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Air Noise Contouring

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Bickerdike Allen Partners (BAP) have been appointed by daa to model the airborne aircraft noise from Dublin Airport.

BAP was started in 1962, and has been involved with airport noise for many years. BAP's airport-related acoustic consultancy work in recent years has involved commissions for airport operators, local planning authorities and developers. BAP also assisted the UK Airports Commission in their consideration of runway capacity.

BAP have worked on developments on UK airports, such as Luton, Belfast City, Liverpool John Lennon, Farnborough, runway extensions at East Midlands and London Southend, second runways at London Gatwick and Stansted, and the UK's first city airport in London's Docklands as well as the new Robin Hood Airport.

BAP have worked on the noise impact of major international airports outside the UK, including Brussels International, Sheremetyevo (Moscow), Gibraltar, Milan (Malpensa), Marrakech, and Kuala Lumpur.

BAP have undertaken noise mapping, required by an EU directive, for a number of airports including Dublin where the output was submitted to the Environmental Protection Agency, Ireland.

More recently BAP have prepared future contours for Dublin Airport to assist with the discharge of planning conditions on the North Runway.

Noise Contours - Introduction

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Noise exposure contours are a common method of portraying aircraft noise.

Noise exposure contours show a set of closed curves on a map.

Each contour shows places where people get the same amounts of noise from the aircraft during a given period.

They are analogous to the contours on an ordinary map showing places at the same height.

Noise exposure contours can be produced for different noise metrics.

For example, it is common to rate annoyance in the U.K using:

- $L_{Aeq,16h}$ which gives the 'average' level during the day (07:00 – 23:00)

Why are Noise Contours Used for impact assessment?

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- Correlated with community response resulting from aircraft noise exposure.
- Take account of the number of events and each events noise level.
- Allow consideration of different scenarios including the future environment.
- Allow an assessment over a wide area.

Consequently at Dublin Airport Noise Contours have been:

- Used for planning purposes by Fingal County Council (Dublin Airport Local Area Plan)
- Referenced in planning conditions for North Runway in relation to:
  - the voluntary purchase of dwellings
  - the voluntary noise insulation of existing dwellings
  - the voluntary noise insulation of schools

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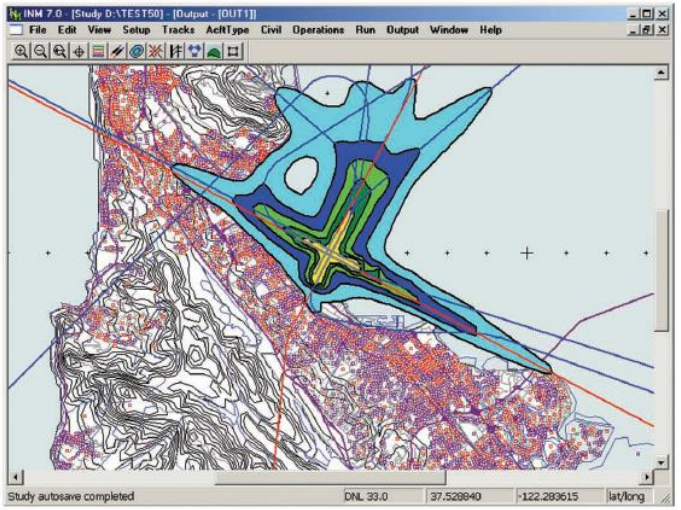
How do you predict aircraft noise?

Predicted using modelling software
Federal Aviation Administration (FAA)
Integrated Noise Model (INM)

Office of Environment and Energy

INM Technical Manual



INTEGRATED NOISE MODEL 7.0

How does the modelling software work?

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- Contains algorithms in accordance with ECAC CEAC Document 29 which model:
  - how aircraft operate accounting for local conditions (e.g. runway layout, and operating procedures)
  - how much noise on the ground each aircraft movement produces accounting for where it flies and local topography
  - the overall noise at points on the ground from all the aircraft movements during a period
  - the noise contours on the ground joining points with equal noise exposure
- Contains a database of aircraft noise and flight performance information. The noise information is based on data obtained when aircraft are certified under controlled conditions.

Noise Contour Input Data

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- Runway locations
- Runway usage (i.e. how the aircraft movements are split between the runways allowing for runway preferences and weather conditions (the average mode))
- Departure Route locations and the dispersion from them (as aircraft do not run on rails so actual tracks may differ from the published routes)
- Route usage (how the aircraft movements are split between routes)
- Aircraft flight profiles (how the aircraft are operated taking into account the destinations served as further destinations require greater fuel)
- The aircraft movements by aircraft type and period (e.g. the numbers during the daytime (07:00 – 23:00) and during the night-time (23:00 – 07:00) on a summer day). This comprises the specific aircraft used at Dublin or those planned to do so.
- The findings of airport specific validation.

