006	4,296,810	9,540,190	991,149	14,828,149	19.6%
2007	4,725,960	10,821,283	1,021,346	16,568,589	10.0%
2008	4,513,190	11,750,419	1,094,384	17,357,993	-4.5%
2009	4,418,800	11,737,830	1,089,964	17,246,594	-2.1%
2010	4,627,390	13,228,889	1,240,684	19,096,963	4.7%
2011	4,735,640	13,477,380	1,304,841	19,517,861	2.3%
2012	4,910,870	14,338,117	1,339,897	20,588,884	3.7%
2013	5,132,526	15,174,004	1,400,659	21,707,189	4.5%
2018	6,054,500	18,163,500	1,924,800	26,142,800	3.2%
2023	7,120,500	21,361,500	2,434,800	30,916,800	2.7%
2028	8,352,500	25,057,500	3,039,000	36,449,000	2.4%
2033	9,775,100	29,325,300	3,765,100	42,865,500	2.1%
CAGR					
2002-13	6.1%	5.3%	9.5%	5.7%	
2013-33	3.3%	3.3%	5.1%	3.5%	

Sources: Charlotte-Douglas International Airport; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-6

Exhibit 3-6
CLT ENPLANEMENT FORECAST RESULTS



Sources: Charlotte-Douglas International Airport; Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]3-6

4. CARGO ACTIVITY FORECAST

This chapter presents the forecast for air cargo activity. Historical air cargo trends for CLT were presented in Section 2, *Historical Aviation Activity*. This section presents the forecast of air cargo volumes for CLT in terms of total air cargo volumes as well as estimates of the split of air cargo between the belly of passenger aircraft and dedicated freighter aircraft.

4.1 THE NATURE OF AIR CARGO

The FAA classifies air cargo as either freight or mail. Air cargo is also typically categorized as either domestic or international. It can move in the belly of passenger aircraft or aboard all-cargo (freighter) aircraft. Most passenger airlines accommodate air cargo as a by-product to the primary activity of carrying passengers. They fill belly space in their aircraft that would otherwise be empty. The incremental costs of carrying cargo in a passenger aircraft have traditionally been negligible, and include only ground handling expenses and an increase in fuel consumption.

Virtually all air cargo begins or ends its journey on a truck, making the ground distribution system (including rail) equally critical. The design and location of airports and their cargo facilities must take this into consideration and be capable of accommodating growth in the landside component of the operation commensurate with growth on the airside.

In an ideal environment, space for the on-airport cargo community would be expansive enough to include a full complement of the supporting and ancillary businesses that are important components of an air cargo operation. Geographic proximity to the carriers allows these other businesses to realize operational and financial benefits, while providing a higher level of service to their customers.

4.2 AIR CARGO IMPACT FACTORS

There are a number of critical industry variables of goods movement by air that impact CLT to some degree:

- **Truck Substitution -** One of the most difficult variables to evaluate in air cargo is the truck substitution component. Trucks have nearly replaced regional air freight service due to the cost savings and increased efficiency. Their services have expanded to provide the transport of freight to gateway airports for consolidation; a number of carriers transport cargo by truck to build their own volumes. Many air cargo facilities are operating to a greater extent than in the past as truck terminals, yet requirements to report truck-to-truck traffic are scarce. Transport by rail is also used for some goods that were air freighted in the past.

- **E-Commerce** – Many of the shipments generated by home shopping networks, catalog shopping, and e-commerce require specialized facilities for efficient processing and expedited delivery. Repair of electronic equipment, computers, and telephones is a particularly active growth area. Accordingly, these shipments have a greater tendency to move by air or expedited trucking. This has accelerated demand for air cargo operations in general and freighter operations in particular. Much of this business has gone to the integrators, although there is spillover that impacts domestic belly cargo and to a greater extent, domestic trucking.
- **Manufacturing Creep** – Manufacturing facilities, particularly those focused on time sensitive products, in response to demand for faster delivery, are moving and/or locating key warehouse facilities closer to airports, or onto airports. This reduces inventory, trucking costs, and staffing requirements while increasing levels of customer service. There is also a growing tendency for industry to decentralize, or regionalize distribution.
- **Aircraft technology -** Modern passenger and freighter aircraft are more fuel-efficient, have greater range, and carry larger payloads than older aircraft. This trend, most clearly illustrated by the number of deliveries and orders of larger, more efficient aircraft will continue the evolution of global shipping patterns. The ability of new aircraft to over-fly traditional points of entry, as well as the inability of many airports to accommodate the new aircraft will affect the selection of O&D airports. A 747-800 carries 120 tons while a 767 carries less than half that amount.

4.3 AIR CARGO OUTLOOK

Industry market outlooks were researched to have a better understanding of the expected growth in air cargo traffic, and in particular, for the North American, Latin American, and European regions, as regions that primarily impact cargo activity at CLT. The *Boeing Current Market Outlook 2013-2032* projects a 2.3 percent annual growth for cargo revenue ton kilometers (RTKs) within North America over the next twenty years. *Airbus Global Market Forecast 2013-2032* projects 3.4 percent annual growth within North America through 2022, and 2.8 percent over the rest of the forecast period. Both Boeing and Airbus have more aggressive cargo forecasts for Europe and Latin America to and from North America. These growth rates are displayed in **Table 4-1, *Industry Outlook – Cargo Forecast Growth Rates***.

Table 4-1
INDUSTRY OUTLOOK – CARGO FORECAST GROWTH RATES

Region	Airbus	Boeing
Within North America		
2012-2022	3.4%	2.3%
2022-2032	2.8%	2.3%
North America to Europe		
2012-2022	4.5%	3.5%
2022-2032	4.0%	3.5%
Europe to North America		
2012-2022	3.8%	3.5%
2022-2032	2.8%	3.5%
North America to Latin America		
2012-2022	4.5%	4.2%
2022-2032	4.4%	4.2%
Latin America to North America		
2012-2022	4.2%	4.2%
2022-2032	4.1%	4.2%

Sources: *Boeing Current Market Outlook 2013-2032, Airbus Global Market Forecast 2013-2032*
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\3-Cargo Forecast\[CLT - Cargo Volume Forecast Workbook.xlsx]Market Outlook

4.4 AIR CARGO FORECAST

The cargo tonnage forecast is predicated on the assumption that the structural changes to the air cargo industry discussed in this chapter are permanent and that emerging trends for air cargo security will continue. Additionally, it is assumed that long-term economic growth in the Charlotte MSA and the broader U.S. economy will increase the demand for the shipment of goods and services over the forecast period.

While historical air cargo volumes play a key role in defining the economic relationships that will be used to predict future growth, broader industry trends, economic analysis, and review of peer forecasts such as those published by the FAA will also play a role in forecasting future activity. The key factors underlying the domestic and international air cargo forecast are:

- Economic growth in North America, Europe, Latin America, and around the world is expected to continue to support growth in air cargo at CLT.
- The domestic cargo tonnage forecast is based on growth rates from the Boeing forecast within North America.
- The international cargo tonnage forecast is based on the Latin America growth rates from the Boeing Forecast, as the majority of international cargo is from that region.
- The belly/freighter ratio is expected to remain about the same from 2013 throughout the forecast period.

- Mail is expected to increase at the same rate as domestic freight over the forecast period.
- Integrated carriers are expected to continue to increase their share of domestic air cargo. However, the expected increase in time-definite second and third day delivery may temper growth in integrated all-cargo operations with more freight moving by truck.

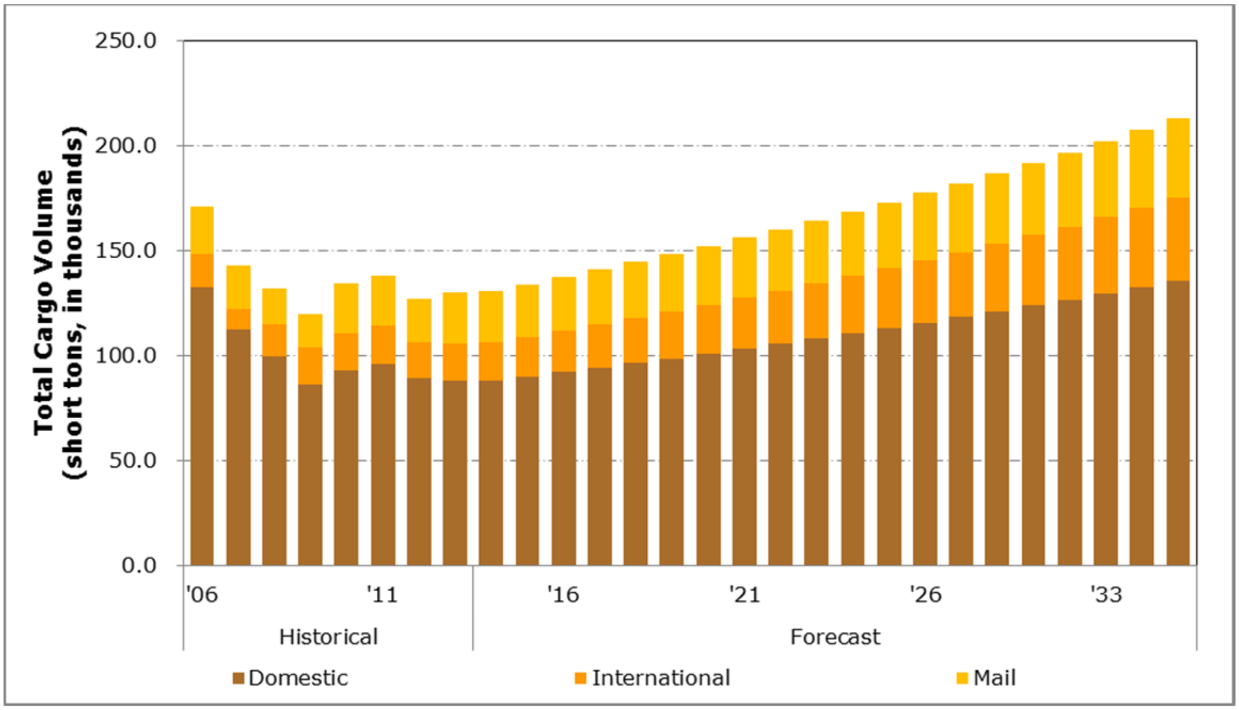
Based on these foregoing factors, domestic air cargo volumes at CLT are forecast to increase from 87,886 tons in 2013 to 135,500 tons by 2033, an average annual growth rate of 2.2 percent. See **Table 4-2, *Air Cargo Forecast (in Short Tons)***. International cargo volumes are expected to increase at a faster rate of 4.0 percent over the same period, from 18,079 tons in 2013 to 39,400 tons in 2033, due to projected growth in Latin America. This results in total cargo volumes increasing at a rate of 2.5 percent over the forecast period, from 129,800 tons in 2013 to 212,600 tons in 2033. **Exhibit 4-1, *Air Cargo Forecast (in Short Tons)***, shows a summary of the historical and forecast cargo volumes.

Table 4-2
AIR CARGO FORECAST (IN SHORT TONS)

Calendar Year	Volume				Year-Over-Year Percent Growth
	Domestic	International	Mail	Total	
2006	132,706	15,755	22,288	170,749	
2007	112,120	10,031	20,668	142,819	-16.4%
2008	99,742	15,174	17,093	132,009	-7.6%
2009	86,236	17,510	15,806	119,552	-9.4%
2010	93,143	17,303	23,893	134,339	12.4%
2011	95,638	18,366	23,941	137,945	2.7%
2012	88,966	17,167	21,095	127,228	-7.8%
2013	87,886	18,079	23,835	129,800	2.0%
2018	96,400	21,300	26,900	144,600	2.6%
2023	108,000	26,200	30,100	164,300	2.6%
2028	121,000	32,100	33,700	186,800	2.6%
2033	135,500	39,400	37,700	212,600	2.6%
CAGR					
2006-13	-5.7%	2.0%	1.0%	-3.8%	
2013-33	2.2%	4.0%	2.3%	2.5%	

Source: Landrum & Brown
Y:\CLT\2012 Planning Forecast\E-L&B Work Product\14-Cargo Forecast\[Cargo Forecast.xlsx]Forecast – Operations

Exhibit 4-1
AIR CARGO FORECAST (IN SHORT TONS)



Source: Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\3-Cargo Forecast\[CLT - Cargo Volume Forecast Workbook.xlsx]TOT Forecast_Market Outlook

For purposes of evaluating dedicated cargo facilities and apron areas at CLT, the total air cargo forecast was allocated between the cargo handled in dedicated freighter aircraft versus the cargo shipped in the belly hold of passenger aircraft. See **Table 4-3, *Air Cargo Belly/Freighter Forecast (in Short Tons)***.

Table 4-3
AIR CARGO BELLY/FREIGHTER FORECAST (IN SHORT TONS)

Calendar	Cargo Volume		
Year	Belly	Freighter	Total
2011	54,566	83,377	137,943
2012	49,329	77,401	126,730
2013	53,970	75,830	129,800
2018	57,863	86,737	144,600
2023	65,738	98,562	164,300
2028	74,730	112,070	186,800
2033	85,040	127,560	212,600
CAGR			
2011-13	-0.5%	-4.6%	-3.0%
2013-33	2.3%	2.6%	2.5%

Source: Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Cargo Operations Forecast.xlsx]Cargo ATM Forecast

5. OPERATIONS FORECAST

The forecast of aircraft operations consists of projections of operations by major activity type at CLT. Aircraft operations, defined as arrivals plus departures, were forecast separately for the five major categories of users: (1) commercial passenger; (2) freighter; (3) non-commercial air taxi; (4) general aviation; and (5) military.

5.1 PASSENGER OPERATIONS

Passenger aircraft operations were derived from the enplaned passenger forecast. The aggregate number of commercial passenger operations at an airport depends on three factors; total passengers, average aircraft size, and average load factor (percent of seats occupied). The relationship is shown in the equation below.

$$Operations = \frac{TotalPassengers}{AverageLoadFactor * AverageAircraftSize}$$

This relationship permits literally infinite combinations of load factors, average aircraft size, and operations to accommodate a given number of passengers. In order to develop reasonable load factor and aircraft gauge assumptions, commercial passenger operations were disaggregated into categories of activity (i.e., air carrier and regional activity divided into domestic and international traffic).

The breakout of commuter service is primarily based on the individual carrier's mode of operation (i.e., providing regional feed to its major airline partners) and certification with the FAA. These commuter carriers typically operate turboprop and less than 90-seat jet equipment.

The fundamental approach to deriving the passenger operations forecast is essentially the same at all airports. However, the underlying assumptions at each airport are inherently different due to differences in how airlines choose to serve the demand for air travel to, from, and over each airport. These differences may result, for example, from a strategic focus on unit revenue versus unit costs, or an emphasis on a hub and spoke system versus a point-to-point operation.

A number of sources were used to develop the historical passenger operations, load factor, and aircraft gauge data. The *Official Airline Guide*; FAA, Air Traffic Activity Data System (ATADS); and U.S. Department of Transportation (U.S. DOT), Schedule T-100 data were used to develop total departures and seats for each segment. Average seats per departure (ASPD) for each of the major groups of passenger activity was calculated from total departures and total departing seats. Aircraft load factors were calculated for each group of passenger operations by dividing total enplaned passengers by total departing seats. To calculate total operations, the total number of departures was multiplied by a factor of two.

Table 5-1, *Passenger ASPD Assumptions*, and **Table 5-2, *Load Factor Assumptions***, detail the historical and projected ASPD and load factors used to calculate domestic and international aircraft operations by air carrier and commuter airlines. The assumptions underlying the forecast values are discussed in the following sections.

Table 5-1
PASSENGER ASPD ASSUMPTIONS

Calendar Year	Domestic (ASPD)		International (ASPD)	
	Air Carrier	Commuter	Air Carrier	Commuter
2006	143.5	56.6	165.9	50.2
2007	142.9	58.1	165.7	54.7
2008	138.8	59.5	166.1	65.9
2009	138.9	60.2	166.9	67.8
2010	145.8	60.3	177.3	66.2
2011	146.1	59.5	181.5	68.3
2012	149.0	60.3	183.6	66.4
2013	152.5	61.1	185.0	59.7
2018	158.0	62.0	190.0	64.0
2023	161.0	64.0	192.0	67.0
2028	164.0	68.0	193.0	70.0
2033	166.0	72.0	193.0	74.0

Sources: U.S. DOT, Schedule T-100, *Official Airline Guide*, Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

Table 5-2
LOAD FACTOR ASSUMPTIONS

Calendar Year	Domestic (LF)		International (LF)	
	Air Carrier	Commuter	Air Carrier	Commuter
2006	75.5%	70.5%	59.4%	59.4%
2007	79.2%	72.5%	65.8%	65.8%
2008	81.9%	73.0%	66.3%	66.3%
2009	81.1%	77.0%	62.2%	62.2%
2010	82.5%	80.1%	62.9%	62.9%
2011	83.3%	79.1%	62.6%	62.6%
2012	85.6%	78.6%	63.5%	63.5%
2013	86.9%	77.9%	67.0%	67.0%
2018	86.0%	78.0%	68.5%	68.5%
2023	86.0%	78.0%	70.0%	70.0%
2028	86.0%	78.0%	72.0%	72.0%
2033	86.0%	78.0%	74.0%	74.0%

Sources: U.S. DOT, Schedule T-100, *Official Airline Guide*, Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

5.2 DOMESTIC PASSENGER OPERATIONS

Over the past seven years CLT has experienced a 2.2 percent net annual average increase in domestic passenger operations from 424,204 operations in 2006 to an estimated 494,870 operations in 2013. This section presents information on domestic passenger operations and assumptions for the operations forecast.

5.2.1 Domestic Air Carrier

Domestic air carrier service accounted for 38.5 percent of total passenger activity in 2013. Over 90 percent of 2013 scheduled domestic air carrier service at CLT was operated by U.S. Airways. Currently, U.S. Airways is updating their fleet for the next generation replacement of current similarly sized aircraft. U.S. Airways has confirmed orders for Airbus A350-900 aircraft and the Airbus A321-200.

Similar to U.S. Airways fleet plans, the assumed evolution of the overall domestic air carrier fleet at CLT consists primarily of next generation replacement of current similarly sized aircraft (e.g. the Boeing 737-700 replacing the Boeing 737-300 or the Boeing 737-800 replacing the MD80) rather than wholesale fleet changes. The resulting ASPD for domestic air carrier flights is projected to increase from 152.5 seats in 2013 to 166.0 seats by 2033.

Domestic air carrier load factors increased from 75.5 percent in 2006 to 86.4 percent in 2013. Over the forecast period, domestic air carrier load factors are expected to decrease slightly to 86 percent by 2018 and remain at that level through 2033.

The result of the foregoing assumptions regarding ASPD and load factor is that domestic air carrier operations are forecast to grow from 200,602 operations in 2013 to 367,020 operations by 2033, representing an average annual growth rate of 3.1 percent.

5.2.2 Domestic Commuter

Domestic commuter operations have accounted for an increasing share of domestic passenger operations over the past 10 years, as legacy airlines have transferred a high percentage of air service to their regional affiliates, resulting in increased commuter frequencies. In 2013, an estimated 294,268 domestic commuter operations were reported at CLT. Of these operations, almost 90.6 percent were operated by U.S. Airways.

ASPD for the domestic commuter carriers increased from 56.6 seats in 2006 to 61.1 seats in 2013. A shift from small 19- to 37-seat turboprops to 50-seat regional jets and larger 70-seat regional jets, accounted for this increase. The trend toward larger aircraft is expected to continue as commuter carriers look to reduce unit costs by spreading operating costs over a greater number of seats per flight. It is also expected that more flexible scope clauses will help regional airlines operate larger regional aircraft in the future. The share of small regional jets is assumed to be reduced over the forecast period. Consequently, the commuter ASPD is expected to increase to 72.0 seats ASPD by 2033, from 61.1 seats in 2013.

Domestic commuter load factors have fluctuated over the last seven years, increasing from 70.5 percent in 2006 to 80.1 percent in 2010, and then stabilizing to 77.4 percent in 2013. It is assumed that regional load factors will level out at 78.0 percent by 2018 and remain constant for the remainder of the forecast period.

Based on the enplanements forecast, the increase in commuter ASPD, and load factor assumptions, commuter operations at CLT are expected to grow at a lower average annual rate than domestic air carrier activity during the forecast period, reaching 459,040 operations by 2033 (representing average annual growth of 2.2 percent per year).

5.3 INTERNATIONAL PASSENGER OPERATIONS

Approximately 26,790 international passenger operations were reported in 2013 at CLT (5.1 percent of total operations). Of those flights approximately 20.7 percent were to/from Canada, 65.0 percent were to/from Latin America, and 14.4 percent were to/from Europe. Over the forecast period load factors are expected to increase from 67.5 percent in 2013 to 74.0 percent in 2033. International air carrier ASPD is expected to increase from 185.0 in 2013 to 193.0 in 2033. International commuter ASPD is expected to increase from 59.7 in 2013 to 74.0 in 2033. These assumptions result in a 5.0 percent annual growth over the forecast period, expecting 60,200 international operations in 2033 (6.8 percent of total operations).

