

DUBLIN AIRPORT

A11219-N01-DR

29 August 2018

'LONGITUDINAL ANALYSIS' – L_{Amax} AND SEL NOISE LEVELS

1.0 INTRODUCTION

Bickerdike Allen Partners LLP (BAP) have been retained by daa to predict the levels of airborne aircraft noise from individual movements close to the airport. That is from departing aircraft shortly after take-off and from arriving aircraft shortly before landing. This information has been provided in accordance with a request from the St. Margaret's Concerned Residents community group.

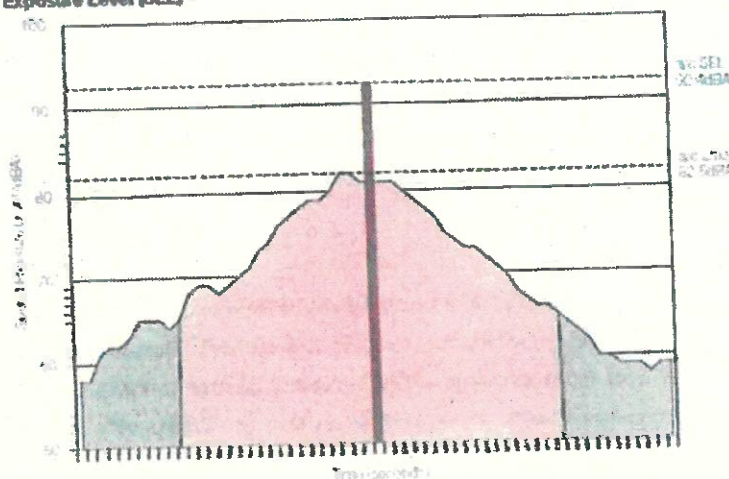
BAP have predicted the noise for six key aircraft types that either currently operate, have operated, or are forecast to operate in the future at Dublin Airport. The noise levels have been predicted for both arrivals and departures at eight points ranging from 0.5 to 4 km, in 0.5 km steps, from the west end of the permitted North Runway along the extended runway centreline. The points are shown in the attached drawing A11219-N01-01. This note reports these predicted noise levels and details the methodology used in their calculation.

2.0 METHODOLOGY

Noise levels have been calculated using the Federal Aviation Administration (FAA) Integrated Noise Model (INM) version 7.0d. The same software was used for the noise mapping of Dublin Airport undertaken for the Environmental Protection Agency (EPA) in 2017.

Noise levels have been calculated in terms of both L_{Amax} and Sound Exposure Level (SEL). L_{Amax} is the maximum instantaneous sound pressure level of an aircraft movement. SEL is a measure of the total noise from an aircraft movement. The SEL noise level for an aircraft movement is the sum of all the noise energy for the event expressed as an average noise level for 1 second. This is shown in the figure below. By adding the SELs of all of the operations at the airport over either 16 hours or 8 hours for the daytime and night time periods respectively and then averaging you get the $L_{Aeq,T}$ average noise contours.

Figure 3.1: Aircraft time history, showing maximum level L_{max} and associated Sound Exposure Level (SEL)²



Source: CAA 1993

The predictions assume the permitted North Runway is in operation. Arrivals have been modelled as using Runway 10L and departures have been modelled as using Runway 28R, both of these overfly the area to the north-west of the airport. Arrivals and departures have been modelled using straight routes, that is along the extended centreline of the North Runway.

Noise levels have been calculated for six key aircraft types:

- The Boeing 737-800 and the Airbus A320, which are the current most common aircraft types at Dublin Airport and in 2016 they performed around 37% and 23% of the total movements respectively;
- The Boeing 737 MAX8, which is forecast to be the most common type in the future, but doesn't yet operate in significant numbers;
- The Airbus A330-300, which is the current most common wide-body aircraft and in 2016 performed around 2% of the total movements;
- The Airbus A380, which is the largest aircraft forecast to operate at Dublin, but doesn't currently operate at Dublin;
- The Boeing 737-200, which is an older aircraft type that used to operate in large numbers, but no longer operates at Dublin. Noise levels have been provided for the Boeing 737-200 to illustrate how aircraft technology improves over time and that each generation of aircraft is quieter than the previous.

The INM noise modelling software includes a database of aircraft types and associated noise performance data. It is possible to refine this default data by a validation procedure to better predict aircraft noise around an airport based on actual noise monitoring data where this is available. At Dublin, the permanent noise monitoring and flight track keeping system provides this opportunity.

BAP have validated the default INM noise predictions for the most common aircraft at Dublin by comparing predicted noise levels with the noise levels measured at the airport's noise monitoring terminals (NMTs). Based on the validation exercise modifications have been made to the default INM noise predictions for the Boeing 737-800, the Airbus A320 and the Airbus A330-300. An aircraft type for the Boeing 737 MAX8 is not included in the INM, therefore the noise levels have been predicted for the Boeing 737-800 with an allowance made for the lower noise levels of the MAX8. This allowance has been based on the assumptions used by ECRD in their work for the Airports Commission in the UK¹.

Departures by the single aisle aircraft have been modelled as using intersection take-offs, whereas departures by the wide-body aircraft have been modelled as using the full runway length, as is expected to be case once the runway is operational.

¹ Baseline and Local Assessment Methodology Addendum, December 2014:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/389579/noise_methodology_addendum.pdf

3.0 RESULTS

The L_{Amax} and SEL noise levels rounded to the nearest decibel are given in Tables 2 and 3 below.

Operation	Aircraft Type	Noise Level, dB L_{Amax}							
		0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km	3.5 km	4.0 km
Departure	Airbus A320	86	83	78	78	77	77	76	76
	Airbus A330-300	91	90	89	88	87	83	82	81
	Airbus A380	89	88	87	86	85	84	83	83
	Boeing 737 Max8	87	84	81	79	78	77	77	76
	Boeing 737-800	90	87	83	81	80	80	79	79
	Boeing 737-200	96	94	93	92	90	87	86	85
Arrival	Airbus A320	94	90	87	85	83	81	80	79
	Airbus A330-300	97	93	90	87	86	84	83	82
	Airbus A380	95	91	89	87	85	83	82	81
	Boeing 737 Max8	94	90	87	85	83	81	80	79
	Boeing 737-800	94	90	87	85	83	81	80	79
	Boeing 737-200	94	90	88	86	84	82	81	80

Table 2: L_{Amax} Noise Levels at Assessment Locations

Operation	Aircraft Type	Noise Level, dB(A) SEL							
		0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km	3.5 km	4.0 km
Departure	Airbus A320	94	92	89	88	87	87	86	86
	Airbus A330-300	99	98	97	96	95	92	91	90
	Airbus A380	97	96	95	94	93	92	92	91
	Boeing 737 Max8	95	93	89	88	87	86	85	85
	Boeing 737-800	97	95	92	90	89	88	88	87
	Boeing 737-200	104	103	101	100	97	95	94	93
Arrival	Airbus A320	99	96	94	92	90	89	89	88
	Airbus A330-300	101	99	97	95	94	93	92	91
	Airbus A380	100	98	96	94	93	92	91	91
	Boeing 737 Max8	96	94	92	91	90	89	88	87
	Boeing 737-800	97	95	93	91	90	89	88	88
	Boeing 737-200	97	95	94	93	91	90	90	89

Table 3: SEL Noise Levels at Assessment Locations

4.0 SUMMARY

The noise levels for arrivals and departures by six key aircraft types have been predicted for operations on the permitted North Runway.

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