

NOISE MEASUREMENT OF AIR TRAFFIC IN NORTHERN IRELAND

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Introduction

Sound is measured in decibels (dB); it is a logarithmic unit of measurement that expresses the magnitude of a physical quantity relative to a specified or implied reference level.

On the decibel scale the smallest audible sound (near total silence) is 0dB. A sound 10 times more powerful is 10dB. A sound 100 times more powerful than near total silence is 20 dB.

Noise – How is it measured?

The commonly accepted definition of noise is ‘sound which is undesired by the recipient’.

A-Weighted Decibel dB(A) is a unit of sound pressure level, adjusted into accordance with the A weighting scale, which takes into account the increased sensitivity of the ear at some frequencies. This is often used in environmental noise measurements and is used for measuring noise at Northern Irish airports.

Under the terms of the European Union’s *Environmental Noise Directive*¹ (END) a programme of actions on noise is set out for Member States. These actions include the determination of noise exposure from the results of strategic noise mapping.

Environmental noise in the context of the END is noise from transport and some industrial sources. The END *does not* cover domestic/neighbour noise, noise at work, noise inside means of transport or military noise.

Noise Mapping

Noise mapping is the current method used for measuring airport noise in Northern Ireland. Belfast City Airport and Belfast International Airport are the two airports which have their noise measured.

A noise map is generally generated using computer software that calculates noise levels from input data such as traffic flows and topography (e.g. ground levels)

Computer modelling is used rather than noise measurement as measurement would be prohibitively expensive and it would be technically difficult to isolate different sources of noise (e.g. road, rail, aircraft, and industry).

¹ <http://ec.europa.eu/environment/noise/directive.htm>

The computation method that's used in Northern Ireland is the FAA INM v6.2a method.

Noise maps are normally contour maps showing areas of differing levels of noise. They can be maps of individual noise sources i.e. road traffic, railway traffic, aircraft in flight or industry. However, all the sources can be combined into one map to give an overall picture of the noise climate. In the case of END maps, the noise levels are calculated at a height of 4 metres above ground level.

Requirement for Noise Maps²

To comply with the END, environmental noise levels have to be strategically mapped in the following areas:

- In agglomerations – large, densely populated urban areas – over 250,000 people and in the UK with a population density of more than 500 people per km². The only agglomeration that meets these criteria in Northern Ireland is the *Belfast Metropolitan Urban Area* (BMUA).
- Around airports with more than 50,000 movements per year.

Measurement of Noise Levels in Northern Ireland under the END

The noise levels are long-term levels determined over a period of a year and are shown in terms of the following noise indicators:

- LAeq, T – This is the notional A-weighted equivalent continuous sound level which, if it occurred over the same time period, would give the same noise level as the actual varying sound level. The T denotes the time period over which the average is taken, for example, LAeq, 8h is the equivalent continuous noise level over the 8 hour period of 2300 – 0700 hours.
- LAeq, 16h – The A-weighted average sound level over the 16 hour period of 0700 – 2300 hours.
- Lday – The A weighted average sound level over the 12 hour day period of 0700 – 1900 hours.
- L evening – The A-weighted average sound level over the 4 hour evening period of 1900 – 2300 hours.
- Lnight – The A-weighted average sound level over the 8 hour night period of 2300 – 0700 hours.
- Lden – The day, evening, night level, Lden is a logarithmic composite of the Lday, Levening, and Lnight but with 5 dB(A) being added to the Levening value and 10 Db(A) being added to the Lnight value.

The *World Health Organisation*³ (WHO) recommends that daytime Leq should not exceed 55Db (A) to avoid any significant annoyance.