5.4 TOTAL PASSENGER OPERATIONS

Table 5-3, *Passenger Operations Forecast by Segment*, displays the results of the domestic and international passenger operations forecast by segment. Domestic passenger operations are expected to grow 2.6 percent annually from 494,870 in 2013 to 826,060 in 2033, while international passengers are expected to grow at a slightly more aggressive rate of 4.1 percent per year from 26,790 in 2013 to 60,200 in 2033. Overall a 2.7 percent average annual growth is expected for total passengers over the forecast period.

Table 5-3
PASSENGER OPERATIONS FORECAST BY SEGMENT

Calendar	Domestic			International			Total		
Year	Air Carrier	Commuter	Total	Air Carrier	Commuter	Total	Air Carrier	Commuter	Total
2006	156,862	267,342	424,204	19,496	2,050	21,546	176,358	269,392	445,750
2007	175,306	266,876	442,182	18,104	1,908	20,012	193,410	268,784	462,194
2008	180,762	275,888	456,650	18,692	2,998	21,690	199,454	278,886	478,340
2009	177,454	265,464	442,918	19,624	3,362	22,986	197,078	268,826	465,904
2010	186,990	273,808	460,798	20,310	5,174	25,484	207,300	278,982	486,282
2011	188,340	286,860	475,200	20,622	6,216	26,838	208,962	293,076	502,038
2012	193,026	292,958	485,984	20,530	6,758	27,288	213,556	299,716	513,272
2013	200,602	294,268	494,870	20,612	6,178	26,790	221,214	300,446	521,660
2018	235,260	340,200	575,460	26,980	7,740	34,720	262,240	347,940	610,180
2023	275,640	376,180	651,820	33,040	9,160	42,200	308,680	385,340	694,020
2028	317,420	415,300	732,720	39,880	10,620	50,500	357,300	425,920	783,220
2033	367,020	459,040	826,060	48,080	12,120	60,200	415,100	471,160	886,260
CAGR									
2006-13	3.6%	1.4%	2.2%	0.8%	17.1%	3.2%	3.3%	1.6%	2.3%
2013-33	3.1%	2.2%	2.6%	4.3%	3.4%	4.1%	3.2%	2.3%	2.7%

Sources: U.S. DOT, Schedule T-100, *Official Airline Guide,* Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

5.5 COMMERCIAL PASSENGER FLEET MIX

The fleet mix was developed to match the aggregate level of ASPD targets for each of the four components of commercial passenger operations presented in the previous subsections. The fleet mix also allowed for the calibration of those assumptions and, where appropriate, modifications were made prior to finalizing the ASPD and load factor assumptions. The allocation of commercial passenger operations by aircraft type is shown in **Table 5-4, *Domestic Passenger Fleet Mix***, for domestic operations and in **Table 5-5, *International Passenger Fleet Mix***, for international activity.

The Critical Design Aircraft at CLT is the Airbus 340-600.

Table 5-4
DOMESTIC PASSENGER FLEET MIX

		Departures							Percent of Total						
Aircraft	**Gauge**	**2011**	**2012**	**2013**	**2018**	**2023**	**2028**	**2033**	**2011**	**2012**	**2013**	**2018**	**2023**	**2028**	**2033**
Air Carrier															
Widebody Jet															
350	330	0	0	0	312	947	1,344	1,950	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.5%
333	291	1	2	31	39	59	84	121	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
332	258	1	99	186	235	358	507	726	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.2%
753	252	1	5	7	9	14	20	29	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
764	219	2	3	1	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
767	208	568	483	488	309	0	0	0	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%
762	204	0	0	217	274	418	591	854	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%
Subtotal		573	592	930	1,178	1,796	2,546	3,680	0.2%	0.2%	0.4%	0.4%	0.6%	0.7%	0.9%
Narrowbody Jet															
757	192	1,730	1,922	1,823	2,135	2,494	2,863	3,297	0.7%	0.8%	0.7%	0.7%	0.8%	0.8%	0.8%
321	182	16,831	23,373	31,362	54,046	65,641	80,443	94,793	7.1%	9.6%	12.7%	18.8%	20.1%	22.0%	23.0%
739	169	4	1	26	30	35	40	46	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
73H	165	66	93	36	42	49	56	64	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
M90	159	10	6	902	2,625	3,066	0	0	0.0%	0.0%	0.4%	0.9%	0.9%	0.0%	0.0%
738	157	783	345	137	828	967	1,110	1,278	0.3%	0.1%	0.1%	0.3%	0.3%	0.3%	0.3%
738Max	160	0	0	0	834	974	2,367	4,165	0.0%	0.0%	0.0%	0.3%	0.3%	0.6%	1.0%
320	149	12,811	13,560	14,117	16,544	20,005	24,060	26,088	5.4%	5.6%	5.7%	5.7%	6.1%	6.6%	6.3%
734	144	24,683	22,017	14,755	0	0	0	0	10.4%	9.1%	6.0%	0.0%	0.0%	0.0%	0.0%
M88	143	2,284	2,178	2,267	1,328	0	0	0	1.0%	0.9%	0.9%	0.5%	0.0%	0.0%	0.0%
73C	143	0	0	94	110	128	147	169	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
73W	139	60	92	1,472	1,725	1,879	1,767	2,034	0.0%	0.0%	0.6%	0.6%	0.6%	0.5%	0.5%
M83	139	618	908	425	0	0	0	0	0.3%	0.4%	0.2%	0.0%	0.0%	0.0%	0.0%
M80	138	1,670	1,002	1,319	0	0	0	0	0.7%	0.4%	0.5%	0.0%	0.0%	0.0%	0.0%
733	131	5,042	3,479	98	0	0	0	0	2.1%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%
737Max	126	0	0	0	115	134	154	177	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
73G	126	291	138	72	84	98	113	130	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
D95	125	719	856	410	240	0	0	0	0.3%	0.4%	0.2%	0.1%	0.0%	0.0%	0.0%
319	124	21,768	21,712	27,708	33,014	37,747	40,213	44,329	9.2%	8.9%	11.2%	11.5%	11.6%	11.0%	10.7%
717	117	1,948	2,194	520	609	643	738	850	0.8%	0.9%	0.2%	0.2%	0.2%	0.2%	0.2%
735	114	508	70	0	0	0	0	0	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E90	99	1,771	1,975	1,828	2,142	2,162	2,091	2,407	0.7%	0.8%	0.7%	0.7%	0.7%	0.6%	0.6%
Subtotal		93,597	95,921	99,371	116,451	136,022	156,161	179,827	39.4%	39.5%	40.2%	40.5%	41.7%	42.6%	43.5%
Total Air Carrier		94,170	96,513	100,301	117,629	137,818	158,707	183,507	39.6%	39.7%	40.5%	40.9%	42.3%	43.3%	44.4%

Table 5-4, *Continued*
DOMESTIC PASSENGER FLEET MIX

		Departures							Percent of Total						
Aircraft	**Gauge**	**2011**	**2012**	**2013**	**2018**	**2023**	**2028**	**2033**	**2011**	**2012**	**2013**	**2018**	**2023**	**2028**	**2033**
Commuter															
Large Regional Jet															
E75	84	17,059	13,151	10,076	13,240	17,809	23,917	32,159	7.2%	5.4%	4.1%	4.6%	5.5%	6.5%	7.8%
CR9	74	21,576	26,045	32,289	44,075	59,285	79,616	107,048	9.1%	10.7%	13.0%	15.3%	18.2%	21.7%	25.9%
E70	72	883	1,018	993	975	1,311	1,761	2,368	0.4%	0.4%	0.4%	0.3%	0.4%	0.5%	0.6%
CR7	69	21,391	22,728	22,870	26,760	35,995	48,339	64,995	9.0%	9.4%	9.2%	9.3%	11.0%	13.2%	15.7%
Subtotal		60,909	62,942	66,228	85,050	114,400	153,633	206,570	25.6%	25.9%	26.8%	29.6%	35.1%	41.9%	50.0%
Small Regional Jet															
DH3	51	10,175	12,378	15,528	16,323	14,143	10,367	4,405	4.3%	5.1%	6.3%	5.7%	4.3%	2.8%	1.1%
CRJ	50	52,578	52,809	45,907	48,258	41,812	30,650	13,023	22.1%	21.7%	18.6%	16.8%	12.8%	8.4%	3.2%
ERJ	50	7,028	7,383	7,627	8,018	6,947	5,092	2,164	3.0%	3.0%	3.1%	2.8%	2.1%	1.4%	0.5%
ER4	49	3,566	3,824	3,986	4,190	3,629	2,660	1,131	1.5%	1.6%	1.6%	1.5%	1.1%	0.7%	0.3%
ERD	44	330	93	0	0	0	0	0	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DH8	41	8,844	6,999	7,662	8,054	6,979	5,116	2,173	3.7%	2.9%	3.1%	2.8%	2.1%	1.4%	0.5%
FRJ	32	0	51	196	206	179	131	56	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%
Subtotal		82,521	83,537	80,906	85,049	73,689	54,016	22,952	34.7%	34.4%	32.7%	29.6%	22.6%	14.7%	5.6%
Total Commuter		143,430	146,479	147,134	170,099	188,089	207,649	229,522	60.4%	60.3%	59.5%	59.1%	57.7%	56.7%	55.6%
Total Aircraft		237,600	242,992	247,435	287,728	325,907	366,356	413,029	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: 1) 2011, 2012, and 2013 are based on scheduled operations.
2) Totals may not sum due to rounding.

Sources: *Official Airline Guide*; Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

Table 5-5
INTERNATIONAL PASSENGER FLEET MIX

Aircraft	Gauge	Departures 2011	2012	2013	2018	2023	2028	2033	Percent of Total 2011	2012	2013	2018	2023	2028	2033
Air Carrier															
Widebody Jet															
346	333	215	215	164	206	252	304	367	1.6%	1.6%	1.2%	1.2%	1.2%	1.2%	1.2%
350	330	0	0	0	418	768	1,237	1,492	0.0%	0.0%	0.0%	2.4%	3.6%	4.9%	5.0%
333	276	999	932	946	1,186	1,452	1,753	2,113	7.4%	6.8%	7.1%	6.8%	6.9%	6.9%	7.0%
332	258	270	367	790	991	1,214	1,465	1,766	2.0%	2.7%	5.9%	5.7%	5.8%	5.8%	5.9%
343	245	11	25	40	50	61	74	89	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%
767	209	1,223	1,209	668	419	257	0	0	9.1%	8.9%	5.0%	2.4%	1.2%	0.0%	0.0%
762	204	0	0	243	305	374	451	544	0.0%	0.0%	1.8%	1.8%	1.8%	1.8%	1.8%
Subtotal		2,718	2,748	2,851	3,575	4,378	5,284	6,371	20.3%	20.1%	21.3%	20.6%	20.7%	20.9%	21.2%
Narrowbody Jet															
752	192	1,453	1,663	1,512	1,500	1,500	1,500	1,500	10.8%	12.2%	11.3%	8.6%	7.1%	5.9%	5.0%
321	182	1,651	1,600	1,904	4,001	5,237	6,633	8,305	12.3%	11.7%	14.2%	23.0%	24.8%	26.3%	27.6%
M83	169	56	74	52	69	84	101	122	0.4%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%
320	165	1,497	1,230	1,433	1,906	2,334	2,817	3,396	11.2%	9.0%	10.7%	11.0%	11.1%	11.2%	11.3%
734	159	288	1,014	720	0	0	0	0	2.1%	7.4%	5.4%	0.0%	0.0%	0.0%	0.0%
733	157	241	27	0	0	0	0	0	1.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
319	160	2,407	1,909	1,834	2,439	2,987	3,605	4,346	17.9%	14.0%	13.7%	14.0%	14.2%	14.3%	14.4%
Subtotal		7,593	7,517	7,455	9,915	12,142	14,656	17,669	56.6%	55.1%	55.7%	57.1%	57.5%	58.0%	58.7%
Total Air Carrier		10,311	10,265	10,306	13,490	16,520	19,940	24,040	76.8%	75.2%	76.9%	77.7%	78.3%	79.0%	79.9%
Commuter															
Large Regional Jet															
E75	84	1,423	1,387	871	1,437	2,017	2,773	3,752	10.6%	10.2%	6.5%	8.3%	9.6%	11.0%	12.5%
CR7	69	280	277	184	304	426	586	793	2.1%	2.0%	1.4%	1.8%	2.0%	2.3%	2.6%
Subtotal		1,703	1,664	1,055	1,741	2,443	3,359	4,545	12.7%	12.2%	7.9%	10.0%	11.6%	13.3%	15.1%
Small Regional Jet															
CRJ	50	1,405	1,715	2,034	2,129	2,136	1,951	1,515	10.5%	12.6%	15.2%	12.3%	10.1%	7.7%	5.0%
Subtotal		1,405	1,715	2,034	2,129	2,136	1,951	1,515	10.5%	12.6%	15.2%	12.3%	10.1%	7.7%	5.0%
Total Commuter		3,108	3,379	3,089	3,870	4,579	5,310	6,060	23.2%	24.8%	23.1%	22.3%	21.7%	21.0%	20.1%
Total Aircraft		13,419	13,644	13,395	17,360	21,099	25,250	30,100	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Notes: 1) 2011, 2012 and 2013 are based on scheduled operations.
2) Totals may not sum due to rounding.

Sources: *Official Airline Guide;* Landrum & Brown Analysis
Y:\CLT\AIRFIELD CAPACITY ENHANCEMENT PLAN\E-L&B WORK PRODUCT\5-FORECAST\4-OPERATIONS FORECAST\[CLT - PASSENGER OPERATIONS FORECAST V3.XLSX]AC-COMMUTER SPLIT

5.6 ALL-CARGO OPERATIONS FORECAST

The air cargo tonnage forecast for the all-cargo operators was used to derive the all-cargo operations forecast, based on assumptions regarding the amount of air cargo tonnage handled per flight.

The tonnage per operation forecast is a function of the type of all-cargo aircraft that are in operation now and are projected to operate in the future at CLT. Historical all-cargo operations by aircraft type were analyzed to better understand the fleet mix for the all-cargo carriers at CLT. Ultimately, these analyses allowed for the projection of all-cargo operations by aircraft type. These aircraft types are assumed to not change over the forecast period (see **Table 5-6, *All Cargo Operations Forecast***). Based on these assumptions, all-cargo operations are expected to increase from an estimated 4,400 operations in 2013 to 7,400 operations in 2033, an average annual growth rate of 2.6 percent.

Table 5-6
ALL CARGO OPERATIONS FORECAST

	Operations					**CAGR**
Aircraft	**2013**	**2018**	**2023**	**2028**	**2033**	**2013-33**
Wide-Body						
A306	35.6%	35.6%	35.6%	35.6%	35.6%	
Narrowbody						
LJ35	24.4%	24.4%	24.4%	24.4%	24.4%	
LJ55	2.2%	2.2%	2.2%	2.2%	2.2%	
Turboprop						
BE58	17.8%	17.8%	17.8%	17.8%	17.8%	
C208	6.7%	6.7%	6.7%	6.7%	6.7%	
C210	8.9%	8.9%	8.9%	8.9%	8.9%	
PA31	4.4%	4.4%	4.4%	4.4%	4.4%	
Tons/Operation	17	17	17	17	17	
Total Operations	4,400	5,030	5,720	6,500	7,400	2.6%

Sources: Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

5.7 CIVIL OPERATIONS FORECAST

Civil activity includes all operations which are not composed of commercial passenger, cargo, or military operations. For purposes of this analysis, the term "civil" includes two types of activity: non-commercial air taxi and general aviation (GA). Air taxi activity typically includes "for hire" aircraft chartered for specific trips on an on-demand basis. Air taxi operations are usually made up of larger GA aircraft, such as large turboprop aircraft and an array of corporate jets. GA activity includes diverse uses that can range from recreational flying, flight training activities, business travel, news reporting, traffic observation, police patrol, emergency medical flights, and even crop dusting.

Civil operations can be subdivided into two major subcategories: "itinerant" and "local" based on FAA classifications. Local operations are defined by the FAA as "operations remaining in the local traffic pattern, simulated instrument approaches at the airport and operations to or from the airport and a practice area within a 20-mile radius of the tower."[8] Itinerant operations are all operations not classified as "local."

Understanding the history and current state of the civil aviation industry can help predict future aviation demand. This section discusses nationwide historical, emerging, and forecast trends in air taxi and GA activity.

5.7.1 Historical National Trends

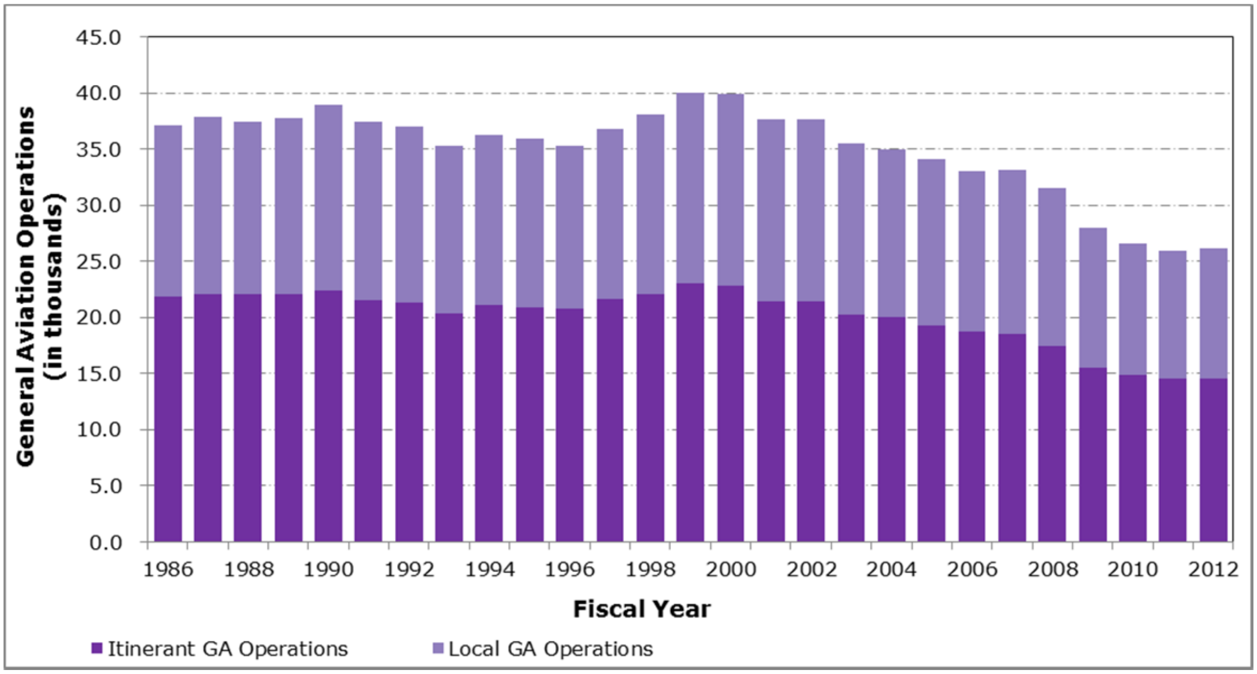
The civil aviation industry in the U.S. has experienced major changes over the last several decades. GA activity levels were at their highest in the late 1970s through 1981. GA operations and new aircraft production reached all-time lows in the early 1990s due to a number of factors including increasing fuel prices, increased product liability stemming from litigation concerns, and the resulting higher cost of new aircraft. The passage of the 1994 GA Revitalization Act (GARA)[9] combined with reduced new aircraft prices, lower fuel prices, resumed production of single-engine aircraft, continued strength in the production and sale of business jets, and a recovered economy led to growth in the GA industry in the latter half of the 1990s (see **Exhibit 5-1, *US. GA Operations***).[10]

The rebound in the U.S. GA industry that began with GARA started to subside by FY 2000. GA traffic at airports with air traffic control service slowed considerably in FY 2001 due largely to a U.S. economic recession and to some extent the terrorist attacks of September 11, 2001. GA traffic at airports with air traffic control service continued to decline through FY 2006 as spikes in fuel costs occurred and the economy grew at a relatively even pace. For the first time since FY 1999, GA traffic at airports with air traffic control service increased in FY 2007, but just slightly

[8] FAA Order 7210.3, Facility Operation and Administration, Section 2, Airport Operations Count
[9] GARA imposes an 18-year statute of repose on product liability lawsuits for general aviation aircraft.
[10] Based on information from the General Aviation Manufacturers Association (GAMA).

(0.2 percent over FY 2006). However, GA operations declined in each subsequent year through FY 2011, primarily as a result of the most recent economic recession coupled with higher oil prices. GA operations ticked up 0.6 percent in FY 2012.[11].

Exhibit 5-1
U.S. GA OPERATIONS



Note: Represents operations at U.S. airports with FAA and Contract Tower Air Traffic Control Service.
Sources: FAA, *Aerospace Forecasts Fiscal Years 2013-2033*; Landrum & Brown analysis.