Noise Contour Validation

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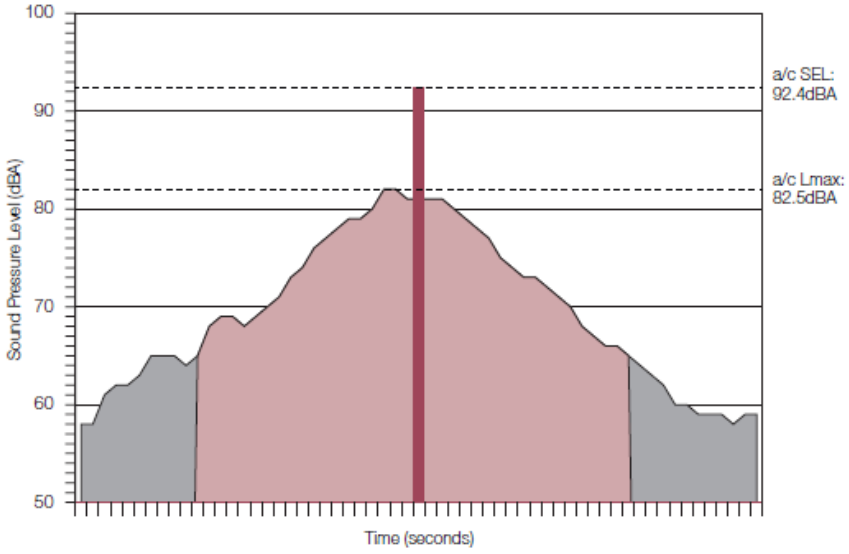
- Uses Aircraft Profiles provided by the main airlines (Aer Lingus and Ryanair)
- Uses the measured Sound Exposure Levels (SELs) from the Airport's noise monitoring system
- A SEL is the total noise from an aircraft movement
- Measured SELs for individual aircraft types are compared with predictions. Aircraft Profiles from airlines are adjusted to match measurements if required

UK Airports Commission Discussion Paper 05: Aviation Noise July 2013

Figure 3.1: Aircraft time history, showing maximum level L_{Amax} and associated Sound Exposure Level (SEL)[41]



Source: CAA data

Noise Contour Output

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Noise Contours can be presented using a number of different noise indices:

Daytime: $L_{Aeq,16h}$

Daytime and night-time: L_{den}

Night-time: L_{night}, $L_{Aeq,8h}$, SEL, L_{Amax}

Noise Contours can be presented using a number of different time periods:

Annual
(for the calendar year)

Summer
(for the 92 day period 16th June to 15th September inclusive, as this is usually the busiest period of the year for an airport)

It is common practice (as used in the UK and in the Dublin Airport 2007 EIS) to use Daytime: $L_{Aeq,16h}$ over an average Summer day.

The 2022 contours used to discharge Condition 6,7 and 9 use the $L_{Aeq,16h}$ metric over a typical busy day.

Noise Contour Example

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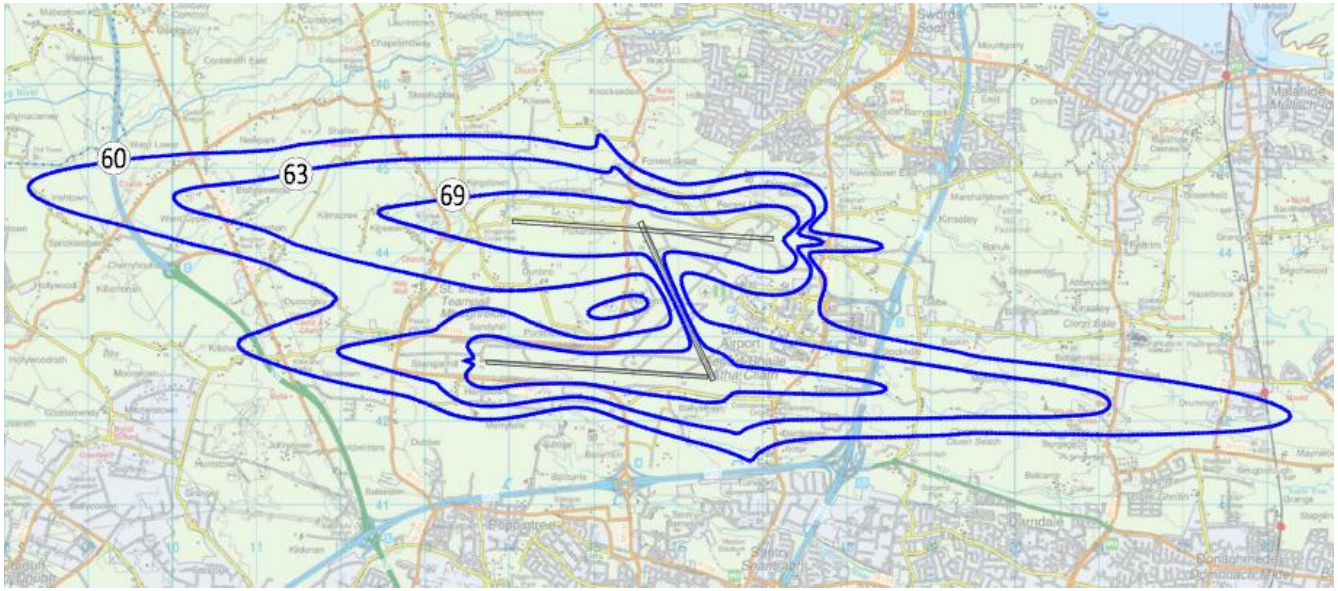
Forecast Daytime in 2022 based on a High Growth forecast for a Typical Busy Day reflecting the Option 7B runway preferences

(69 dB voluntary purchase of dwellings, 63 dB the voluntary noise insulation of existing dwellings, 60 dB the voluntary noise insulation of schools)



Noise Contours - Interpretation

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For the $L_{Aeq,16h}$ metric:

- 63 dB is where the UK Government expects airport operators to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, consequently it is commonly used as a threshold for noise mitigation
- The North Runway planning conditions use 63 dB for where a scheme for the voluntary noise insulation of existing dwellings is to apply. A scheme for all schools and registered pre-schools exposed to 60 dB is also required
- 69 dB is where the UK Government expects airport operators to offer households assistance with the costs of moving
- The North Runway planning conditions use 69 dB for where a scheme for the voluntary purchase of dwellings is to apply