² http://www.environmental-protection.org.uk/assets/library/documents/Noise_Mapping_Briefing_May08.pdf

³ http://www.ladacan.org/html/about_noise.HTM

Belfast International Airport⁴

The following table sets out the results of the population exposure analysis for the Belfast International Airport outside the Belfast Metropolitan Urban Area (BMUA), inside the BMUA and across the whole of Northern Ireland:

Noise Scenario	Noise Category (dB)	Estimated Population		
		Outside BMUA	Inside BMUA	Northern Ireland
L _{den}	<55	1,098,300	576,300	1,674,600
	55-59	500	0	500
	60-64	100	0	100
	65-69	0	0	0
	70-74	0	0	0
	>=75	0	0	0
	Total		1,098,900	576,300
L _{night}	<50	1,098,800	576,300	1,675,100
	50-54	100	0	100
	55-59	0	0	0
	60-64	0	0	0
	65-69	0	0	0
	>=70	0	0	0
	Total		1,098,900	576,300

⁴ http://www.noiseni.co.uk/index/maps-and-charts/major_airports.htm

Belfast City Airport⁵

The following table sets out the results of population exposure analysis for Belfast City Airport within the Belfast agglomeration. Belfast International Airport does not produce any impact within the Belfast agglomeration within these noise categories:

<i>Noise Scenario</i>	<i>Noise Category (dB)</i>	<i>Estimated Population</i>
		<i>Inside BMUA</i>
L _{den}	<55	574,000
	55-59	2,300
	60-64	0
	65-69	0
	70-74	0
	>=75	0
	Total	576,300
L _{night}	<50	576,300
	50-54	0
	55-59	0
	60-64	0
	65-69	0
	>=70	0
	Total	576,300

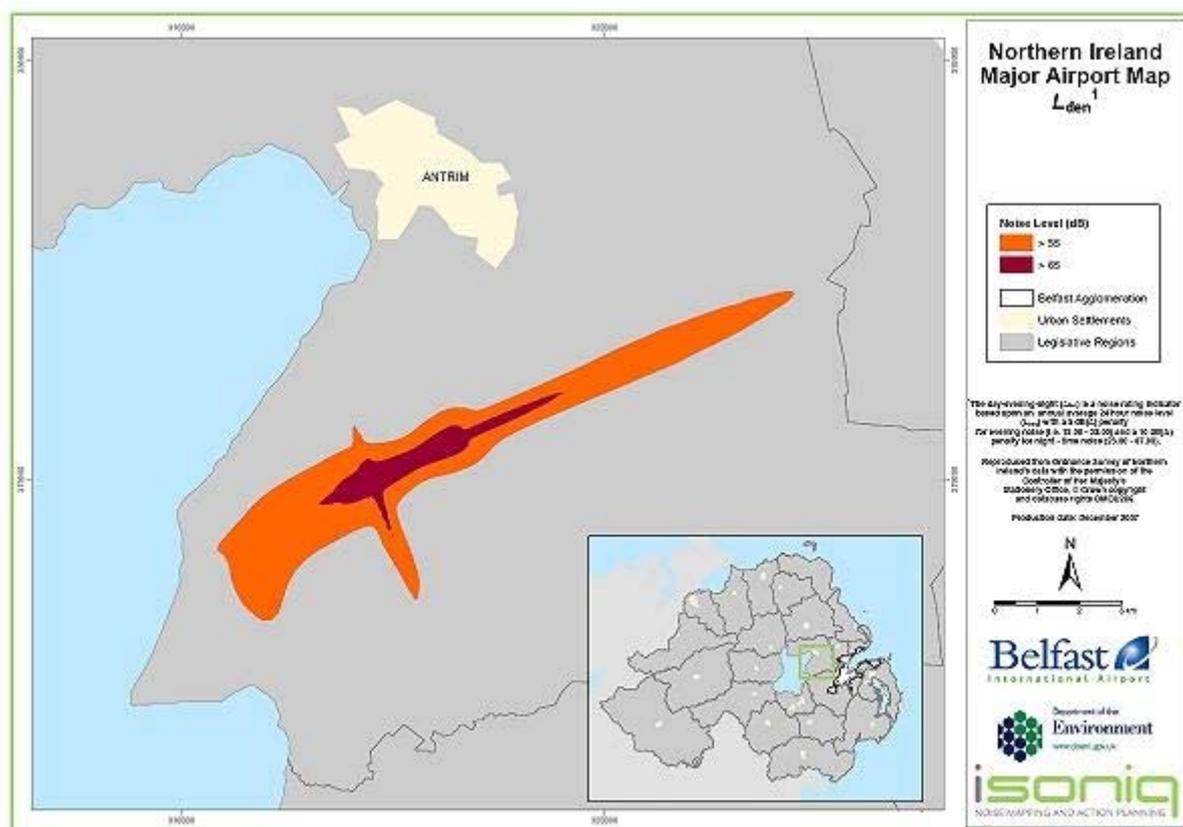
⁵ http://www.noiseni.co.uk/index/maps-and-charts/agglomeration_airports.htm