5.7.2 FAA National Forecast

The FAA publishes activity forecasts for the U.S. aviation industry annually. The FAA projects the following trends in the U.S. GA industry from 2013 to 2033:[12]

- The number of active GA aircraft is forecast to increase by 0.5 percent annually.
- Growth of 1.5 percent annually is expected in the number of GA hours flown.
- The number of student pilots is expected to decline by 0.1 percent per annum through 2033.
- GA operations at airports with air traffic control service are forecast to grow by 0.4 percent annually.
- Business use of GA aircraft will continue to grow more rapidly than recreational use.

[11] FAA, *Aerospace Forecasts Fiscal Years 2013-2033*, Table 32
[12] FAA, *Aerospace Forecasts Fiscal Years 2013-2033.*

5.7.3 Emerging Aircraft Ownership Trends

The concept of purchasing hours of jet time began to emerge in the 1990s as the fractional ownership of business jets started gaining popularity. Fractional ownership, as it suggests, involves purchasing a share of ownership in a GA aircraft. The user also typically pays an hourly usage fee and a monthly management fee. The fractional owner will usually purchase the share from one of several operators that can also offer a variety of jet types that the potential purchaser can consider. Companies such as NetJets, FlexJet, Citation Shares, and others provide these types of services. The fractional ownership concept began with jets but has also begun to expand to all types of aircraft including single-engine piston aircraft. Fractional ownership has significantly contributed to the revitalization of the GA manufacturing industry in the 21st century. For example, NetJets alone has purchased hundreds of corporate jet aircraft of varying sizes ranging up to the Boeing BBJ (typically a derivative of the Boeing 737 aircraft).

5.7.4 Fuel Prices

The aviation industry's activity levels depend heavily on the prices of fuel, especially in the commercial and smaller GA segments. From 2004 through 2008, fuel prices nearly tripled according to data from the International Air Transport Association (IATA). A decline in fuel prices was experienced in 2009, but fuel prices rebounded sharply in 2010 and have since moderated.

Changes in fuel prices impact the economic relationships between modes of transportation and the price differentials between different segments of the aviation market. Although fuel prices are a major problem for the commercial airlines, corporate GA users are a little less sensitive to changes in fuel prices. Given the cost to own and operate a corporate aircraft or to charter a business jet, the incremental cost of fuel is typically a secondary consideration.

According to data from the National Business Aviation Association (NBAA), major fuel providers and charter companies indicate that when fuel prices spike, activity does decline. In a survey of operators conducted by NBAA, the results from across the U.S. showed that when fuel costs increase dramatically the purchase of Jet-A fuel falls between 10 and 20 percent, while the purchase of AvGas drops between 30 and 40 percent. This indicates the relative sensitivity of the private or leisure segment of the GA market versus the corporate GA market.

5.7.5 GA Operations Forecast

There are a number of approaches to developing GA operations forecasts ranging from econometric, trend or time series, and market share forecasts. During the forecast development, no reasonable fit of the GA operations to time or socio-economic variables was found. Nationally, the FAA's *Aerospace Forecasts Fiscal Years 2013-2033* predicts that "Active GA Aircraft" will grow 0.5 percent annually over the forecast period. The FAA also projects the following growth rates by aircraft type:

- Single-engine piston aircraft are expected to slowly decline at an average annual rate of 0.2 percent.
- Multi-engine piston aircraft are expected to decline at an average annual rate of 0.6 percent from 2012 to 2033.
- Turboprops are forecast to grow at a rate of 1.7 percent annually.
- Jet aircraft are expected to be the fastest growing segment with growth of 3.5 percent per year.

These national trends were accounted for in the context of the aircraft fleet that operates at CLT. As such, the single-engine and multi-engine segment are expected to decline over the forecast period, while the jet segment is expected to experience the fastest rate of growth. **Table 5-7, *GA Operations Forecast***, displays the GA operations forecast by aircraft category.

Table 5-7
GA OPERATIONS FORECAST

	Operations					CAGR
Aircraft	**2013**	**2018**	**2023**	**2028**	**2033**	**2012-33**
Turbo Jet C56X, C525, H25B LJ45, C680, C25A C550, GALX, C750	78.8%	79.4%	80.1%	80.7%	82.0%	
Turbo Prop B350, BE9L, BE20 BE10, C208, P28A	6.5%	6.9%	7.3%	7.6%	8.5%	
Piston C182, C172, BE58 C210, BE36, PA24 C421, C206, PA32	11.9%	10.7%	9.7%	8.6%	6.5%	
Helicopter	2.8%	3.0%	3.0%	3.0%	3.0%	
Total Operations	25,426	26,070	26,720	27,390	28,090	0.5%

Sources: ATADS; Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

5.7.6 Air Taxi Forecast

This section summarizes the annual non-commercial air taxi operations forecast for CLT. The non-commercial air taxi category represents operations on chartered aircraft operated by companies who operate under Part 91 (i.e., not certified as an air carrier by the FAA and not covered under Part 121).

The primary assumptions underpinning the air taxi forecast are:

- The air taxi segment is comprised of predominantly turbojet aircraft at CLT being used for business/corporate purposes.
- The air taxi segment is projected to be one of the fastest growing segments in the U.S. by the GA Manufacturers Association and the FAA.
- Based on the *FAA Aerospace Forecast 2013-2033,* air taxi operations, are projected to increase 1.6 percent annually from 2013 and 2032. This growth rate was applied to CLT air taxi operations.

The forecast air taxi operations are shown in **Table 5-8, *Air Taxi Operations Forecast***. Air taxi operations are expected to increase 1.6 percent from 5,070 operations in 2013 to 6,930 operations in 2033.

Table 5-8
AIR TAXI OPERATIONS FORECAST

Calendar Year	Air Taxi Operations
2011	6,492
2012	9,229
2013	5,070
2018	5,330
2023	5,700
2028	6,230
2033	6,930
CAGR	
2011-13	-11.6%
2013-33	1.6%

Sources: FAA *Aerospace Forecast 2013-2033*; FAA ATADS; Landrum & Brown Analysis
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5.8 MILITARY OPERATIONS FORECAST

Military operations are aircraft operations by military and other governmental units, primarily the North Carolina Air National Guard. Historically, military operations at CLT have made up less than one percent of total aircraft operations ranging from 1,702 to 2,056 in the 2006 to 2012 period. In 2013, military operations dropped to 1,392 due to sequestration budget cuts and extended deployments to other locations. Military operations were held flat over the forecast period and equal to the 2013 operations volume. Historical and forecast military operations are shown in **Table 5-9, *Military Operations Forecast*.**

Table 5-9
MILITARY OPERATIONS FORECAST

Calendar Year	Military Operations
2006	2,042
2007	1,713
2008	1,802
2009	1,867
2010	1,741
2011	1,909
2012	1,702
2013	1,392
2018	1,400
2023	1,400
2028	1,400
2033	1,400
CAGR	
2002-13	-14.6%
2013-33	0.0%

Note: Historical figures are from FAA, ATADS.
Sources: FAA ATADS; Landrum & Brown Analysis
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5.9 TOTAL AIRCRAFT OPERATIONS FORECAST

Table 5-10, *Total Aircraft Operations Forecast*, displays the total operations forecast for CLT. Total operations at the Airport are expected to grow at an average rate of 2.6 percent annually over the forecast period, increasing from 557,948 operations in 2013 to 930,080 operations in 2033.

Table 5-10
TOTAL AIRCRAFT OPERATIONS FORECAST

Calendar Year	Commerical Passenger	Freighter	Air Taxi	Total Commercial	General Aviation	Military	Total
2011	502,038	5,272	6,492	513,802	24,131	1,909	539,842
2012	513,272	4,490	9,229	526,991	23,400	1,702	552,093
2013	521,660	4,400	5,070	531,130	25,426	1,392	557,948
2014	542,880	4,540	5,100	552,520	25,550	1,400	579,470
2015	563,120	4,660	5,140	572,920	25,680	1,400	600,000
2016	579,260	4,780	5,190	589,230	25,810	1,400	616,440
2017	594,800	4,900	5,260	604,960	25,940	1,400	632,300
2018	610,180	5,030	5,330	620,540	26,070	1,400	648,010
2019	628,460	5,160	5,400	639,020	26,200	1,400	666,620
2020	647,540	5,290	5,470	658,300	26,330	1,400	686,030
2021	666,840	5,430	5,540	677,810	26,460	1,400	705,670
2022	686,560	5,570	5,620	697,750	26,590	1,400	725,740
2023	694,020	5,720	5,700	705,440	26,720	1,400	733,560
2024	711,260	5,870	5,790	722,920	26,850	1,400	751,170
2025	728,820	6,020	5,890	740,730	26,980	1,400	769,110
2026	746,560	6,170	5,990	758,720	27,110	1,400	787,230
2027	764,700	6,330	6,110	777,140	27,250	1,400	805,790
2028	783,220	6,500	6,230	795,950	27,390	1,400	824,740
2029	803,660	6,670	6,350	816,680	27,530	1,400	845,610
2030	824,560	6,850	6,480	837,890	27,670	1,400	866,960
2031	845,720	7,030	6,620	859,370	27,810	1,400	888,580
2032	867,360	7,210	6,770	881,340	27,950	1,400	910,690
2033	886,260	7,400	6,930	900,590	28,090	1,400	930,080
CAGR							
2011-13	1.9%	-8.6%	-11.6%	1.7%	2.6%	-14.6%	1.7%
2013-33	2.7%	2.6%	1.6%	2.7%	0.5%	0.0%	2.6%

Sources: FAA ATADS; Landrum & Brown Analysis
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6. PEAK PERIOD FORECASTS

The traffic demand patterns imposed upon an airport are subject to seasonal, monthly, daily, and hourly variations. Peaking characteristics are critical in the assessment of existing facilities and airfield components to determine their ability to accommodate forecast increases in passenger and operational activity throughout the forecast period. The objective of developing peak period forecasts is to provide a design level that allows for sizing facilities so they are neither underutilized nor overcrowded too often.

The annual passenger and operations forecasts for CLT were converted into peak month, daily, and peak hour equivalents. The peak period passenger forecasts were developed for domestic, international, and total passenger segments. The peak period operations forecasts were developed for domestic passenger, international passenger, air cargo, general aviation, military, and total operations.

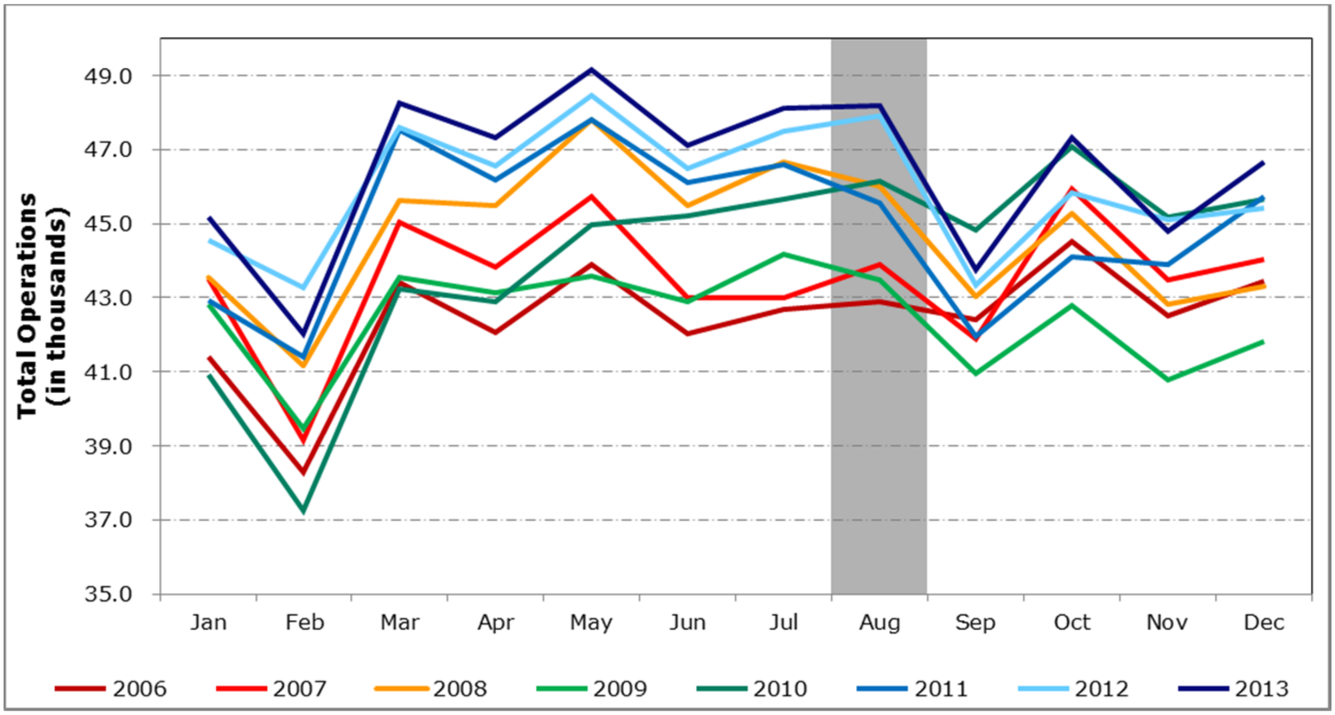
6.1 PEAK PERIOD OPERATIONS FORECAST

Peak period operations factors were developed using FAA, ATADS; FAA, Enhanced Traffic Management System Counts (ETMSC); U.S. DOT, Schedule T-100 data; passenger airline schedules published in the OAG; and noise monitoring data. Based on FAA ATADS data and OAG, May was the peak month for total operations for nearly every year since 2006 (See **Exhibit 6-1, *Monthly Historical Total Operations***). However, for purposes of the Airfield Capacity Enhancement Plan, a design day based on operations after the closure of Runway 5-23 is preferred. Consequently, August 2013 (typically the second busiest month) was used as the basis for developing peak period forecasts for domestic passenger, international passenger, general aviation, cargo, and total operations.

For the daily forecasts, it was assumed that an average weekday in the peak month was a reasonable planning parameter for domestic passenger, international passenger, and general aviation movements due to the reduced demand during the weekends. For the purposes of developing daily operations forecasts, it was assumed that the share of daily traffic as a percent of the peak month would remain constant over the forecast period.

The peak hour operations forecasts were developed for each key activity segment to allow for specific facility evaluation as domestic passenger, international passenger, cargo, and general aviation activity operate from different areas of the Airport. However, it should be noted that the individual peak hours cannot be aggregated to derive a total peak hour as they occur at different times of day. The base year 2013 peak hour operations were developed based on OAG and Airport provided data.

Exhibit 6-1
MONTHLY HISTORICAL TOTAL OPERATIONS



Sources: FAA ATADS; Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\4-Operations Forecast\[CLT - Passenger Operations Forecast v3.xlsx]AC-Commuter Split

6.1.1 Passenger Operations

Based on Airport data and OAG fillings, August passenger operations represented 8.6 percent of annual passenger operations in 2013. Daily OAG data for the month of August was analyzed to select the average weekday. Based on this data, August 16th, 2013 was selected to develop peak hourly factors. As a result, design day passenger operations were estimated to account for 3.4 percent of the monthly passenger activity in 2013.

Based on a rolling-60 minute analysis, domestic peak hour operations as a percent of a busy weekday was 7.7 percent in 2013. Peak hour domestic passenger operations are expected to increase from 109 in 2013 to 207 in 2033. International peak hour operations as a percent of a busy day were 17.1 percent in 2013. Peak hour international passenger operations are expected to increase from 14 in 2013 to 36 in 2033. As a result of the domestic and international peak analysis, total passenger peak hour operations as a percent of a busy day are 8.6 percent. Peak hour total passenger operations are expected to increase from 114 in 2013 to 221 in 2033.

6.1.2 Cargo Operations

Based on the Airport's 2013 monthly Traffic Reports, August cargo operations represented 8.3 percent of annual cargo operations in 2013. Due to variations in the daily levels of activity during the month, it was assumed that cargo operations occur over five and a half of the seven days in the week. As a result, design day cargo operations were estimated to account for 4.2 percent of the monthly cargo activity in 2013. It was estimated that the cargo peak hour operations as a percent of a busy day is 32.6 percent. The cargo monthly, daily, and hourly factors are not expected to change materially during the planning horizon.

6.1.3 General Aviation Operations

Based on FAA ATADS data, August general aviation operations represented 8.0 percent of annual general aviation operations in 2013. Due to variations in the daily levels of activity during the month, an average daily factor was used to evaluate the design day operations. As a result, design day general aviation were estimated to account for 3.2 percent of the monthly activity in 2013. Peak hour activity is expected to increase from nine in 2013 to 10 in 2033, primarily due to the increase expected in air taxi operations.

6.1.4 Air Taxi Operations

Based on FAA ATADS data, August air taxi operations represented 8.3 percent of annual general aviation operations in 2013. Due to variations in the daily levels of activity during the month, an average daily factor was used to evaluate the design day operations. As a result, design day air taxi operations were estimated to account for 3.2 percent of the monthly activity in 2013. Peak hour activity is expected to increase from seven in 2013 to 10 in 2033.

6.1.5 Military Operations

Based on FAA ATADS data, August military operations represented 8.6 percent of annual military operations in 2013. Due to variations in the daily levels of military activity during the month, an average daily factor was used to evaluate the design day military operations. As a result, design day military operations were estimated to account for 3.4 percent of the monthly military activity in 2013. Design day military peak hour operations were estimated to account for 50.0 percent of a busy day of military activity. These factors will remain unchanged through 2033.

6.1.6 Peak Period Summary

The annual, monthly, daily, and hourly peak operations forecasts are presented in **Table 6-1, *Peak Period Operations Forecast***. The total operations peak hour will grow from 121 operations in 2013 to 229 operations in 2033, mainly driven by the domestic passenger operations peak. The cargo operations peak hour will increase from five movements in 2013 to nine in 2033. General aviation operations are expected increase from nine operations in the peak hour in 2013 to 10 by 2033. Air taxi operations are expected increase from seven operations in the peak hour in 2013 to 10 by 2033. Military peak hour operations will remain at two through 2033.

It is worth noting that the peak hour for individual categories of aircraft operations are not necessarily in the same hour. As a result, the peak hour operations for the various categories of operations cannot be aggregated to derive a total peak.

Table 6-1
PEAK PERIOD OPERATIONS FORECAST

Segment	2013	2018	2023	2028	2033	CAGR 2013-33
Domestic Passenger						
Annual	494,870	575,460	651,820	732,720	826,060	2.6%
Peak Month	42,126	49,200	55,720	62,640	70,620	2.6%
Design Day	1,420	1,658	1,878	2,111	2,380	2.6%
Peak Hour	109	127	144	162	182	2.6%
Peak Month % of Annual	8.5%	8.5%	8.5%	8.5%	8.5%	
Daily as % of Month	3.4%	3.4%	3.4%	3.4%	3.4%	
Peak Hour as % of Daily	7.7%	7.7%	7.7%	7.7%	7.7%	
International Passenger						
Annual	26,790	34,720	42,200	50,500	60,200	4.1%
Peak Month	2,551	3,240	3,940	4,710	5,610	4.0%
Design Day	82	104	127	151	180	4.0%
Peak Hour	14	17	21	25	30	3.9%
Peak Month % of Annual	9.5%	9.5%	9.5%	9.5%	9.5%	
Daily as % of Month	3.2%	3.2%	3.2%	3.2%	3.2%	
Peak Hour as % of Daily	17.1%	17.1%	17.1%	17.1%	17.1%	
Total Passenger						
Annual	521,660	610,180	694,020	783,220	886,260	2.7%
Peak Month	44,677	52,440	59,660	67,350	76,230	2.7%
Design Day	1,502	1,762	2,005	2,262	2,560	2.7%
Peak Hour	114	134	152	172	194	2.7%
Peak Month % of Annual	8.6%	8.6%	8.6%	8.6%	8.6%	
Daily as % of Month	3.4%	3.4%	3.4%	3.4%	3.4%	
Peak Hour as % of Daily	7.6%	7.6%	7.6%	7.6%	7.6%	
Cargo						
Annual	4,400	5,030	5,720	6,500	7,400	2.6%
Peak Month	367	420	480	540	620	2.7%
Design Day	15	18	20	23	26	2.7%
Peak Hour	5	6	7	8	9	3.0%
Peak Month % of Annual	8.3%	8.3%	8.3%	8.3%	8.3%	
Daily as % of Month	4.2%	4.2%	4.2%	4.2%	4.2%	
Peak Hour as % of Daily	32.5%	32.5%	32.5%	32.5%	32.5%	

Table 6-1, *Continued*
PEAK PERIOD OPERATIONS FORECAST

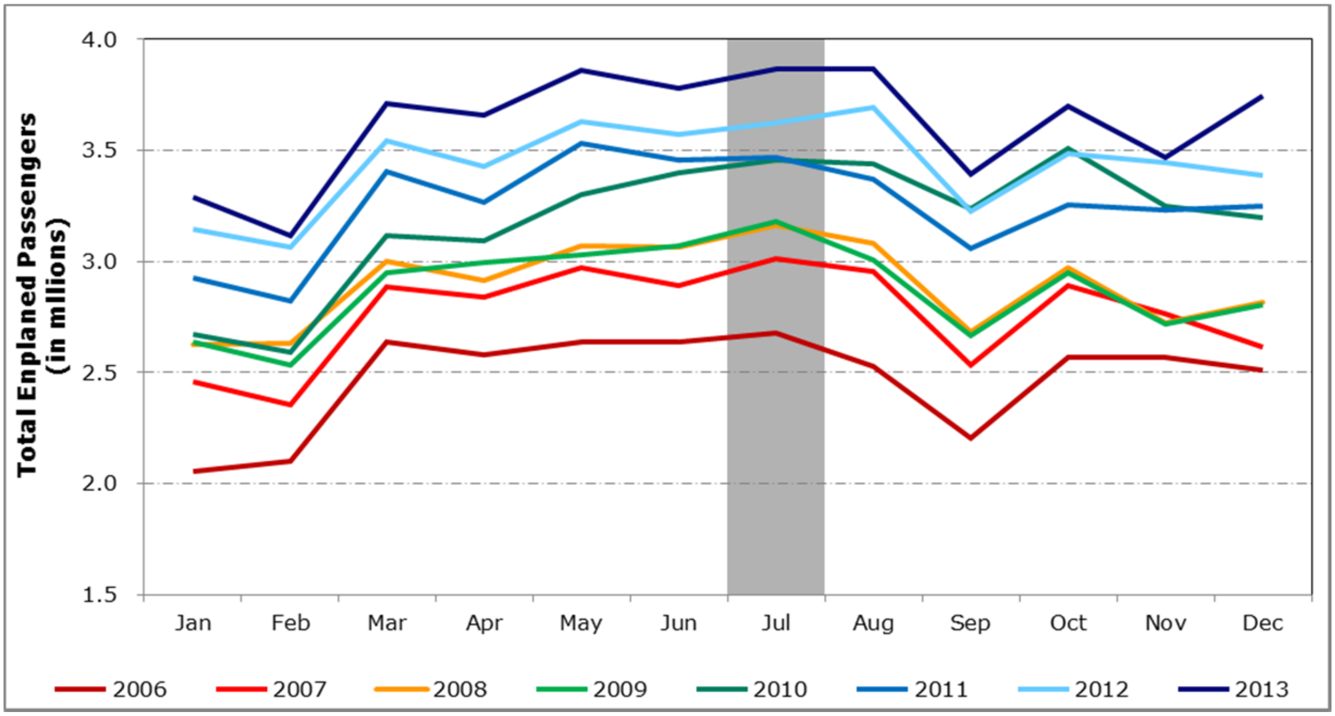
Segment	2013	2018	2023	2028	2033	CAGR 2013-33
General Aviation						
Annual	25,426	26,070	26,720	27,390	28,090	0.5%
Peak Month	2,014	2,130	2,180	2,230	2,290	0.6%
Design Day	64	68	69	71	73	0.7%
Peak Hour	9	10	10	10	10	0.5%
Peak Month % of Annual	7.9%	7.9%	7.9%	7.9%	7.9%	
Daily as % of Month	3.2%	3.2%	3.2%	3.2%	3.2%	
Peak Hour as % of Daily	14.1%	14.1%	14.1%	14.1%	14.1%	
Non-Commerical Air Taxi						
Annual	5,070	5,330	5,700	6,230	6,930	1.6%
Peak Month	423	440	480	520	580	1.6%
Design Day	25	26	28	31	34	1.5%
Peak Hour	7	7	8	9	10	1.8%
Peak Month % of Annual	8.3%	8.3%	8.3%	8.3%	8.3%	
Daily as % of Month	5.9%	5.9%	5.9%	5.9%	5.9%	
Peak Hour as % of Daily	28.0%	28.0%	28.0%	28.0%	28.0%	
Military						
Annual	1,392	1,400	1,400	1,400	1,400	0.0%
Peak Month	118	120	120	120	120	0.1%
Design Day	4	4	4	4	4	0.0%
Peak Hour	2	2	2	2	2	0.0%
Peak Month % of Annual	8.5%	8.5%	8.5%	8.5%	8.5%	
Daily as % of Month	3.4%	3.4%	3.4%	3.4%	3.4%	
Peak Hour as % of Daily	50.0%	50.0%	50.0%	50.0%	50.0%	
Total Operations						
Annual	557,948	648,010	733,560	824,740	930,080	2.6%
Peak Month	47,598	55,550	62,920	70,760	79,840	2.6%
Design Day	1,610	1,878	2,126	2,391	2,697	2.6%
Peak Hour	121	141	159	179	202	2.6%
Peak Month % of Annual	8.5%	8.5%	8.5%	8.5%	8.5%	
Daily as % of Month	3.4%	3.4%	3.4%	3.4%	3.4%	
Peak Hour as % of Daily	7.5%	7.5%	7.5%	7.5%	7.5%	

Sources: *Official Airline Guide,* FAA ATADS, Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 6-3

6.2 PEAK PERIOD PASSENGER FORECASTS

The peak period passenger forecasts are designed to be representative of an average (or typical day) in the peak month for the base year and each of the forecast horizons. Actual monthly passenger enplanements from the Airport were collected to derive peak month forecasts. In 2013, August accounted for 9.0 percent of annual enplanements (see **Exhibit 6-2, *Monthly Historical Enplanements***).

Exhibit 6-2
MONTHLY HISTORICAL ENPLANEMENTS



Source: CLT Monthly Traffic Reports 2012
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 6-1

OAG scheduled seats data was used to determine the passenger peaking patterns at CLT. OAG seat data was used as a proxy for passengers because historical passenger data was not available in the level of detail needed for this analysis. The seats peaking factors were used to develop the peak month, peak month average day (PMAD), and peak hour passenger forecasts. For purposes of developing monthly passenger forecasts, it was assumed that the relationship between annual and monthly traffic would remain largely unchanged.

The peak month forecasts were converted to average daily forecasts by multiplying by the percent of seats in the design day for the month of August. For purposes of developing daily passenger forecasts, it was assumed that the share of daily traffic as a percent of the peak month would remain constant over the forecast period.

The peak hour passenger factors were estimated and derived from the flight schedules published in the OAG. The flight schedules provide an indication of how airlines allocate their flights and seats by time of day. This allows peak periods to be identified. The distribution of seats across the day serves as a reasonable proxy for passenger flows. Load factors for each segment (domestic and international) by airline were developed using data from T100. The load factors were then multiplied by the number of seats for each of the aircraft in the design day. The result was a baseline peak hour passenger total for CLT.

The annual, monthly, daily, and hourly peak passenger forecasts are presented in **Table 6-2, *Peak Period Passenger Forecast***. Peak hour enplanements, which were at 10,377 for the 2013 design day, are projected to increase to 20,340 by 2033.

Table 6-2
PEAK PERIOD PASSENGER FORECAST

Segment	2013	2018	2023	2028	2033	CAGR 2013-33
Domestic Passengers						
Annual	40,639,778	48,436,000	56,964,000	66,820,000	78,200,800	3.3%
Peak Month	3,571,285	4,266,300	5,017,460	5,885,590	6,888,020	3.3%
Design Day	114,655	136,970	161,080	188,960	221,140	3.3%
Peak Hour	9,423	11,256	13,238	15,529	18,174	3.3%
Peak Month % of Annual	8.8%	8.8%	8.8%	8.8%	8.8%	
Daily as % of Month	3.2%	3.2%	3.2%	3.2%	3.2%	
Peak Hour as % of Daily	8.2%	8.2%	8.2%	8.2%	8.2%	
International Passengers						
Annual	2,817,693	3,849,600	4,869,600	6,078,000	7,530,200	5.0%
Peak Month	294,538	404,210	511,310	638,190	790,670	5.1%
Design Day	9,775	13,410	16,970	21,180	26,240	5.1%
Peak Hour	1,657	2,273	2,876	3,590	4,448	5.1%
Peak Month % of Annual	10.5%	10.5%	10.5%	10.5%	10.5%	
Daily as % of Month	3.3%	3.3%	3.3%	3.3%	3.3%	
Peak Hour as % of Daily	17.0%	17.0%	17.0%	17.0%	17.0%	
Total Passengers						
Annual	43,457,471	52,285,600	61,833,600	72,898,000	85,731,000	3.5%
Peak Month	3,865,823	4,637,210	5,484,030	6,465,330	7,603,490	3.4%
Design Day	124,430	150,380	178,050	210,140	247,380	3.5%
Peak Hour	10,377	12,541	14,848	17,354	20,630	3.5%
Peak Month % of Annual	8.9%	8.9%	8.9%	8.9%	8.9%	
Daily as % of Month	3.2%	3.2%	3.2%	3.2%	3.3%	
Peak Hour as % of Daily	8.3%	8.3%	8.3%	8.3%	8.3%	

Sources: CLT Year End and Monthly Traffic Reports; *Official Airline Guide*, Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 6-3

7. COMPARISON OF FORECAST TO 2013 TAF

The FAA publishes its own forecasts annually for each U.S. airport including CLT. The Terminal Area Forecast (TAF) is "prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public."[13] If the Sponsor forecast will be used for FAA decision making (i.e., LOIs, BCAs, ALPs, or environmental approvals), the FAA requires that Sponsor enplanement and operations forecasts be compared with the most current TAF. If the Sponsor forecast deviates by more than 10 percent from the TAF in the 5-year time period or by more than 15 percent in the 10-year time period, differences have to be resolved before proceeding.

The TAF is prepared on a federal fiscal year (FFY) basis (October to September). The ACEP forecast was developed on a calendar year (CY) basis. When an airport's traffic is growing rapidly, a timing difference between the FFY base year and the CY base year can be significant. This timing difference distorts a straight future year comparison between the two forecasts. The true comparison that needs to be made is between the projected growth rate of the TAF and the projected growth rate of the Sponsor forecast.

A summary comparison of passenger enplanements, commercial operations, and total operations to the TAF is displayed in **Table 7-1, *FAA TAF Forecast Comparison***. The ACEP forecast values are also shown adjusted to the FFY base. The variance is calculated between the adjusted ACEP forecast and the 2013 TAF. **Table 7-2, FAA TAF Forecast Comparison - Appendix B** and **Table 7-3, FAA TAF Forecast Comparison - Appendix C** provide a more detailed comparison of the passenger enplanements, commercial operations, and total operations to the TAF.

[13] http://aspm.faa.gov/main/taf.asp

Table 7-1
FAA TAF FORECAST COMPARISON

	Forecast Year	ACEP Forecast	ACEP Forecast adjusted for FFY	2013 TAF	% Variance ACEP Adjusted Forecast vs 2013 TAF
Passenger Enplanements					
Base Year	2013	21,707,189	20,850,813	20,850,813	0.0%
Base Year + 1 Year	2014	22,635,900	21,742,885	21,522,162	1.0%
Base Year + 5 Years	2018	26,142,800	25,111,433	23,714,223	**5.9%**
Base Year + 10 Years	2023	30,916,800	29,697,093	26,213,210	**13.3%**
Base Year + 15 Years	2028	36,449,000	35,011,041	28,725,917	21.9%
Compound Annual Growth Rates					
2013-18		3.8%	3.8%	2.6%	
2014-18		3.7%	3.7%	2.5%	
2018-23		3.4%	3.4%	2.0%	
2023-28		3.3%	3.3%	1.8%	
Commercial Operations					
Base Year	2013	531,130	529,346	529,346	0.0%
Base Year + 1 Year	2014	552,520	550,664	534,844	3.0%
Base Year + 5 Years	2018	620,540	618,456	586,162	**5.5%**
Base Year + 10 Years	2023	705,440	703,071	648,534	**8.4%**
Base Year + 15 Years	2028	795,950	793,277	721,370	10.0%
Compound Annual Growth Rates					
2013-18		3.2%	3.2%	2.1%	
2014-18		2.9%	2.9%	2.3%	
2018-23		2.6%	2.6%	2.0%	
2023-28		2.4%	2.4%	2.2%	
Total Operations					
Base Year	2013	557,948	555,491	555,491	0.0%
Base Year + 1 Year	2014	579,470	576,918	562,231	2.6%
Base Year + 5 Years	2018	648,010	645,156	613,757	**5.1%**
Base Year + 10 Years	2023	733,560	730,330	676,389	**8.0%**
Base Year + 15 Years	2028	824,740	821,108	749,489	9.6%
Compound Annual Growth Rates					
2013-18		3.0%	3.0%	2.0%	
2014-18		2.8%	2.8%	2.2%	
2018-23		2.5%	2.5%	2.0%	
2023-28		2.4%	2.4%	2.1%	

Note: ACEP Forecast is presented for calendar years. TAF is presented for federal fiscal years.

Sources: FAA and Landrum & Brown Analysis

Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Table 7-1

Table 7-2
FAA TAF FORECAST COMPARISON – APPENDIX B

A. Forecast Levels and Growth Rates

	2013 Base Yr. Level	2014 Base Yr.+1yr.	2018 Base Yr.+5yrs.	2023 Base Yr.+10yrs.	2028 Base Yr.+15yrs.	Average Annual Compound Growth Rates Base Yr. to +1	Base Yr. to +5	Base Yr. to +10	Base Yr. to +15
Passenger Enplanements									
Air carrier	14,569,993	15,153,109	17,739,043	21,303,155	25,155,865	4.0%	4.0%	3.9%	3.7%
Commuter	7,137,197	7,482,791	8,403,757	9,613,645	11,293,135	4.8%	3.3%	3.0%	3.1%
TOTAL	21,707,189	22,635,900	26,142,800	30,916,800	36,449,000	4.3%	3.8%	3.6%	3.5%
Operations									
Itinerant									
Air carrier	223,951	231,664	265,369	312,239	361,344	3.4%	3.5%	3.4%	3.2%
Commuter/air taxi	307,179	320,856	355,171	393,201	434,606	4.5%	2.9%	2.5%	2.3%
Total Commercial Operations	531,130	552,520	620,540	705,440	795,950	4.0%	3.2%	2.9%	2.7%
General aviation	25,426	25,550	26,070	26,720	27,390	0.5%	0.5%	0.5%	0.5%
Military	1,392	1,400	1,400	1,400	1,400	0.6%	0.1%	0.1%	0.0%
Local									
General aviation	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Military	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
TOTAL OPERATIONS	557,948	579,470	648,010	733,560	824,740	3.9%	3.0%	2.8%	2.6%
Instrument Operations									
Peak Hour Operations	121	126	141	159	179	4.1%	3.1%	2.8%	2.6%
Cargo/mail (enplaned + deplaned tonnes)	129,800	130,500	144,600	164,300	186,800	0.5%	2.2%	2.4%	2.5%
Based Aircraft									
Single Engine (Nonjet)									
Multi Engine (Nonjet)									
Jet Engine									
Helicopter									
Other									
TOTAL									

B. Operational Factors

	2013 Base Yr. Level	2014 Base Yr.+1yr.	2018 Base Yr.+5yrs.	2023 Base Yr.+10yrs.	2028 Base Yr.+15yrs.
Average aircraft size (seats)					
Air carrier	152.5	153.6	158.0	161.0	164.0
Commuter	61.1	61.3	62.0	64.0	68.0
Average enplaning load factor					
Air carrier	86.9%	86.7%	86.0%	86.0%	86.0%
Commuter	77.9%	77.9%	78.0%	78.0%	78.0%
GA operations per based aircraft					

Sources: FAA TAF, Landrum & Brown Analysis
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Table 7-3
FAA TAF FORECAST COMPARISON – APPENDIX C

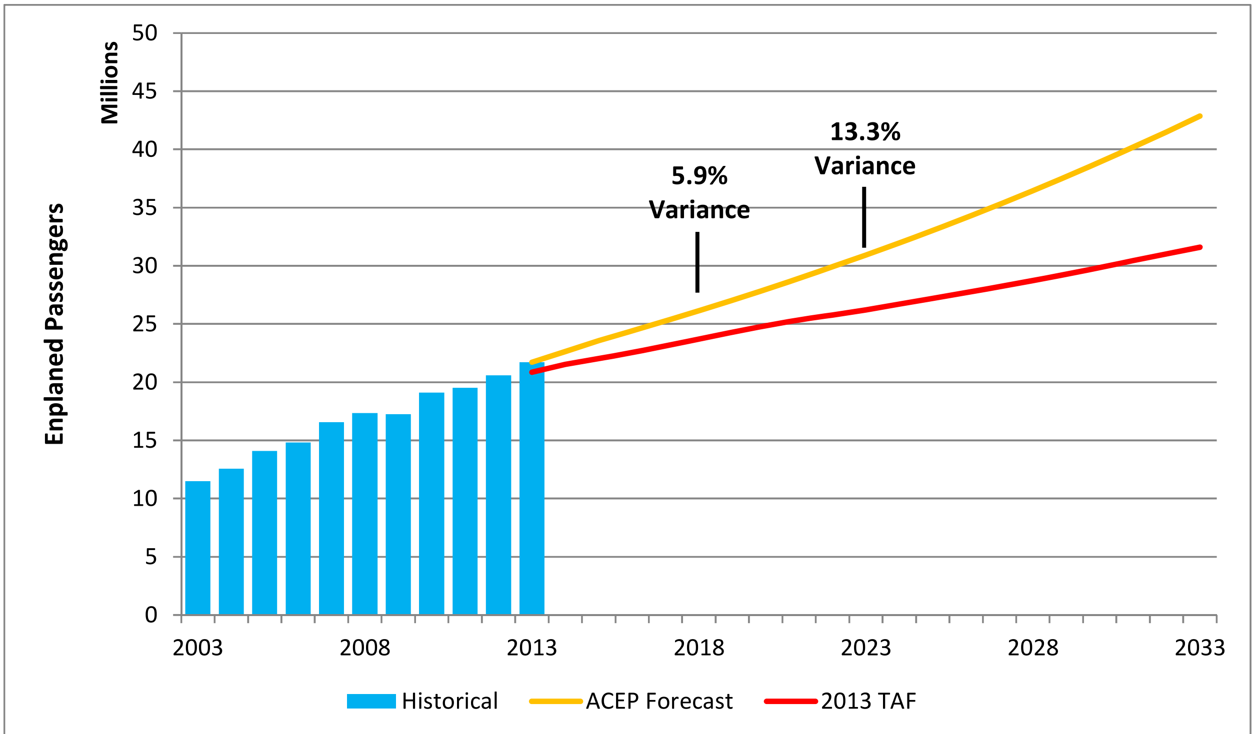
	Year	CY Sponsor Forecast	FFY 2013 TAF	Variance (% Difference)
Passenger Enplanements				
Base yr.	2013	21,707,189	20,850,813	4.1%
Base yr. + 5yrs.	2018	26,142,800	23,714,223	10.2%
Base yr. + 10yrs.	2023	30,916,800	26,213,210	17.9%
Base yr. + 15yrs.	2028	36,449,000	28,725,917	26.9%
Commercial Operations /1				
Base yr.	2013	531,130	529,346	0.3%
Base yr. + 5yrs.	2018	620,540	586,162	5.9%
Base yr. + 10yrs.	2023	705,440	648,534	8.8%
Base yr. + 15yrs.	2028	795,950	721,370	10.3%
Total Operations				
Base yr.	2013	557,948	555,491	0.4%
Base yr. + 5yrs.	2018	648,010	613,757	5.6%
Base yr. + 10yrs.	2023	733,560	676,389	8.5%
Base yr. + 15yrs.	2028	824,740	749,489	10.0%

Sources: FAA TAF, Landrum & Brown Analysis
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\1-Source Data\FAA\TAF\[FAA TAF Comp Templates.xlsx]Appendix B

7.1 ENPLANED PASSENGER FORECAST COMPARISON TO TAF

The variance analysis shown in **Exhibit 7-1, *Enplanement Forecast Comparison to TAF***, provides a comparison of the enplaned passenger forecast developed for this study to the FAA's 2013 TAF for CLT. The 2013 TAF for CLT projects 2.2 percent average annual growth for enplanements between 2013 and 2033, compared with 3.5 percent average annual growth in the CLT ACEP forecast. After adjusting the ACEP forecast to the FFY base, the enplanement forecast is within 10 percent at five years and within 15 percent at 10 years.