Example of Strategic Noise Map:

The following *Strategic Noise Map*⁶ shows the land in the Antrim area which has been affected by various noise levels:

- >55 dBL_{en} is highlighted in orange
- >65 dBL_{en} is highlighted in red

The highlighted area with a high level of noise is the location of Belfast International Airport.



The purpose of the strategic noise maps is:

- To enable the assessment of the exposure of populations to noise – by linking population data to high noise areas on maps.
- To inform the development of action plans to reduce the exposure of populations to noise areas on the maps.

END Noise maps *do not* account for individual noisy incidents. What they do show is an indication of the areas most consistently affected by relatively high levels of environmental noise and also those areas which are likely to be relatively quiet.

⁶ http://www.noiseni.co.uk/gb_n_df4_mair.pdf

Can the Methodology for Measuring Noise actually be Changed?

There is a second round of mapping in 2012⁷, in addition to remapping the areas covered in the first round. In this second round, all agglomerations with a population of over 100,000 will also be mapped.

According to the *Luton & District Association for the Control of Aircraft Noise*⁸ there has been interest in alternative ways of characterising noise around airports: one such indicator is N70. It's a simple count of the number of overflights at a location for which peak noise on the ground exceeds 70 dB (A). It is usually calculated for the "average day" in a time period. N70 has been extensively used in Australia to supplement average indicators. N60 is sometimes used for the night period.

Before the Leq (i.e. noise mapping) method was adopted in the UK, the standard indicator was the *Noise and Number Index* (NNI) which attempted to reflect both the frequency of noise events and their loudness.

A recently-completed study for the UK Government known as *ANASE*⁹ has provided some support for this view. It concluded that either flight numbers are under-represented by Leq indicators or that if Leq is a valid indicator of annoyance, people are now more sensitive to aircraft noise than they were in the early 1980's when a similar study was completed.

Media Coverage of Belfast City Airport

The *Belfast Telegraph*¹⁰ on the 1st September 2008 cite in an article about Belfast City Airport that controls at limiting the number of passengers and aircraft movements are to be relaxed. This would see more air traffic. A 'new draft planning agreement has been produced, and is currently being examined by the interested parties'.

The revised agreement will see two key changes:

- 'Cap on seats for sale per annum to be raised from three million inbound and outbound to four million';
- 'Limit on aircraft movements to be increase from 45,000 to 48,000'.

A review of these changes by the *General Consumer Council* is available at¹¹:

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⁷ <http://rod.eionet.europa.eu/show.jsv?id=368&aid=&mode=A&tab=overview>

⁸ http://www.ladacan.org/html/about_noise.HTM

⁹ <http://www.dft.gov.uk/pgr/aviation/environmentalissues/Anase/>

¹⁰ <http://www.belfasttelegraph.co.uk/business/business-news/belfast-city-airport-curbs-set-to-be-relaxed-13957658.html>

¹¹ <http://64.233.183.104/search?hl=en&gl=uk&q=response+to+the+consultation+belfast+city+airport>