Exhibit 7-1
ENPLANEMENT FORECAST COMPARISON TO TAF

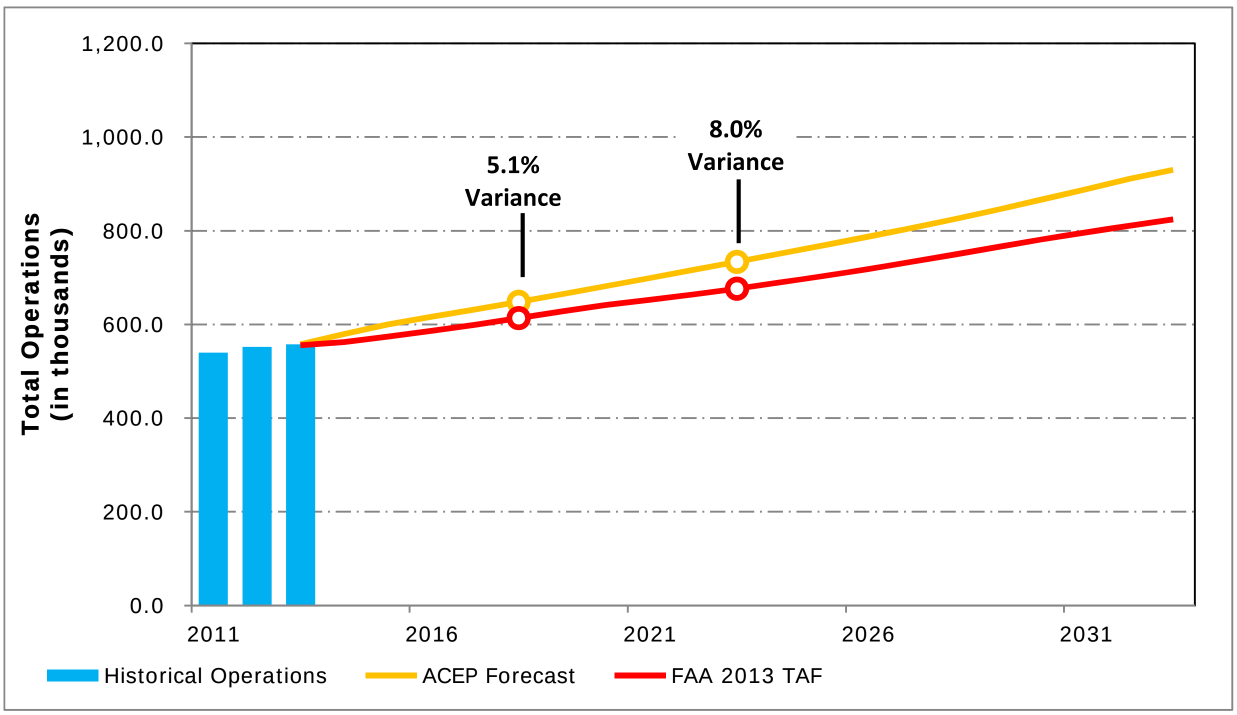


Sources: FAA, Landrum & Brown
Y:\CLT\Airfield Capacity Enhancement Plan\E-L&B Work Product\5-Forecast\7-Document\[Tables for Document.xlsx]Exhibit 7-1

7.2 OPERATIONS PASSENGER FORECAST COMPARISON TO TAF

The variance analysis shown in **Exhibit 7-2, *Operations Forecast Comparison to TAF***, provides a comparison of the enplaned operations forecast developed for this study to the FAA's 2013 TAF for CLT. The 2013 TAF for CLT projects 1.9 percent average annual growth for enplanements between 2013 and 2033, compared with 2.6 percent average annual growth in the CLT ACEP forecast. After adjusting the ACEP forecast to the FFY base, the operations forecast is within 10 percent at five years and within 15 percent at 10 years.

Exhibit 7-2
OPERATIONS FORECAST COMPARISON TO TAF



Sources: FAA, Landrum & Brown
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U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd, Suite 2250
Memphis, Tennessee 38118

Phone: 901-322-8180

April 2, 2014

Ms. Kathy Dennis, AICP
Airport Planner
Charlotte Douglas International Airport
5601 Wilkinson Blvd.
Charlotte, NC 28208

Forecast of Aviation Demand
Airfield Capacity Enhancement Plan
Charlotte Douglas International Airport (CLT)

Dear Ms. Dennis:

We have reviewed the draft copy of the Forecast of Aviation Demand transmitted to us on March 25, 2014. The forecast data was reviewed by the Federal Aviation Administration (FAA) Memphis Airports District Office and we find it consistent with the 2013 FAA Terminal Area Forecast (TAF). Based on this finding the Forecast of Aviation Demand is approved for use. Should you have any questions, please contact Tim Hester at (901) 322-8187.

Sincerely,

Tim Hester

Tim Hester
Community Planner

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Appendix G

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APPENDIX G
SUPPLEMENTAL GRID POINT ANALYSIS

This Appendix provides maps and output grid reports detailing the results of a supplemental grid point analysis that was conducted for this Noise Exposure Map (NEM) Update. The Integrated Noise Model (INM) was used to calculate noise levels at specific grid points in the vicinity of the Charlotte Douglas International Airport (CLT) using the following noise metrics:

- Day-Night Average Sound Level (DNL),
- Sound Exposure Level (SEL),
- Maximum Level (LMAX), and
- Time Above Level-65 (TA65) decibels (dB) reported in minutes and seconds (MM:SS)

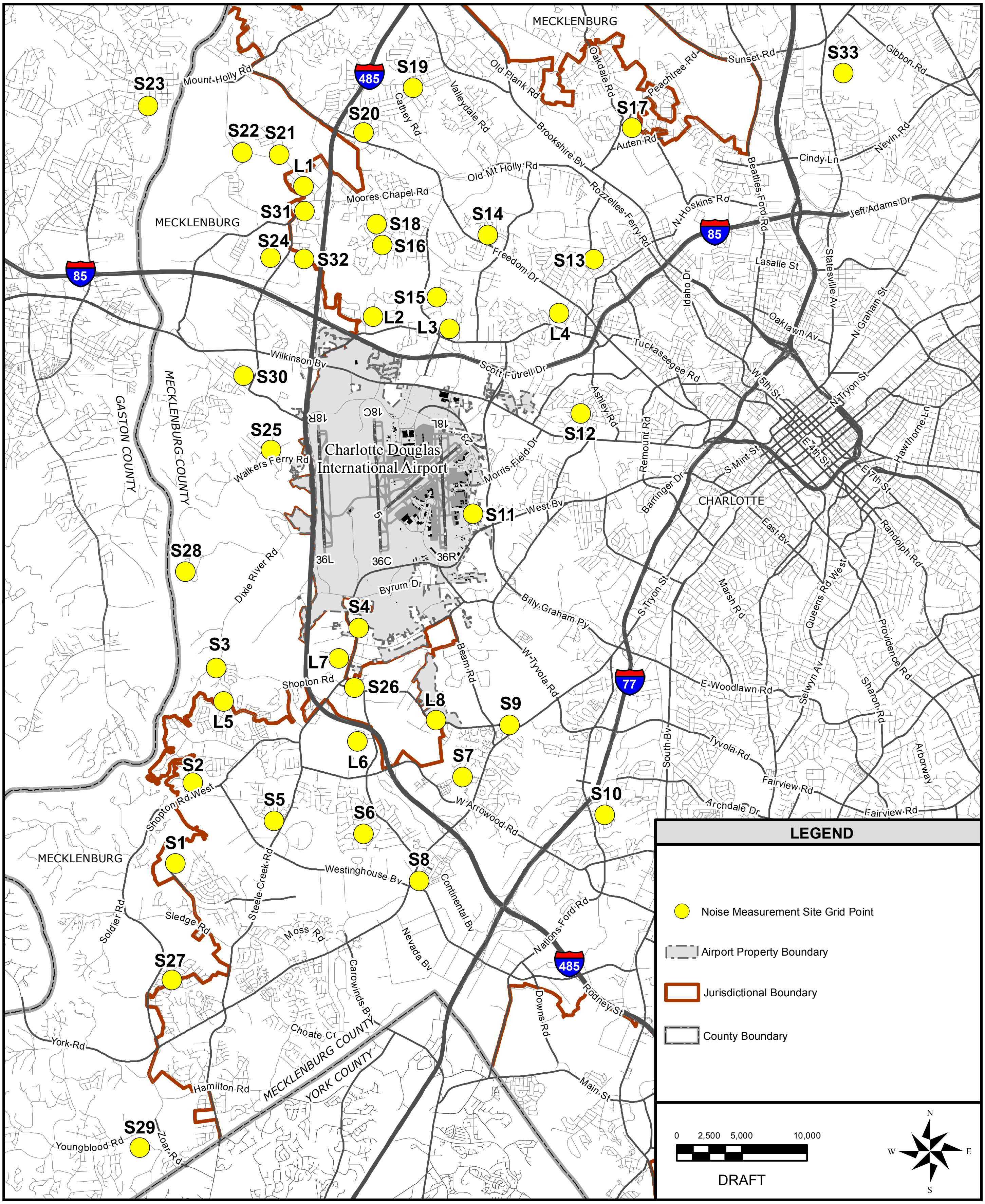
Grid point locations were created in the INM at the noise measurement program sites described in Appendix B, and at regularly spaced grid points. The area of coverage for the regularly spaced grid points was based on comments received from the public during the conduct of the NEM Update. **Exhibit G-1** shows the locations of the noise measurement program grid points. **Table G-1** provides a key for the noise measurement program grid point locations. **Table G-2** provides the location of each regularly spaced grid point, which are shown on **Exhibit G-2**. The regularly-spaced grid points (RSG) are identified by their column letter A through N and their row number 1-23 so that the grid in the northeast corner is identified by the Grid ID RSG-N-23. Note that several of the regularly-spaced grid points are within airport property. **Table G-3** provides the noise levels at each noise-sensitive facility for the Existing (2015) Noise Contour and the Future (2020) Noise Contour. **Table G-4** provides the noise levels at each regularly spaced grid point for the Existing (2015) NEM and the Future (2020) NEM.

The noise levels at each of the grid points are reported using the DNL, LMAX, SEL and TA65 metrics. More information about these metrics is included in Appendix C. Note that the SEL and LMAX metrics are always higher than the DNL as the DNL is the average noise for an average annual day. The LMAX represents the instantaneous noise level single highest aircraft noise event. For the SEL metric all sound energy occurring during the event, within 10 dB of the peak level (Lmax), is mathematically integrated over one second. Per FAA guidelines, there are no thresholds of significance for the LMAX and SEL.

The DNL levels for the Future (2020) is higher than the DNL levels from the Existing (2015) Noise Contour due to the forecasted increase in total operations expected to occur by 2020. At most locations, the LMAX and Time Above 65 dB increases from the 2015 to 2020 conditions although at some grid points these values decrease from the 2015 to 2020 conditions. This decrease occurs in locations farther from major flight corridors which are more heavily influenced by a smaller number of operations of loud aircraft. Some older, louder aircraft are forecasted to be phased out by 2020; therefore, the LMAX and TA65 levels decrease at some locations due to this phase-out even though there is a forecasted increase in total operations from 2015 to 2020.

Table G-1
NOISE MEASUREMENT SITES GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LOCATION	LATITUDE	LONGITUDE
LT1	Shady Brook Baptist Church	35.2767	-80.9725
LT2	West Mecklenburg High School	35.2496	-80.9540
LT3	Mulberry Baptist Church	35.2472	-80.9343
LT4	Tuckaseegee Park	35.2510	-80.9062
LT5	Windygap Road near intersection with Hermsley Road	35.1678	-80.9904
LT6	Olympic High School	35.1773	-80.9611
LT7	9220 Snow Ridge Lane	35.1599	-80.9558
LT8	North side of Shopton Road east of Lebanon Drive	35.1647	-80.9358
ST1	Winget Park	35.1334	-81.0020
ST2	River Cabin Lane	35.1505	-80.9980
ST3	Ramoth Zion AME Church - 6600 Dixie River Rd	35.1753	-80.9919
ST4	Cades Cove Drive & Steele Meadow Road	35.1839	-80.9561
ST5	Steele Creek Presbyterian Church	35.1428	-80.9769
ST6	O'Hara Drive & Bonnie Blue Lane	35.1405	-80.9538
ST7	Thornfield Road cul-de-sac	35.1528	-80.9287
ST8	Central Steele Creek Church - 9401 S Tryon St	35.1308	-80.9396
ST9	Steele Creek A.M.E. Zion Church - 1500 Shopton Road	35.1641	-80.9168
ST10	Farmhurst Drive - Treetops Apartments	35.1455	-80.8921
ST11	Airport Dr & Ashley Crescent - Jackson Park Minist	35.2084	-80.9278
ST12	Corbett Street	35.2300	-80.9002
ST13	Hovis Rd & Bradford Dr - Chappell Baptist Church	35.2626	-80.8970
ST14	Eagles Landing Drive	35.2672	-80.9250
ST15	1854 Still Pond Court	35.2539	-80.9377
ST16	7114 Cabe Lane	35.2647	-80.9520
ST17	Peachtree Road and Emmanuel Drive - Church Parking	35.2904	-80.8884
ST18	Dylan Shane Road	35.2690	-80.9536
ST19	Coulwood Drive & Fielding Road	35.2979	-80.9449
ST20	Oak Grove Baptist Church - 9000 Mt Holly Rd	35.2876	-80.9576
ST21	John Chapel Baptist Church - 2239 Belmeade Drive	35.2833	-80.9790
ST22	Whitewater Middle School - 1520 Belmeade Drive	35.2836	-80.9885
ST23	Glendale Avenue & Highland Street, Mt Holly	35.2931	-81.0129
ST24	Garden Memorial Presbyterian Church, 2324 Sam Wilson Rd.	35.2605	-80.9797
ST25	Berryhill Baptist Church - 9801 Walkers Ferry Rd	35.2208	-80.9810
ST26	8814 Gerren Drive	35.1713	-80.9569
ST27	11610 Village Pond Drive	35.1089	-81.0023
ST28	4600 Lochfoot Drive	35.1950	-81.0010
ST29	14029 Appling Ln	35.0734	-81.0096
ST30	Whisper Lane & Oak Island Court	35.2365	-80.9870
ST31	10324 Prairiegrouse Lane	35.2715	-80.9722
ST32	2226 Pleasant Dale Drive	35.2614	-80.9720
ST33	Nevin Park - 6000 Statesville Road	35.3028	-80.8344



Charlotte-Douglas INTERNATIONAL AIRPORT

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Noise Measurement Sites Grid Point Locations

EXHIBIT:

G-1

Date: 9/2/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\G-1_Noise Measurement Sites Grid Point Locations.mxd

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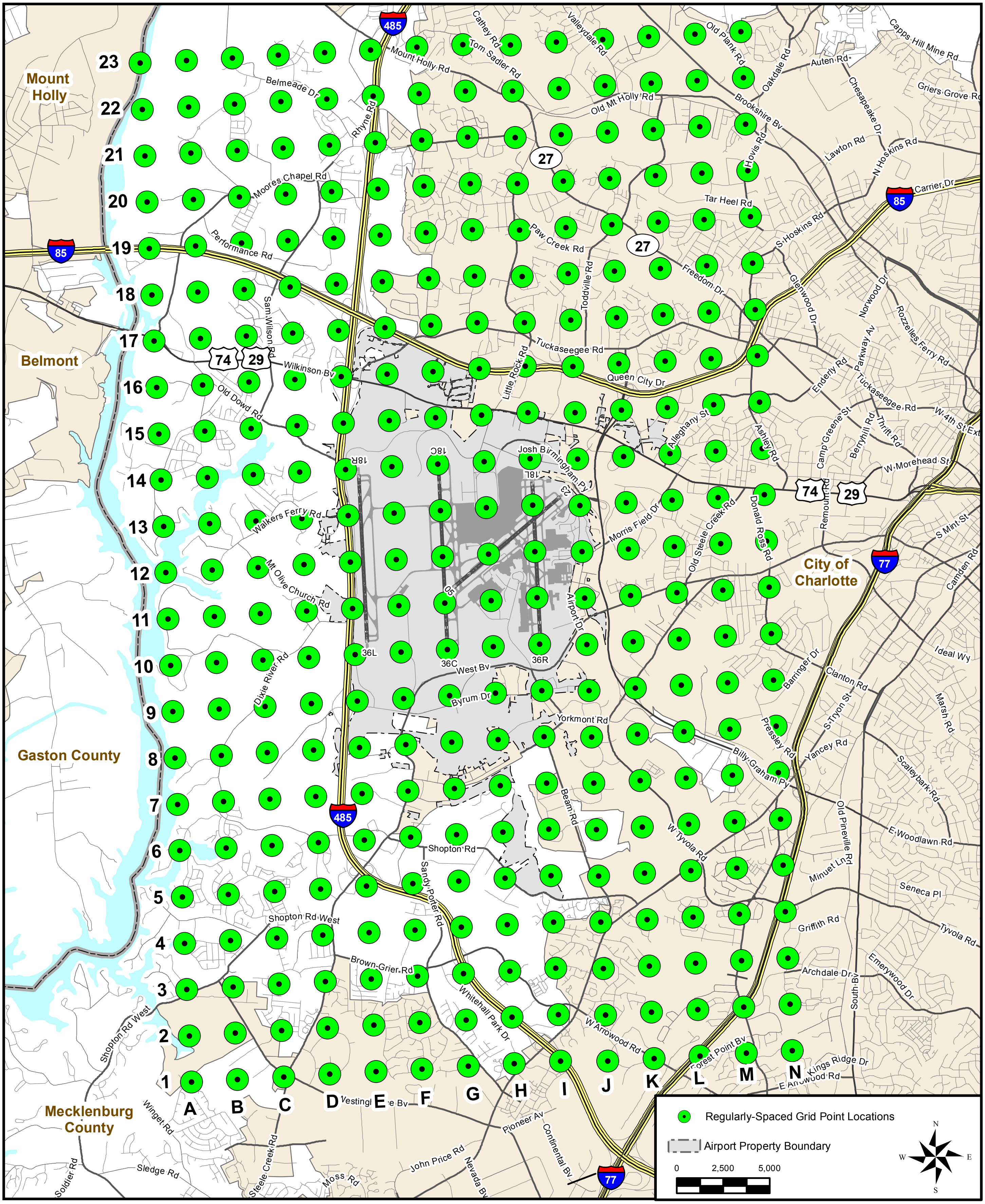

Noise Exposure Map Update

CHARLOTTE DOUGLAS INTERNATIONAL AIRPORT

Regularly-Spaced Grid Point Locations

EXHIBIT: **G-2**

Date: 9/3/2015 Y:\CLT\NEM Update\E-L&B Work Product\2-GIS\MXD\Exhibits\C-19_Helicopter_Tracks.mxd

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Table G-2
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-A-1	35.1351	-80.9953	**RSG-B-12**	35.2108	-80.9934
RSG-A-2	35.1420	-80.9959	**RSG-B-13**	35.2176	-80.9940
RSG-A-3	35.1488	-80.9965	**RSG-B-14**	35.2244	-80.9946
RSG-A-4	35.1556	-80.9971	**RSG-B-15**	35.2313	-80.9952
RSG-A-5	35.1625	-80.9976	**RSG-B-16**	35.2381	-80.9958
RSG-A-6	35.1693	-80.9982	**RSG-B-17**	35.2449	-80.9964
RSG-A-7	35.1761	-80.9988	**RSG-B-18**	35.2517	-80.9970
RSG-A-8	35.1830	-80.9994	**RSG-B-19**	35.2586	-80.9975
RSG-A-9	35.1898	-81.0000	**RSG-B-20**	35.2654	-80.9981
RSG-A-10	35.1966	-81.0006	**RSG-B-21**	35.2722	-80.9987
RSG-A-11	35.2035	-81.0012	**RSG-B-22**	35.2791	-80.9993
RSG-A-12	35.2103	-81.0017	**RSG-B-23**	35.2859	-80.9999
RSG-A-13	35.2171	-81.0023	**RSG-C-1**	35.1361	-80.9787
RSG-A-14	35.2239	-81.0029	**RSG-C-2**	35.1429	-80.9793
RSG-A-15	35.2308	-81.0035	**RSG-C-3**	35.1498	-80.9799
RSG-A-16	35.2376	-81.0041	**RSG-C-4**	35.1566	-80.9804
RSG-A-17	35.2444	-81.0047	**RSG-C-5**	35.1634	-80.9810
RSG-A-18	35.2513	-81.0053	**RSG-C-6**	35.1703	-80.9816
RSG-A-19	35.2581	-81.0059	**RSG-C-7**	35.1771	-80.9822
RSG-A-20	35.2649	-81.0064	**RSG-C-8**	35.1839	-80.9828
RSG-A-21	35.2718	-81.0070	**RSG-C-9**	35.1908	-80.9834
RSG-A-22	35.2786	-81.0076	**RSG-C-10**	35.1976	-80.9840
RSG-A-23	35.2854	-81.0082	**RSG-C-11**	35.2044	-80.9845
RSG-B-1	35.1356	-80.9870	**RSG-C-12**	35.2112	-80.9851
RSG-B-2	35.1425	-80.9876	**RSG-C-13**	35.2181	-80.9857
RSG-B-3	35.1493	-80.9882	**RSG-C-14**	35.2249	-80.9863
RSG-B-4	35.1561	-80.9888	**RSG-C-15**	35.2317	-80.9869
RSG-B-5	35.1630	-80.9893	**RSG-C-16**	35.2386	-80.9875

Table G-2 (*Continued*)
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-B-6	35.1698	-80.9899	**RSG-C-17**	35.2454	-80.9881
RSG-B-7	35.1766	-80.9905	**RSG-C-18**	35.2522	-80.9886
RSG-B-8	35.1834	-80.9911	**RSG-C-19**	35.2591	-80.9892
RSG-B-9	35.1903	-80.9917	**RSG-C-20**	35.2659	-80.9898
RSG-B-10	35.1971	-80.9923	**RSG-C-21**	35.2727	-80.9904
RSG-B-11	35.2039	-80.9929	**RSG-C-22**	35.2795	-80.9910
RSG-C-23	35.2864	-80.9916	**RSG-E-11**	35.2054	-80.9679
RSG-D-1	35.1366	-80.9704	**RSG-E-12**	35.2122	-80.9685
RSG-D-2	35.1434	-80.9710	**RSG-E-13**	35.2190	-80.9691
RSG-D-3	35.1502	-80.9716	**RSG-E-14**	35.2259	-80.9697
RSG-D-4	35.1571	-80.9721	**RSG-E-15**	35.2327	-80.9703
RSG-D-5	35.1639	-80.9727	**RSG-E-16**	35.2395	-80.9708
RSG-D-6	35.1707	-80.9733	**RSG-E-17**	35.2464	-80.9714
RSG-D-7	35.1776	-80.9739	**RSG-E-18**	35.2532	-80.9720
RSG-D-8	35.1844	-80.9745	**RSG-E-19**	35.2600	-80.9726
RSG-D-9	35.1912	-80.9751	**RSG-E-20**	35.2668	-80.9732
RSG-D-10	35.1981	-80.9756	**RSG-E-21**	35.2737	-80.9738
RSG-D-11	35.2049	-80.9762	**RSG-E-22**	35.2805	-80.9744
RSG-D-12	35.2117	-80.9768	**RSG-E-23**	35.2873	-80.9749
RSG-D-13	35.2186	-80.9774	**RSG-F-1**	35.1375	-80.9538
RSG-D-14	35.2254	-80.9780	**RSG-F-2**	35.1444	-80.9544
RSG-D-15	35.2322	-80.9786	**RSG-F-3**	35.1512	-80.9549
RSG-D-16	35.2390	-80.9792	**RSG-F-4**	35.1580	-80.9555
RSG-D-17	35.2459	-80.9797	**RSG-F-5**	35.1649	-80.9561
RSG-D-18	35.2527	-80.9803	**RSG-F-6**	35.1717	-80.9567
RSG-D-19	35.2595	-80.9809	**RSG-F-7**	35.1785	-80.9573
RSG-D-20	35.2664	-80.9815	**RSG-F-8**	35.1854	-80.9579
RSG-D-21	35.2732	-80.9821	**RSG-F-9**	35.1922	-80.9584

Table G-2 (*Continued*)
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-D-22	35.2800	-80.9827	**RSG-F-10**	35.1990	-80.9590
RSG-D-23	35.2869	-80.9833	**RSG-F-11**	35.2059	-80.9596
RSG-E-1	35.1371	-80.9621	**RSG-F-12**	35.2127	-80.9602
RSG-E-2	35.1439	-80.9627	**RSG-F-13**	35.2195	-80.9608
RSG-E-3	35.1507	-80.9633	**RSG-F-14**	35.2263	-80.9614
RSG-E-4	35.1576	-80.9638	**RSG-F-15**	35.2332	-80.9619
RSG-E-5	35.1644	-80.9644	**RSG-F-16**	35.2400	-80.9625
RSG-E-6	35.1712	-80.9650	**RSG-F-17**	35.2468	-80.9631
RSG-E-7	35.1780	-80.9656	**RSG-F-18**	35.2537	-80.9637
RSG-E-8	35.1849	-80.9662	**RSG-F-19**	35.2605	-80.9643
RSG-E-9	35.1917	-80.9668	**RSG-F-20**	35.2673	-80.9649
RSG-E-10	35.1985	-80.9673	**RSG-F-21**	35.2742	-80.9654
RSG-F-22	35.2810	-80.9660	**RSG-H-10**	35.2000	-80.9424
RSG-F-23	35.2878	-80.9666	**RSG-H-11**	35.2068	-80.9430
RSG-G-1	35.1380	-80.9455	**RSG-H-12**	35.2136	-80.9436
RSG-G-2	35.1449	-80.9461	**RSG-H-13**	35.2205	-80.9442
RSG-G-3	35.1517	-80.9466	**RSG-H-14**	35.2273	-80.9447
RSG-G-4	35.1585	-80.9472	**RSG-H-15**	35.2341	-80.9453
RSG-G-5	35.1653	-80.9478	**RSG-H-16**	35.2410	-80.9459
RSG-G-6	35.1722	-80.9484	**RSG-H-17**	35.2478	-80.9465
RSG-G-7	35.1790	-80.9490	**RSG-H-18**	35.2546	-80.9471
RSG-G-8	35.1858	-80.9496	**RSG-H-19**	35.2615	-80.9476
RSG-G-9	35.1927	-80.9501	**RSG-H-20**	35.2683	-80.9482
RSG-G-10	35.1995	-80.9507	**RSG-H-21**	35.2751	-80.9488
RSG-G-11	35.2063	-80.9513	**RSG-H-22**	35.2819	-80.9494
RSG-G-12	35.2132	-80.9519	**RSG-H-23**	35.2888	-80.9500
RSG-G-13	35.2200	-80.9525	**RSG-I-1**	35.1390	-80.9289
RSG-G-14	35.2268	-80.9530	**RSG-I-2**	35.1458	-80.9295

Table G-2 (*Continued*)
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-G-15	35.2337	-80.9536	**RSG-I-3**	35.1526	-80.9300
RSG-G-16	35.2405	-80.9542	**RSG-I-4**	35.1595	-80.9306
RSG-G-17	35.2473	-80.9548	**RSG-I-5**	35.1663	-80.9312
RSG-G-18	35.2541	-80.9554	**RSG-I-6**	35.1731	-80.9318
RSG-G-19	35.2610	-80.9560	**RSG-I-7**	35.1800	-80.9324
RSG-G-20	35.2678	-80.9565	**RSG-I-8**	35.1868	-80.9329
RSG-G-21	35.2746	-80.9571	**RSG-I-9**	35.1936	-80.9335
RSG-G-22	35.2815	-80.9577	**RSG-I-10**	35.2005	-80.9341
RSG-G-23	35.2883	-80.9583	**RSG-I-11**	35.2073	-80.9347
RSG-H-1	35.1385	-80.9372	**RSG-I-12**	35.2141	-80.9353
RSG-H-2	35.1453	-80.9378	**RSG-I-13**	35.2209	-80.9358
RSG-H-3	35.1522	-80.9383	**RSG-I-14**	35.2278	-80.9364
RSG-H-4	35.1590	-80.9389	**RSG-I-15**	35.2346	-80.9370
RSG-H-5	35.1658	-80.9395	**RSG-I-16**	35.2414	-80.9376
RSG-H-6	35.1727	-80.9401	**RSG-I-17**	35.2483	-80.9382
RSG-H-7	35.1795	-80.9407	**RSG-I-18**	35.2551	-80.9388
RSG-H-8	35.1863	-80.9412	**RSG-I-19**	35.2619	-80.9393
RSG-H-9	35.1931	-80.9418	**RSG-I-20**	35.2688	-80.9399
RSG-I-21	35.2756	-80.9405	**RSG-K-9**	35.1946	-80.9169
RSG-I-22	35.2824	-80.9411	**RSG-K-10**	35.2014	-80.9175
RSG-I-23	35.2893	-80.9417	**RSG-K-11**	35.2082	-80.9181
RSG-J-1	35.1394	-80.9206	**RSG-K-12**	35.2151	-80.9186
RSG-J-2	35.1463	-80.9211	**RSG-K-13**	35.2219	-80.9192
RSG-J-3	35.1531	-80.9217	**RSG-K-14**	35.2287	-80.9198
RSG-J-4	35.1599	-80.9223	**RSG-K-15**	35.2356	-80.9204
RSG-J-5	35.1668	-80.9229	**RSG-K-16**	35.2424	-80.9210
RSG-J-6	35.1736	-80.9235	**RSG-K-17**	35.2492	-80.9215
RSG-J-7	35.1804	-80.9240	**RSG-K-18**	35.2560	-80.9221

Table G-2 (*Continued*)
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-J-8	35.1873	-80.9246	**RSG-K-19**	35.2629	-80.9227
RSG-J-9	35.1941	-80.9252	**RSG-K-20**	35.2697	-80.9233
RSG-J-10	35.2009	-80.9258	**RSG-K-21**	35.2765	-80.9239
RSG-J-11	35.2078	-80.9264	**RSG-K-22**	35.2834	-80.9244
RSG-J-12	35.2146	-80.9270	**RSG-K-23**	35.2902	-80.9250
RSG-J-13	35.2214	-80.9275	**RSG-L-1**	35.1404	-80.9040
RSG-J-14	35.2283	-80.9281	**RSG-L-2**	35.1472	-80.9045
RSG-J-15	35.2351	-80.9287	**RSG-L-3**	35.1541	-80.9051
RSG-J-16	35.2419	-80.9293	**RSG-L-4**	35.1609	-80.9057
RSG-J-17	35.2487	-80.9299	**RSG-L-5**	35.1677	-80.9063
RSG-J-18	35.2556	-80.9304	**RSG-L-6**	35.1746	-80.9069
RSG-J-19	35.2624	-80.9310	**RSG-L-7**	35.1814	-80.9074
RSG-J-20	35.2692	-80.9316	**RSG-L-8**	35.1882	-80.9080
RSG-J-21	35.2761	-80.9322	**RSG-L-9**	35.1950	-80.9086
RSG-J-22	35.2829	-80.9328	**RSG-L-10**	35.2019	-80.9092
RSG-J-23	35.2897	-80.9333	**RSG-L-11**	35.2087	-80.9097
RSG-K-1	35.1399	-80.9123	**RSG-L-12**	35.2155	-80.9103
RSG-K-2	35.1468	-80.9128	**RSG-L-13**	35.2224	-80.9109
RSG-K-3	35.1536	-80.9134	**RSG-L-14**	35.2292	-80.9115
RSG-K-4	35.1604	-80.9140	**RSG-L-15**	35.2360	-80.9121
RSG-K-5	35.1672	-80.9146	**RSG-L-16**	35.2429	-80.9126
RSG-K-6	35.1741	-80.9152	**RSG-L-17**	35.2497	-80.9132
RSG-K-7	35.1809	-80.9157	**RSG-L-18**	35.2565	-80.9138
RSG-K-8	35.1877	-80.9163	**RSG-L-19**	35.2634	-80.9144
RSG-L-20	35.2702	-80.9150	**RSG-M-22**	35.2843	-80.9078
RSG-L-21	35.2770	-80.9155	**RSG-M-23**	35.2912	-80.9084
RSG-L-22	35.2838	-80.9161	**RSG-N-1**	35.1413	-80.8874
RSG-L-23	35.2907	-80.9167	**RSG-N-2**	35.1482	-80.8879

Table G-2 (*Continued*)
REGULARLY-SPACED GRID POINT KEY
Charlotte Douglas International Airport

GRID ID	LATITUDE	LONGITUDE	GRID ID	LATITUDE	LONGITUDE
RSG-M-1	35.1409	-80.8957	**RSG-N-3**	35.1550	-80.8885
RSG-M-2	35.1477	-80.8962	**RSG-N-4**	35.1618	-80.8891
RSG-M-3	35.1545	-80.8968	**RSG-N-5**	35.1687	-80.8897
RSG-M-4	35.1614	-80.8974	**RSG-N-6**	35.1755	-80.8902
RSG-M-5	35.1682	-80.8980	**RSG-N-7**	35.1823	-80.8908
RSG-M-6	35.1750	-80.8985	**RSG-N-8**	35.1892	-80.8914
RSG-M-7	35.1819	-80.8991	**RSG-N-9**	35.1960	-80.8920
RSG-M-8	35.1887	-80.8997	**RSG-N-10**	35.2028	-80.8925
RSG-M-9	35.1955	-80.9003	**RSG-N-11**	35.2097	-80.8931
RSG-M-10	35.2024	-80.9009	**RSG-N-12**	35.2165	-80.8937
RSG-M-11	35.2092	-80.9014	**RSG-N-13**	35.2233	-80.8943
RSG-M-12	35.2160	-80.9020	**RSG-N-14**	35.2301	-80.8949
RSG-M-13	35.2228	-80.9026	**RSG-N-15**	35.2370	-80.8954
RSG-M-14	35.2297	-80.9032	**RSG-N-16**	35.2438	-80.8960
RSG-M-15	35.2365	-80.9038	**RSG-N-17**	35.2506	-80.8966
RSG-M-16	35.2433	-80.9043	**RSG-N-18**	35.2575	-80.8972
RSG-M-17	35.2502	-80.9049	**RSG-N-19**	35.2643	-80.8978
RSG-M-18	35.2570	-80.9055	**RSG-N-20**	35.2711	-80.8983
RSG-M-19	35.2638	-80.9061	**RSG-N-21**	35.2780	-80.8989
RSG-M-20	35.2707	-80.9066	**RSG-N-22**	35.2848	-80.8995
RSG-M-21	35.2775	-80.9072	**RSG-N-23**	35.2916	-80.9001

Table G-3
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
LT1	58.1	59.1	1.0	83.0	81.1	-1.9	106.0	107.0	1.0	42:18	53:00	10:42
LT2	63.2	64.2	1.0	96.1	89.5	-6.6	108.9	110.0	1.1	46:24	59:36	13:12
LT3	61.9	62.7	0.8	99.4	90.5	-8.9	108.3	109.2	0.9	48:30	62:30	14:00
LT4	52.0	52.6	0.6	90.1	82.2	-7.9	97.4	98.1	0.7	2:06	2:30	0:24
LT5	48.7	49.0	0.3	83.7	81.0	-2.7	91.5	91.8	0.3	0:18	0:12	-0:06
LT6	61.0	61.8	0.8	93.7	85.4	-8.3	108.2	109.1	0.9	59:48	75:48	16:00
LT7	58.3	58.7	0.4	93.7	83.3	-10.4	104.8	105.3	0.5	36:00	43:48	7:48
LT8	58.3	58.8	0.5	94.7	85.5	-9.2	104.7	105.3	0.6	35:54	43:36	7:42
ST1	48.5	48.7	0.2	80.2	75.4	-4.8	94.2	94.4	0.2	0:54	0:30	-0:24
ST2	46.6	46.7	0.1	82.3	78.3	-4.0	91.4	91.5	0.1	0:18	0:12	-0:06
ST3	53.9	54.4	0.5	92.4	82.8	-9.6	94.4	94.8	0.4	2:54	3:30	0:36
ST4	62.6	63.5	0.9	99.0	90.6	-8.4	108.8	109.8	1.0	54:00	70:12	16:12
ST5	52.1	52.4	0.3	83.1	79.4	-3.7	98.4	98.8	0.4	4:12	3:12	-1:00
ST6	55.7	56.3	0.6	85.3	80.6	-4.7	102.4	103.1	0.7	13:54	15:18	1:24
ST7	58.9	59.6	0.7	90.8	82.3	-8.5	105.5	106.3	0.8	41:00	50:24	9:24
ST8	52.7	53.5	0.8	82.5	78.7	-3.8	98.6	99.5	0.9	4:42	5:30	0:48
ST9	54.7	55.1	0.4	94.3	84.4	-9.9	101.0	101.4	0.4	12:06	13:00	0:54
ST10	48.3	48.5	0.2	84.8	80.2	-4.6	94.5	94.8	0.3	1:00	0:30	-0:30
ST11	62.6	63.6	1.0	85.4	85.4	0.0	108.7	109.8	1.1	72:42	92:48	20:06
ST12	47.9	48.6	0.7	77.7	77.0	-0.7	92.7	93.5	0.8	0:18	0:18	0:00
ST13	49.5	49.9	0.4	91.3	82.2	-9.1	95.2	95.6	0.4	1:18	1:06	-0:12
ST14	55.8	56.1	0.3	94.7	83.9	-10.8	102.2	102.5	0.3	20:48	25:48	5:00
ST15	60.9	61.7	0.8	97.1	87.6	-9.5	107.5	108.4	0.9	40:42	51:18	10:36
ST16	54.6	55.5	0.9	78.5	78.5	0.0	100.3	101.3	1.0	10:48	14:06	3:18
ST17	49.4	49.7	0.3	83.3	78.5	-4.8	95.7	96.0	0.3	2:24	2:00	-0:24
ST18	55.7	56.7	1.0	80.7	80.7	0.0	101.2	102.3	1.1	14:06	18:18	4:12

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
ST19	51.3	52.3	1.0	83.3	78.7	-4.6	98.1	99.2	1.1	9:06	12:00	2:54
ST20	55.6	56.7	1.1	81.5	81.5	0.0	101.0	102.3	1.3	14:24	19:06	4:42
ST21	52.8	53.5	0.7	81.0	78.5	-2.5	100.1	101.0	0.9	5:36	5:00	-0:36
ST22	52.6	53.0	0.4	85.5	80.7	-4.8	99.2	99.7	0.5	7:30	7:42	0:12
ST23	50.3	50.7	0.4	82.1	77.0	-5.1	96.7	97.2	0.5	2:48	2:00	-0:48
ST24	56.6	57.0	0.4	95.1	84.2	-10.9	103.2	103.7	0.5	23:48	29:18	5:30
ST25	47.6	48.4	0.8	81.9	81.9	0.0	93.6	94.5	0.9	0:00	0:00	0:00
ST26	59.7	60.2	0.5	96.2	86.6	-9.6	106.1	106.7	0.6	46:06	58:00	11:54
ST27	48.4	48.6	0.2	79.0	72.8	-6.2	94.4	94.6	0.2	0:36	0:12	-0:24
ST28	43.8	44.1	0.3	78.2	72.4	-5.8	87.9	88.3	0.4	0:06	0:00	-0:06
ST29	43.4	43.6	0.2	76.6	70.3	-6.3	89.3	89.7	0.4	0:06	0:00	-0:06
ST30	46.4	47.0	0.6	82.1	82.1	0.0	92.8	93.4	0.6	0:12	0:06	-0:06
ST31	59.2	60.1	0.9	89.6	82.0	-7.6	106.9	107.9	1.0	49:54	62:00	12:06
ST32	60.8	61.5	0.7	95.2	84.7	-10.5	108.3	109.2	0.9	67:30	86:06	18:36
ST33	49.9	50.5	0.6	78.6	71.7	-6.9	95.9	96.6	0.7	0:30	0:18	-0:12
RSG-A-1	48.8	48.9	0.1	81.3	76.6	-4.7	94.7	94.9	0.2	1:00	0:36	-0:24
RSG-A-2	47.6	47.7	0.1	81.7	77.3	-4.4	93.2	93.4	0.2	0:30	0:18	-0:12
RSG-A-3	46.7	46.8	0.1	81.2	77.7	-3.5	91.8	92.0	0.2	0:18	0:12	-0:06
RSG-A-4	46.7	46.9	0.2	82.8	78.4	-4.4	90.9	91.0	0.1	0:12	0:12	0:00
RSG-A-5	48.2	48.5	0.3	81.8	79.1	-2.7	90.8	91.0	0.2	0:18	0:18	0:00
RSG-A-6	51.7	52.2	0.5	86.5	80.4	-6.1	92.6	93.0	0.4	1:36	1:54	0:18
RSG-A-7	53.2	53.7	0.5	88.5	81.4	-7.1	93.6	94.0	0.4	2:24	2:54	0:30
RSG-A-8	49.1	49.4	0.3	85.1	78.2	-6.9	90.6	91.0	0.4	0:30	0:30	0:00
RSG-A-9	45.7	46.0	0.3	77.6	72.5	-5.1	88.8	89.1	0.3	0:12	0:06	-0:06
RSG-A-10	43.6	43.9	0.3	77.9	72.1	-5.8	87.9	88.4	0.5	0:00	0:00	0:00
RSG-A-11	42.1	42.5	0.4	78.4	71.9	-6.5	87.2	87.7	0.5	0:00	0:00	0:00

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-A-12	41.6	42.0	0.4	77.7	71.0	-6.7	87.0	87.6	0.6	0:00	0:00	0:00
RSG-A-13	41.3	41.7	0.4	77.0	77.0	0.0	87.0	87.6	0.6	0:00	0:00	0:00
RSG-A-14	41.2	41.6	0.4	79.6	79.6	0.0	87.2	87.6	0.4	0:06	0:06	0:00
RSG-A-15	41.5	41.8	0.3	77.7	77.7	0.0	87.6	88.0	0.4	0:06	0:06	0:00
RSG-A-16	41.8	42.0	0.2	76.4	76.4	0.0	87.9	88.3	0.4	0:06	0:06	0:00
RSG-A-17	42.5	42.7	0.2	75.4	75.4	0.0	88.7	89.0	0.3	0:00	0:00	0:00
RSG-A-18	43.8	44.0	0.2	73.3	73.0	-0.3	90.2	90.4	0.2	0:00	0:00	0:00
RSG-A-19	45.9	46.1	0.2	78.8	76.3	-2.5	92.3	92.5	0.2	0:18	0:12	-0:06
RSG-A-20	48.2	48.5	0.3	86.8	81.4	-5.4	94.7	95.0	0.3	1:18	1:00	-0:18
RSG-A-21	50.2	50.5	0.3	85.7	80.7	-5.0	96.6	97.0	0.4	3:06	2:36	-0:30
RSG-A-22	51.3	51.7	0.4	84.5	79.5	-5.0	97.8	98.2	0.4	4:30	3:48	-0:42
RSG-A-23	51.5	51.9	0.4	83.2	78.3	-4.9	98.0	98.4	0.4	4:42	4:06	-0:36
RSG-B-1	50.1	50.3	0.2	82.3	77.7	-4.6	96.2	96.5	0.3	1:36	0:54	-0:42
RSG-B-2	48.8	48.9	0.1	82.9	78.7	-4.2	94.9	95.1	0.2	0:48	0:30	-0:18
RSG-B-3	47.7	47.7	0.0	83.2	79.5	-3.7	93.5	93.7	0.2	0:24	0:18	-0:06
RSG-B-4	47.0	47.0	0.0	82.2	79.1	-3.1	92.3	92.5	0.2	0:12	0:12	0:00
RSG-B-5	47.2	47.4	0.2	83.0	80.1	-2.9	91.5	91.7	0.2	0:06	0:06	0:00
RSG-B-6	49.4	49.7	0.3	84.3	81.6	-2.7	91.9	92.2	0.3	0:24	0:24	0:00
RSG-B-7	54.3	54.8	0.5	92.9	83.4	-9.5	94.8	95.3	0.5	3:00	3:42	0:42
RSG-B-8	53.4	53.8	0.4	91.9	83.2	-8.7	94.1	94.6	0.5	2:30	3:06	0:36
RSG-B-9	48.8	49.2	0.4	81.4	75.3	-6.1	91.2	91.7	0.5	0:30	0:30	0:00
RSG-B-10	46.0	46.5	0.5	74.5	72.4	-2.1	89.9	90.6	0.7	0:06	0:00	-0:06
RSG-B-11	44.3	44.9	0.6	74.5	70.1	-4.4	89.2	89.9	0.7	0:00	0:00	0:00
RSG-B-12	43.5	44.2	0.7	75.4	70.1	-5.3	89.0	89.7	0.7	0:00	0:00	0:00
RSG-B-13	43.3	43.9	0.6	77.1	77.1	0.0	89.1	89.7	0.6	0:00	0:00	0:00
RSG-B-14	43.3	43.9	0.6	81.2	81.2	0.0	89.3	90.0	0.7	0:06	0:06	0:00
RSG-B-15	43.4	43.9	0.5	79.7	79.7	0.0	89.5	90.1	0.6	0:06	0:06	0:00

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-B-16	43.7	44.1	0.4	78.6	78.6	0.0	89.9	90.4	0.5	0:06	0:06	0:00
RSG-B-17	44.7	45.0	0.3	77.2	77.2	0.0	91.0	91.4	0.4	0:06	0:00	-0:06
RSG-B-18	46.5	46.7	0.2	79.4	75.0	-4.4	92.9	93.2	0.3	0:12	0:06	-0:06
RSG-B-19	48.8	49.1	0.3	85.1	80.0	-5.1	95.2	95.6	0.4	1:24	0:48	-0:36
RSG-B-20	51.1	51.4	0.3	87.1	81.8	-5.3	97.6	97.9	0.3	4:06	3:30	-0:36
RSG-B-21	52.7	53.0	0.3	86.3	81.1	-5.2	99.1	99.5	0.4	7:36	7:30	-0:06
RSG-B-22	53.1	53.5	0.4	85.3	80.5	-4.8	99.5	100.0	0.5	9:36	10:30	0:54
RSG-B-23	52.4	52.8	0.4	84.0	79.0	-5.0	98.9	99.3	0.4	7:12	7:30	0:18
RSG-C-1	52.3	52.5	0.2	83.2	78.8	-4.4	98.5	98.9	0.4	4:24	3:30	-0:54
RSG-C-2	51.3	51.5	0.2	83.7	79.8	-3.9	97.5	97.8	0.3	2:42	1:30	-1:12
RSG-C-3	50.1	50.3	0.2	83.7	79.8	-3.9	96.3	96.6	0.3	1:36	0:48	-0:48
RSG-C-4	49.1	49.2	0.1	83.7	79.7	-4.0	95.1	95.4	0.3	0:54	0:24	-0:30
RSG-C-5	48.4	48.6	0.2	76.7	75.2	-1.5	94.1	94.4	0.3	0:12	0:06	-0:06
RSG-C-6	48.7	49.0	0.3	78.8	77.5	-1.3	93.4	93.7	0.3	0:12	0:06	-0:06
RSG-C-7	51.3	51.7	0.4	85.2	81.6	-3.6	94.0	94.5	0.5	0:48	0:54	0:06
RSG-C-8	56.8	57.4	0.6	94.9	85.9	-9.0	97.4	98.0	0.6	3:48	4:36	0:48
RSG-C-9	53.4	54.0	0.6	89.0	82.0	-7.0	95.0	95.7	0.7	2:12	2:42	0:30
RSG-C-10	49.4	50.0	0.6	79.7	74.0	-5.7	92.9	93.7	0.8	0:24	0:24	0:00
RSG-C-11	47.3	48.1	0.8	73.1	68.1	-5.0	92.1	93.0	0.9	0:00	0:00	0:00
RSG-C-12	46.4	47.1	0.7	69.9	67.1	-2.8	91.8	92.7	0.9	0:00	0:00	0:00
RSG-C-13	45.9	46.7	0.8	77.0	77.0	0.0	91.7	92.5	0.8	0:00	0:00	0:00
RSG-C-14	46.0	46.7	0.7	83.3	83.3	0.0	92.0	92.8	0.8	0:06	0:06	0:00
RSG-C-15	46.1	46.7	0.6	81.9	81.9	0.0	92.3	93.0	0.7	0:06	0:06	0:00
RSG-C-16	46.5	47.0	0.5	80.5	80.5	0.0	92.8	93.5	0.7	0:12	0:06	-0:06
RSG-C-17	47.7	48.1	0.4	79.2	79.2	0.0	94.1	94.6	0.5	0:24	0:12	-0:12
RSG-C-18	50.0	50.3	0.3	85.5	78.6	-6.9	96.4	96.8	0.4	2:06	1:18	-0:48

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-C-19	52.5	52.8	0.3	94.1	83.1	-11.0	98.9	99.3	0.4	6:30	6:00	-0:30
RSG-C-20	54.3	54.6	0.3	89.3	82.8	-6.5	100.7	101.1	0.4	13:12	15:00	1:48
RSG-C-21	54.7	55.1	0.4	87.8	82.0	-5.8	101.2	101.6	0.4	16:00	19:18	3:18
RSG-C-22	53.8	54.2	0.4	86.1	80.9	-5.2	100.3	100.7	0.4	12:12	14:12	2:00
RSG-C-23	52.2	52.6	0.4	84.7	79.8	-4.9	98.7	99.2	0.5	6:36	6:36	0:00
RSG-D-1	54.4	54.8	0.4	84.4	79.9	-4.5	100.8	101.3	0.5	10:00	10:12	0:12
RSG-D-2	54.2	54.6	0.4	85.2	80.6	-4.6	100.7	101.1	0.4	9:18	9:24	0:06
RSG-D-3	53.7	54.0	0.3	86.4	81.3	-5.1	100.2	100.6	0.4	7:30	7:18	-0:12
RSG-D-4	53.0	53.3	0.3	87.7	82.1	-5.6	99.5	99.9	0.4	5:18	4:42	-0:36
RSG-D-5	52.1	52.4	0.3	84.5	77.8	-6.7	98.5	98.9	0.4	3:12	2:30	-0:42
RSG-D-6	51.3	51.7	0.4	78.9	74.0	-4.9	97.4	97.9	0.5	1:30	0:42	-0:48
RSG-D-7	51.5	52.1	0.6	79.0	75.8	-3.2	97.0	97.6	0.6	1:06	0:42	-0:24
RSG-D-8	54.1	54.8	0.7	88.1	81.7	-6.4	97.5	98.3	0.8	2:06	2:30	0:24
RSG-D-9	59.7	60.4	0.7	97.3	87.7	-9.6	100.5	101.3	0.8	4:30	5:30	1:00
RSG-D-10	54.2	55.1	0.9	86.5	80.3	-6.2	97.2	98.1	0.9	1:54	2:30	0:36
RSG-D-11	51.2	52.0	0.8	77.8	74.6	-3.2	95.9	96.8	0.9	0:24	0:36	0:12
RSG-D-12	49.9	50.7	0.8	71.6	69.4	-2.2	95.5	96.3	0.8	0:00	0:00	0:00
RSG-D-13	49.3	50.1	0.8	76.3	76.3	0.0	95.3	96.2	0.9	0:00	0:06	0:06
RSG-D-14	49.3	50.2	0.9	86.7	86.7	0.0	95.5	96.4	0.9	0:06	0:12	0:06
RSG-D-15	49.8	50.6	0.8	84.2	84.2	0.0	96.2	97.1	0.9	0:12	0:18	0:06
RSG-D-16	50.6	51.3	0.7	82.0	82.0	0.0	97.2	98.0	0.8	1:00	0:54	-0:06
RSG-D-17	52.0	52.6	0.6	86.2	81.8	-4.4	98.6	99.3	0.7	4:00	3:54	-0:06
RSG-D-18	54.3	54.8	0.5	95.2	85.7	-9.5	100.9	101.4	0.5	11:06	12:12	1:06
RSG-D-19	56.1	56.4	0.3	95.2	84.4	-10.8	102.6	103.1	0.5	20:36	25:00	4:24
RSG-D-20	56.3	56.7	0.4	93.1	83.1	-10.0	102.9	103.3	0.4	22:54	28:24	5:30

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-D-21	55.1	55.6	0.5	88.1	82.1	-6.0	101.8	102.3	0.5	16:24	19:42	3:18
RSG-D-22	53.2	53.7	0.5	85.6	80.8	-4.8	99.9	100.5	0.6	7:30	7:30	0:00
RSG-D-23	51.1	51.6	0.5	81.1	78.6	-2.5	98.0	98.7	0.7	2:30	1:36	-0:54
RSG-E-1	57.1	57.8	0.7	84.6	80.1	-4.5	104.2	105.1	0.9	36:24	45:48	9:24
RSG-E-2	57.8	58.5	0.7	85.9	80.9	-5.0	105.0	105.8	0.8	43:30	54:24	10:54
RSG-E-3	58.5	59.2	0.7	87.3	81.8	-5.5	105.7	106.5	0.8	49:12	61:36	12:24
RSG-E-4	59.0	59.6	0.6	91.2	82.6	-8.6	106.3	107.1	0.8	50:42	63:00	12:18
RSG-E-5	59.4	60.2	0.8	93.3	83.8	-9.5	106.8	107.7	0.9	51:00	63:06	12:06
RSG-E-6	59.6	60.4	0.8	90.1	82.6	-7.5	107.0	108.0	1.0	48:30	60:06	11:36
RSG-E-7	59.7	60.6	0.9	85.7	83.4	-2.3	107.2	108.2	1.0	45:54	57:24	11:30
RSG-E-8	60.0	61.0	1.0	85.1	84.0	-1.1	107.4	108.4	1.0	43:18	55:00	11:42
RSG-E-9	61.1	62.0	0.9	91.4	85.1	-6.3	107.4	108.5	1.1	41:42	53:24	11:42
RSG-E-10	62.1	63.0	0.9	98.4	89.5	-8.9	106.6	107.6	1.0	35:30	45:24	9:54
RSG-E-11	59.8	60.6	0.8	88.5	87.7	-0.8	106.7	107.5	0.8	30:24	38:24	8:00
RSG-E-12	57.9	58.4	0.5	85.3	84.0	-1.3	105.1	105.6	0.5	29:54	36:36	6:42
RSG-E-13	59.2	59.9	0.7	88.5	87.8	-0.7	106.8	107.6	0.8	30:54	39:06	8:12
RSG-E-14	57.9	58.9	1.0	91.4	91.4	0.0	105.4	106.4	1.0	29:36	37:48	8:12
RSG-E-15	59.9	60.9	1.0	87.0	87.0	0.0	107.6	108.7	1.1	41:18	53:06	11:48
RSG-E-16	60.1	61.1	1.0	89.0	85.4	-3.6	107.9	108.9	1.0	49:12	62:30	13:18
RSG-E-17	60.5	61.3	0.8	97.0	87.1	-9.9	108.0	108.9	0.9	58:54	74:42	15:48
RSG-E-18	60.7	61.5	0.8	96.0	86.2	-9.8	108.1	109.0	0.9	66:54	85:30	18:36
RSG-E-19	60.5	61.2	0.7	95.8	85.4	-10.4	107.9	108.8	0.9	68:12	87:18	19:06
RSG-E-20	59.4	60.2	0.8	94.4	83.4	-11.0	106.9	107.8	0.9	56:54	71:54	15:00
RSG-E-21	58.0	58.8	0.8	85.4	81.7	-3.7	105.7	106.6	0.9	44:30	55:36	11:06
RSG-E-22	56.4	57.4	1.0	82.9	79.8	-3.1	104.3	105.3	1.0	34:48	44:12	9:24
RSG-E-23	55.2	56.2	1.0	81.2	78.7	-2.5	103.1	104.2	1.1	30:18	40:06	9:48
RSG-F-1	55.3	56.0	0.7	84.9	80.3	-4.6	102.1	102.8	0.7	12:30	13:36	1:06

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-F-2	56.3	56.9	0.6	86.3	81.2	-5.1	103.0	103.7	0.7	18:06	20:54	2:48
RSG-F-3	57.3	57.8	0.5	87.7	82.1	-5.6	103.9	104.5	0.6	26:12	30:48	4:36
RSG-F-4	58.1	58.5	0.4	93.0	82.8	-10.2	104.6	105.1	0.5	33:00	39:54	6:54
RSG-F-5	58.8	59.2	0.4	94.7	85.0	-9.7	105.3	105.8	0.5	40:06	49:36	9:30
RSG-F-6	59.8	60.3	0.5	96.3	86.7	-9.6	106.2	106.8	0.6	44:12	55:48	11:36
RSG-F-7	60.8	61.4	0.6	97.6	87.8	-9.8	107.1	107.8	0.7	47:18	60:18	13:00
RSG-F-8	61.6	62.5	0.9	96.4	89.8	-6.6	107.9	108.9	1.0	50:12	64:06	13:54
RSG-F-9	61.9	62.9	1.0	90.4	87.6	-2.8	107.9	109.0	1.1	54:48	71:00	16:12
RSG-F-10	63.9	64.9	1.0	96.2	90.3	-5.9	108.8	109.9	1.1	78:18	100:42	22:24
RSG-F-11	63.6	64.5	0.9	94.4	90.9	-3.5	108.2	109.2	1.0	69:42	88:48	19:06
RSG-F-12	60.7	61.6	0.9	82.4	82.4	0.0	106.2	107.3	1.1	46:12	59:24	13:12
RSG-F-13	60.4	61.3	0.9	83.1	83.1	0.0	106.6	107.6	1.0	47:12	59:18	12:06
RSG-F-14	61.5	62.5	1.0	92.4	92.4	0.0	107.8	108.8	1.0	65:48	84:06	18:18
RSG-F-15	61.0	62.0	1.0	93.8	90.5	-3.3	107.5	108.6	1.1	51:18	64:42	13:24
RSG-F-16	61.6	62.5	0.9	101.2	91.2	-10.0	108.1	109.1	1.0	52:18	67:12	14:54
RSG-F-17	61.5	62.3	0.8	98.5	89.7	-8.8	108.0	108.9	0.9	49:54	64:06	14:12
RSG-F-18	59.8	60.4	0.6	96.8	86.8	-10.0	106.4	107.1	0.7	42:12	54:06	11:54
RSG-F-19	57.3	57.9	0.6	95.6	85.6	-10.0	104.0	104.7	0.7	27:24	33:48	6:24
RSG-F-20	55.2	55.9	0.7	88.3	81.5	-6.8	102.1	102.9	0.8	14:06	15:48	1:42
RSG-F-21	53.9	54.7	0.8	80.9	76.3	-4.6	101.0	101.9	0.9	9:18	10:30	1:12
RSG-F-22	53.1	54.0	0.9	77.4	77.4	0.0	100.2	101.3	1.1	6:30	8:18	1:48
RSG-F-23	52.6	53.6	1.0	80.0	77.8	-2.2	99.8	100.9	1.1	5:42	7:30	1:48
RSG-G-1	56.1	57.0	0.9	85.2	81.2	-4.0	101.8	102.7	0.9	14:30	17:24	2:54
RSG-G-2	57.3	58.2	0.9	85.9	82.5	-3.4	103.0	103.8	0.8	17:54	20:42	2:48
RSG-G-3	58.5	59.3	0.8	87.6	83.7	-3.9	104.2	105.0	0.8	23:30	27:18	3:48
RSG-G-4	59.9	60.6	0.7	93.7	85.5	-8.2	105.5	106.3	0.8	30:06	35:42	5:36
RSG-G-5	60.9	61.7	0.8	94.4	86.7	-7.7	106.6	107.4	0.8	39:12	47:48	8:36

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-G-6	62.9	63.7	0.8	96.0	89.5	-6.5	108.6	109.4	0.8	50:24	63:24	13:00
RSG-G-7	64.8	65.7	0.9	97.3	91.8	-5.5	110.5	111.4	0.9	62:30	80:00	17:30
RSG-G-8	67.1	68.1	1.0	99.2	94.8	-4.4	112.9	113.9	1.0	75:30	97:36	22:06
RSG-G-9	70.3	71.3	1.0	103.8	101.0	-2.8	115.9	117.0	1.1	84:24	109:24	25:00
RSG-G-10	78.0	79.2	1.2	117.3	116.4	-0.9	123.6	124.9	1.3	122:24	157:18	34:54
RSG-G-11	86.7	87.8	1.1	133.5	126.2	-7.3	133.0	134.2	1.2	213:36	271:00	57:24
RSG-G-12	86.0	87.2	1.2	132.9	130.7	-2.2	132.3	133.7	1.4	128:42	165:48	37:06
RSG-G-13	88.8	89.8	1.0	131.7	129.9	-1.8	134.9	136.1	1.2	117:18	149:48	32:30
RSG-G-14	94.9	96.1	1.2	127.4	132.7	5.3	141.1	142.4	1.3	234:18	299:54	65:36
RSG-G-15	70.6	71.6	1.0	109.7	99.5	-10.2	116.3	117.5	1.2	79:18	103:00	23:42
RSG-G-16	67.5	68.5	1.0	103.1	94.5	-8.6	113.3	114.5	1.2	69:48	90:12	20:24
RSG-G-17	65.3	66.3	1.0	99.0	92.7	-6.3	110.9	112.1	1.2	55:18	71:24	16:06
RSG-G-18	62.2	63.2	1.0	93.7	89.1	-4.6	107.8	108.9	1.1	36:00	45:36	9:36
RSG-G-19	60.2	61.2	1.0	86.8	86.8	0.0	105.6	106.7	1.1	22:54	28:06	5:12
RSG-G-20	58.8	59.9	1.1	85.4	85.4	0.0	104.2	105.4	1.2	18:00	22:24	4:24
RSG-G-21	58.2	59.2	1.0	84.8	84.8	0.0	103.5	104.7	1.2	17:24	22:18	4:54
RSG-G-22	56.7	57.8	1.1	83.0	83.0	0.0	102.1	103.4	1.3	15:18	20:00	4:42
RSG-G-23	55.7	56.8	1.1	81.7	81.7	0.0	101.1	102.4	1.3	14:24	19:06	4:42
RSG-H-1	53.1	53.8	0.7	85.2	80.5	-4.7	99.4	100.1	0.7	3:00	2:36	-0:24
RSG-H-2	54.1	54.7	0.6	85.9	80.9	-5.0	100.4	101.0	0.6	5:00	4:30	-0:30
RSG-H-3	55.2	55.7	0.5	89.0	82.2	-6.8	101.5	102.0	0.5	7:54	7:30	-0:24
RSG-H-4	56.1	56.6	0.5	93.8	83.7	-10.1	102.4	102.9	0.5	12:42	12:42	0:00
RSG-H-5	57.0	57.5	0.5	93.5	84.8	-8.7	103.3	103.8	0.5	17:42	18:42	1:00
RSG-H-6	58.1	58.7	0.6	95.5	86.4	-9.1	104.3	105.0	0.7	25:30	29:24	3:54
RSG-H-7	59.4	60.2	0.8	97.5	89.5	-8.0	105.6	106.5	0.9	39:54	50:06	10:12
RSG-H-8	60.8	61.8	1.0	91.5	87.7	-3.8	107.0	108.0	1.0	59:12	76:48	17:36
RSG-H-9	62.5	63.6	1.1	87.4	85.1	-2.3	108.6	109.8	1.2	80:30	103:54	23:24

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-H-10	64.8	65.9	1.1	85.0	84.8	-0.2	110.7	111.8	1.1	136:24	174:54	38:30
RSG-H-11	70.0	70.9	0.9	84.4	86.1	1.7	113.7	114.7	1.0	186:06	234:42	48:36
RSG-H-12	81.5	82.3	0.8	135.5	133.8	-1.7	121.6	122.5	0.9	114:18	145:06	30:48
RSG-H-13	63.3	64.3	1.0	83.1	83.8	0.7	109.3	110.3	1.0	94:00	119:00	25:00
RSG-H-14	63.6	64.6	1.0	84.3	84.7	0.4	109.7	110.8	1.1	107:06	136:00	28:54
RSG-H-15	61.3	62.3	1.0	86.0	83.7	-2.3	107.6	108.7	1.1	61:18	78:54	17:36
RSG-H-16	59.1	60.0	0.9	86.5	84.0	-2.5	105.4	106.5	1.1	40:24	52:42	12:18
RSG-H-17	56.5	57.4	0.9	85.6	82.9	-2.7	102.8	103.8	1.0	19:48	25:00	5:12
RSG-H-18	54.1	54.9	0.8	82.1	78.0	-4.1	100.4	101.2	0.8	6:36	7:00	0:24
RSG-H-19	52.4	53.1	0.7	78.2	72.4	-5.8	98.7	99.5	0.8	2:00	1:48	-0:12
RSG-H-20	51.3	52.0	0.7	74.6	71.5	-3.1	97.5	98.3	0.8	0:48	1:12	0:24
RSG-H-21	50.6	51.4	0.8	73.5	71.5	-2.0	96.8	97.7	0.9	0:48	1:24	0:36
RSG-H-22	50.1	51.0	0.9	72.6	71.5	-1.1	96.3	97.3	1.0	0:54	1:24	0:30
RSG-H-23	49.8	50.8	1.0	76.8	74.3	-2.5	96.0	97.1	1.1	0:54	1:24	0:30
RSG-I-1	56.5	57.3	0.8	85.3	80.5	-4.8	103.1	104.1	1.0	25:42	32:12	6:30
RSG-I-2	57.7	58.5	0.8	86.9	81.6	-5.3	104.4	105.2	0.8	31:48	39:06	7:18
RSG-I-3	58.9	59.6	0.7	90.5	82.5	-8.0	105.5	106.3	0.8	39:18	47:42	8:24
RSG-I-4	60.2	61.0	0.8	93.9	84.3	-9.6	106.9	107.6	0.7	49:30	61:30	12:00
RSG-I-5	61.5	62.2	0.7	94.9	85.5	-9.4	108.1	108.9	0.8	60:24	76:00	15:36
RSG-I-6	63.4	64.2	0.8	96.5	87.9	-8.6	110.0	110.9	0.9	70:36	89:30	18:54
RSG-I-7	65.9	66.9	1.0	98.5	91.2	-7.3	112.5	113.5	1.0	80:36	102:42	22:06
RSG-I-8	68.1	69.1	1.0	102.1	94.2	-7.9	114.6	115.7	1.1	89:48	114:30	24:42
RSG-I-9	70.9	71.9	1.0	108.0	99.2	-8.8	117.5	118.5	1.0	99:00	126:42	27:42
RSG-I-10	77.4	78.5	1.1	123.8	111.9	-11.9	123.9	125.1	1.2	123:12	156:30	33:18
RSG-I-11	87.6	88.6	1.0	135.0	131.9	-3.1	134.0	135.0	1.0	131:30	164:30	33:00
RSG-I-12	88.7	89.8	1.1	137.9	143.1	5.2	135.0	136.2	1.2	114:48	142:30	27:42
RSG-I-13	89.8	91.0	1.2	128.3	130.5	2.2	136.1	137.4	1.3	184:36	234:42	50:06

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-I-14	73.5	74.3	0.8	129.6	109.8	-19.8	120.2	121.0	0.8	72:30	92:00	19:30
RSG-I-15	69.0	69.9	0.9	109.2	99.1	-10.1	115.6	116.6	1.0	64:24	82:24	18:00
RSG-I-16	66.6	67.5	0.9	103.6	95.6	-8.0	113.2	114.2	1.0	57:42	73:42	16:00
RSG-I-17	63.7	64.6	0.9	99.4	91.9	-7.5	110.4	111.3	0.9	48:06	61:12	13:06
RSG-I-18	60.5	61.3	0.8	95.2	87.9	-7.3	107.2	108.0	0.8	36:48	46:06	9:18
RSG-I-19	58.4	59.2	0.8	88.6	85.9	-2.7	105.1	106.0	0.9	25:24	30:48	5:24
RSG-I-20	57.2	58.0	0.8	85.0	85.0	0.0	104.0	104.9	0.9	19:36	22:54	3:18
RSG-I-21	56.1	57.0	0.9	84.0	84.0	0.0	102.9	103.9	1.0	17:30	21:18	3:48
RSG-I-22	54.9	55.9	1.0	82.7	82.7	0.0	101.8	102.8	1.0	15:06	19:06	4:00
RSG-I-23	53.5	54.5	1.0	84.7	80.9	-3.8	100.3	101.4	1.1	13:48	17:54	4:06
RSG-J-1	54.2	54.7	0.5	85.2	80.5	-4.7	100.6	101.1	0.5	9:00	9:12	0:12
RSG-J-2	55.5	56.0	0.5	86.7	81.3	-5.4	101.9	102.4	0.5	14:54	17:30	2:36
RSG-J-3	56.5	56.9	0.4	89.4	82.2	-7.2	102.9	103.3	0.4	20:30	24:24	3:54
RSG-J-4	57.3	57.7	0.4	94.0	83.8	-10.2	103.6	104.1	0.5	25:42	31:12	5:30
RSG-J-5	58.1	58.5	0.4	95.1	85.7	-9.4	104.4	104.9	0.5	30:06	37:36	7:30
RSG-J-6	59.0	59.6	0.6	95.8	86.5	-9.3	105.3	106.0	0.7	34:30	43:48	9:18
RSG-J-7	60.0	60.8	0.8	94.0	88.4	-5.6	106.2	107.1	0.9	40:48	52:48	12:00
RSG-J-8	60.5	61.5	1.0	91.7	88.0	-3.7	106.7	107.8	1.1	46:36	60:18	13:42
RSG-J-9	60.9	62.0	1.1	89.0	86.6	-2.4	107.2	108.3	1.1	52:00	66:48	14:48
RSG-J-10	62.0	63.0	1.0	86.1	85.0	-1.1	108.1	109.2	1.1	70:24	90:00	19:36
RSG-J-11	60.9	61.9	1.0	83.3	83.3	0.0	107.0	108.0	1.0	53:42	67:48	14:06
RSG-J-12	59.5	60.5	1.0	82.2	82.2	0.0	105.6	106.7	1.1	48:24	64:24	16:00
RSG-J-13	64.9	65.8	0.9	94.4	97.6	3.2	108.9	109.9	1.0	81:30	102:54	21:24
RSG-J-14	63.8	64.8	1.0	98.0	94.2	-3.8	109.1	110.2	1.1	83:30	105:48	22:18
RSG-J-15	60.9	61.9	1.0	107.5	93.8	-13.7	107.0	108.1	1.1	37:48	49:12	11:24
RSG-J-16	60.4	61.3	0.9	102.2	91.8	-10.4	106.7	107.6	0.9	36:06	46:24	10:18
RSG-J-17	59.7	60.4	0.7	98.8	89.7	-9.1	106.0	106.8	0.8	33:12	42:42	9:30

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-J-18	58.5	59.1	0.6	96.5	86.7	-9.8	104.9	105.5	0.6	28:24	36:12	7:48
RSG-J-19	56.7	57.0	0.3	95.3	85.5	-9.8	103.0	103.4	0.4	22:06	27:36	5:30
RSG-J-20	54.6	55.0	0.4	94.2	83.5	-10.7	101.0	101.5	0.5	14:12	17:00	2:48
RSG-J-21	52.5	52.9	0.4	88.9	82.8	-6.1	99.0	99.5	0.5	6:30	6:48	0:18
RSG-J-22	50.4	50.9	0.5	87.4	82.0	-5.4	96.9	97.5	0.6	2:36	2:00	-0:36
RSG-J-23	48.7	49.3	0.6	83.0	79.4	-3.6	95.3	96.0	0.7	1:00	0:54	-0:06
RSG-K-1	53.7	54.1	0.4	85.0	80.3	-4.7	100.0	100.4	0.4	10:30	11:42	1:12
RSG-K-2	54.3	54.7	0.4	86.3	81.0	-5.3	100.6	101.0	0.4	12:00	13:30	1:30
RSG-K-3	54.1	54.4	0.3	87.2	81.7	-5.5	100.4	100.7	0.3	10:00	10:30	0:30
RSG-K-4	53.6	53.9	0.3	92.9	82.7	-10.2	99.8	100.2	0.4	7:42	7:06	-0:36
RSG-K-5	53.0	53.4	0.4	90.4	82.1	-8.3	99.3	99.7	0.4	6:30	6:00	-0:30
RSG-K-6	52.8	53.4	0.6	83.6	77.3	-6.3	99.0	99.7	0.7	5:24	4:42	-0:42
RSG-K-7	53.1	53.8	0.7	80.6	78.1	-2.5	99.3	100.1	0.8	6:18	6:48	0:30
RSG-K-8	53.5	54.4	0.9	79.1	77.4	-1.7	99.7	100.7	1.0	6:54	8:30	1:36
RSG-K-9	54.1	55.0	0.9	77.7	77.7	0.0	100.2	101.2	1.0	6:18	8:06	1:48
RSG-K-10	54.3	55.2	0.9	80.0	80.0	0.0	100.4	101.4	1.0	4:42	6:00	1:18
RSG-K-11	53.6	54.6	1.0	76.7	76.7	0.0	99.6	100.6	1.0	2:00	2:18	0:18
RSG-K-12	53.5	54.4	0.9	77.4	77.4	0.0	99.2	100.2	1.0	1:12	1:36	0:24
RSG-K-13	55.5	56.4	0.9	83.2	82.2	-1.0	100.3	101.4	1.1	3:00	4:00	1:00
RSG-K-14	64.0	64.9	0.9	101.0	94.2	-6.8	109.4	110.4	1.0	49:54	62:36	12:42
RSG-K-15	58.7	59.6	0.9	91.5	87.8	-3.7	103.7	104.7	1.0	27:12	35:12	8:00
RSG-K-16	55.5	56.4	0.9	97.5	90.3	-7.2	101.4	102.3	0.9	10:18	12:36	2:18
RSG-K-17	55.5	56.1	0.6	98.4	88.1	-10.3	101.7	102.3	0.6	12:48	15:06	2:18
RSG-K-18	55.6	56.1	0.5	96.3	86.5	-9.8	101.9	102.4	0.5	16:24	19:48	3:24
RSG-K-19	55.8	56.1	0.3	95.6	85.3	-10.3	102.1	102.5	0.4	20:12	24:54	4:42
RSG-K-20	55.4	55.7	0.3	94.4	83.3	-11.1	101.7	102.1	0.4	19:12	23:36	4:24
RSG-K-21	54.2	54.5	0.3	88.7	82.7	-6.0	100.5	100.9	0.4	14:24	17:24	3:00

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-K-22	52.2	52.6	0.4	87.4	82.1	-5.3	98.6	99.0	0.4	8:06	9:18	1:12
RSG-K-23	49.5	49.9	0.4	81.8	78.6	-3.2	95.9	96.3	0.4	2:36	2:00	-0:36
RSG-L-1	52.9	53.3	0.4	84.7	80.2	-4.5	99.2	99.6	0.4	8:30	9:18	0:48
RSG-L-2	52.0	52.3	0.3	86.1	81.0	-5.1	98.2	98.6	0.4	5:06	4:42	-0:24
RSG-L-3	50.5	50.7	0.2	86.8	81.5	-5.3	96.7	97.0	0.3	2:24	1:18	-1:06
RSG-L-4	49.2	49.5	0.3	87.1	80.3	-6.8	95.5	95.7	0.2	1:00	0:24	-0:36
RSG-L-5	48.4	48.8	0.4	81.6	75.2	-6.4	94.7	95.0	0.3	0:18	0:12	-0:06
RSG-L-6	48.2	48.7	0.5	75.7	72.2	-3.5	94.4	94.9	0.5	0:18	0:12	-0:06
RSG-L-7	48.4	49.0	0.6	75.0	75.0	0.0	94.6	95.2	0.6	0:24	0:18	-0:06
RSG-L-8	48.9	49.6	0.7	76.5	76.5	0.0	95.0	95.8	0.8	0:30	0:30	0:00
RSG-L-9	49.2	50.0	0.8	76.8	76.8	0.0	95.3	96.2	0.9	0:24	0:30	0:06
RSG-L-10	49.1	50.0	0.9	72.9	72.9	0.0	95.1	96.0	0.9	0:06	0:24	0:18
RSG-L-11	49.2	50.0	0.8	75.3	75.3	0.0	95.1	95.9	0.8	0:24	0:30	0:06
RSG-L-12	49.4	50.2	0.8	78.1	78.1	0.0	95.1	95.9	0.8	0:24	0:30	0:06
RSG-L-13	50.2	51.1	0.9	77.3	76.3	-1.0	95.2	96.2	1.0	0:18	0:36	0:18
RSG-L-14	54.5	55.4	0.9	86.8	83.3	-3.5	99.0	99.9	0.9	2:06	2:48	0:42
RSG-L-15	66.0	66.9	0.9	102.7	91.0	-11.7	112.0	112.9	0.9	50:24	62:36	12:12
RSG-L-16	55.5	56.3	0.8	88.1	83.7	-4.4	100.6	101.5	0.9	8:12	9:06	0:54
RSG-L-17	52.2	52.7	0.5	94.5	85.9	-8.6	98.0	98.6	0.6	3:36	3:54	0:18
RSG-L-18	52.0	52.4	0.4	93.0	84.6	-8.4	98.1	98.6	0.5	5:06	5:00	-0:06
RSG-L-19	52.6	52.9	0.3	94.9	84.4	-10.5	98.9	99.3	0.4	7:12	7:00	-0:12
RSG-L-20	53.4	53.7	0.3	92.2	83.1	-9.1	99.7	100.0	0.3	10:00	10:48	0:48
RSG-L-21	53.6	54.0	0.4	88.5	82.6	-5.9	100.0	100.3	0.3	12:12	14:12	2:00
RSG-L-22	53.1	53.5	0.4	87.4	82.0	-5.4	99.5	99.8	0.3	11:12	13:24	2:12
RSG-L-23	51.4	51.8	0.4	85.7	80.9	-4.8	97.7	98.2	0.5	7:00	8:00	1:00
RSG-M-1	50.9	51.2	0.3	84.4	80.0	-4.4	97.1	97.5	0.4	3:24	2:36	-0:48
RSG-M-2	48.8	49.1	0.3	85.8	81.0	-4.8	95.1	95.3	0.2	1:18	0:36	-0:42

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-M-3	47.1	47.2	0.1	86.0	81.1	-4.9	93.3	93.5	0.2	0:24	0:12	-0:12
RSG-M-4	45.9	46.0	0.1	77.1	75.3	-1.8	92.1	92.3	0.2	0:06	0:06	0:00
RSG-M-5	45.2	45.4	0.2	74.9	73.9	-1.0	91.4	91.6	0.2	0:06	0:06	0:00
RSG-M-6	44.8	45.2	0.4	72.4	72.4	0.0	91.0	91.4	0.4	0:06	0:06	0:00
RSG-M-7	45.2	45.6	0.4	72.9	72.9	0.0	91.4	91.9	0.5	0:12	0:12	0:00
RSG-M-8	45.5	46.0	0.5	74.1	74.1	0.0	91.6	92.2	0.6	0:18	0:12	-0:06
RSG-M-9	45.6	46.3	0.7	75.6	75.6	0.0	91.7	92.4	0.7	0:12	0:06	-0:06
RSG-M-10	45.7	46.5	0.8	70.9	70.9	0.0	91.6	92.5	0.9	0:06	0:06	0:00
RSG-M-11	46.2	46.9	0.7	76.1	76.1	0.0	92.1	92.8	0.7	0:18	0:18	0:00
RSG-M-12	46.6	47.2	0.6	79.0	79.0	0.0	92.2	92.9	0.7	0:24	0:24	0:00
RSG-M-13	46.7	47.4	0.7	76.6	76.6	0.0	91.9	92.7	0.8	0:06	0:06	0:00
RSG-M-14	49.3	50.1	0.8	79.6	77.4	-2.2	94.0	94.9	0.9	0:30	0:36	0:06
RSG-M-15	55.7	56.5	0.8	89.6	83.2	-6.4	100.8	101.6	0.8	14:06	17:12	3:06
RSG-M-16	63.7	64.6	0.9	98.4	88.4	-10.0	109.8	110.7	0.9	50:12	62:30	12:18
RSG-M-17	53.1	53.8	0.7	88.2	80.7	-7.5	98.5	99.2	0.7	2:42	3:12	0:30
RSG-M-18	50.4	50.7	0.3	95.8	85.3	-10.5	96.2	96.6	0.4	2:06	2:12	0:06
RSG-M-19	50.0	50.3	0.3	90.3	81.4	-8.9	96.2	96.5	0.3	2:30	2:24	-0:06
RSG-M-20	50.8	51.1	0.3	88.2	82.5	-5.7	97.1	97.4	0.3	3:54	3:42	-0:12
RSG-M-21	51.5	51.8	0.3	87.6	82.0	-5.6	97.8	98.2	0.4	5:30	5:18	-0:12
RSG-M-22	52.1	52.4	0.3	85.8	81.2	-4.6	98.4	98.7	0.3	7:12	7:30	0:18
RSG-M-23	51.6	52.0	0.4	84.9	80.0	-4.9	97.9	98.3	0.4	6:36	7:06	0:30
RSG-N-1	48.4	48.7	0.3	82.7	78.3	-4.4	94.7	95.0	0.3	1:12	0:36	-0:36
RSG-N-2	46.3	46.5	0.2	84.1	79.8	-4.3	92.5	92.7	0.2	0:18	0:12	-0:06
RSG-N-3	44.5	44.6	0.1	81.3	78.1	-3.2	90.7	90.8	0.1	0:06	0:06	0:00
RSG-N-4	43.3	43.4	0.1	72.7	71.5	-1.2	89.4	89.5	0.1	0:00	0:00	0:00
RSG-N-5	42.6	42.7	0.1	68.9	67.0	-1.9	88.8	88.9	0.1	0:00	0:00	0:00
RSG-N-6	42.5	42.7	0.2	70.8	70.8	0.0	88.7	88.9	0.2	0:06	0:06	0:00

Table G-3 (*Continued*)
NOISE MEASUREMENT SITES GRID POINT ANALYSIS - 2015 AND 2020 NOISE CONTOURS
Charlotte Douglas International Airport

GRID ID	DNL			LMAX			SEL			TA65		
	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE	2015	2020	CHANGE
RSG-N-7	42.9	43.2	0.3	71.1	71.1	0.0	89.1	89.4	0.3	0:12	0:12	0:00
RSG-N-8	43.1	43.5	0.4	72.9	72.9	0.0	89.3	89.7	0.4	0:12	0:12	0:00
RSG-N-9	43.1	43.6	0.5	74.2	74.2	0.0	89.1	89.7	0.6	0:06	0:06	0:00
RSG-N-10	43.2	43.8	0.6	70.9	70.9	0.0	89.2	89.8	0.6	0:06	0:06	0:00
RSG-N-11	43.9	44.5	0.6	77.0	77.0	0.0	89.8	90.4	0.6	0:12	0:12	0:00
RSG-N-12	44.2	44.7	0.5	79.7	79.7	0.0	89.9	90.5	0.6	0:18	0:18	0:00
RSG-N-13	44.0	44.7	0.7	75.9	75.9	0.0	89.5	90.1	0.6	0:06	0:06	0:00
RSG-N-14	45.7	46.3	0.6	76.3	76.3	0.0	90.7	91.4	0.7	0:06	0:06	0:00
RSG-N-15	49.7	50.3	0.6	81.5	81.0	-0.5	94.6	95.3	0.7	0:36	0:36	0:00
RSG-N-16	57.7	58.5	0.8	92.4	84.6	-7.8	103.5	104.4	0.9	33:24	42:42	9:18
RSG-N-17	59.7	60.6	0.9	94.4	85.4	-9.0	105.8	106.7	0.9	43:36	55:06	11:30
RSG-N-18	51.7	52.2	0.5	92.8	82.9	-9.9	97.2	97.9	0.7	1:54	2:06	0:12
RSG-N-19	49.1	49.4	0.3	88.2	80.1	-8.1	94.9	95.3	0.4	1:24	1:18	-0:06
RSG-N-20	49.2	49.5	0.3	88.4	82.4	-6.0	95.4	95.7	0.3	2:18	2:30	0:12
RSG-N-21	49.8	50.0	0.2	86.5	81.6	-4.9	96.0	96.3	0.3	2:48	2:42	-0:06
RSG-N-22	50.5	50.8	0.3	85.7	80.8	-4.9	96.9	97.2	0.3	4:12	4:06	-0:06
RSG-N-23	50.8	51.1	0.3	84.2	79.3	-4.9	97.1	97.5	0.4	4:12	3:42	-0:30