LONDON LUTON AIRPORT

A9457-N15-NW

14 August 2015

2015 CONTOURING METHODOLOGY UPDATE

1.0 INTRODUCTION

Since quarter 1 of 2012, London Luton Airport Operations Limited (LLAOL) have retained Bickerdike Allen Partners to produce quarterly night noise contours in accordance with the Night Noise Policy.

The methodology uses the Federal Aviation Administration (FAA) prediction program, the Integrated Noise Model (INM), and the actual number and mix of aircraft during the quarter, which is supplied by the airport. The methodology is reviewed periodically to ensure that the accuracy of the contours is maintained. A review has recently been completed resulting in the 2015 methodology which will be used for all 2015 contours. The main change between this and the previous (2014) methodology, reported in the note A9457-N08-NW, is a refinement of the departure profiles of the most common aircraft, based on information provided by easyJet and measured results from the mobile noise monitor while it was stationed in south Luton (Ludlow Avenue). In addition to this, there has been the usual update of the validation exercise so that it is based on the most recent annual set of measured results from the airport's noise and track keeping (NTK) system.

Sections 2.0 to 6.0 describe the main assumptions used in the modelling and highlight any changes to the previous methodology. Section 7.0 assesses the effect of the update in methodology by comparing the recently produced contours, those for the first quarter of 2015, produced under both methodologies.

2.0 SOFTWARE

The 2014 contours were produced using INM version 7.0d, which was released on 30th May 2013. This has been replaced by the FAA with the Aviation Environmental Design Tool (AEDT) as of May 2015. Until this new software has been fully trialled and validated, the earlier INM software has continued to be used.

3.0 ARRIVAL AND DEPARTURE TRACKS

Arrivals are modelled as straight approaches, along the runway centreline. Departure tracks are based on the published Standard Instrument Departures (SIDs) as given in the UK Aeronautical Information Publication (AIP). There are three modelled departure tracks from each runway end; one to Compton, one to Olney, and one to Match/Detling. The movement data supplied by the airport gives details of departure tracks. These assumptions are identical to those used for the previous methodology.

4.0 LOCAL TERRAIN

Local terrain has been included in the model, as it was in the previous methodology.

5.0 STAGE LENGTH

In the INM software, departure profiles and weight are determined by the stage length parameter, which categorises aircraft based on the distance to their destinations. Destination information has been used to determine departure weights, as was the case in the previous methodology.

6.0 DEPARTURE PROFILES AND UPDATE OF VALIDATION

Measured results from the mobile noise monitor while it was stationed in south Luton (Ludlow Avenue), given in Table 1, indicated that the 2014 methodology was significantly overestimating the noise levels produced by the three most common aircraft types at this location by around 4 dB(A) SEL, although the modelled noise levels at the fixed noise monitors agreed with the measured levels.

As a result, BAP have investigated the reason for the discrepancy. Reviewing detailed data from the airport's NTK system showed that the modelled departure profile did not match what was being modelled, so more information was sought from airlines. EasyJet were able to provide some detailed information regarding typical profiles achieved by their Airbus A319 and A320 aircraft. In summary, their aircraft cut back to a lower thrust setting earlier, and climb to 3,000 feet later than previously assumed. The modified profile has the effect of significantly reducing the noise level close to the airport, but has a smaller effect at more distant locations.

For the Boeing 737-800 aircraft, no information was received from the operators. However, using a modified profile similar to those used for the two Airbus aircraft resulted in much better agreement with the measured results at the south Luton location, while not changing

the modelled noise levels at the fixed noise monitors significantly. Therefore, it has been assumed that the Boeing 737-800 also follows a similar profile.

As can be seen in Table 1, using the updated methodology has significantly improved the accuracy at the south Luton location, reducing the predicted noise levels by 3-4 dB(A) and therefore significantly reducing the modelled overestimation.

Aircraft Type	Operation	South Luton NMT Noise Level, SEL dB(A)		
		Measured Average[1]	Validated INM Prediction (2014 Methodology)	Validated INM Prediction (2015 Methodology)
Airbus A319	Departure	87.8	92.1	88.4
Airbus A320	Departure	87.6	92.5	88.8
Boeing 737-800	Departure	90.3	93.0	90.0

Table 1: Comparison of Measured Sound Exposure Levels – South Luton

[1] Arithmetic average of measurements.

The validation exercise undertaken by BAP has also been updated so that it is based on the most recent set of annual measured results from the airport's NTK system. For the most common and loudest aircraft types the previous validation exercise, which used 2013 measured data, has been updated. This has been based on measured results in 2014. The measured sound exposure levels (SELs) obtained for the three main aircraft types operating at Luton Airport, the Airbus A319 and A320 and the Boeing 737-800, from the fixed Noise Monitoring Terminals (NMTs) in 2013 and 2014 are shown in Table 2.

Aircraft Type	Operation	Movement-Weighted NMT Noise Level, SEL dB(A)		
		2013 Average[1]	2014 Average[1]	Validated INM Prediction
Airbus A319	Arrival	84.3	84.4	84.5
	Departure	84.2	84.4	84.3
Airbus A320	Arrival	84.1	84.1	85.1
	Departure	84.5	84.8	84.9
Boeing 737-800	Arrival	85.6	85.5	86.5
	Departure	85.4	85.6	85.1

Table 2: Comparison of Measured Sound Exposure Levels – Fixed NMTs

[1] Only NMT1 results used for arrivals.NMT2 and NMT3 given half weighting as each movement typically results in 2 measured noise events.

The measured noise levels have remained consistent from 2013 to 2014, and therefore for arrivals the validated noise levels did not change. With the modified departure profiles, after the validation correction the validated noise levels at the fixed NMTs are similar to the previous methodology. This is despite a decrease in noise levels at the south Luton location of 3-4 dB(A), which has greatly improved the accuracy at that location.

Some minor changes were made to other aircraft types, which are not expected to have a significant effect on the noise contours.

7.0 CONTOUR COMPARISON

The contours for quarter 1 of 2015 have been computed using both methodologies and are compared in Figure A9457-N15-01. The areas are given in Table 3. The methodology update results in a decrease in the area of the contours, in particular in the 51-57 dB $L_{Aeq,8h}$ range. This is because the updated departure profiles for the three most common aircraft are initially very similar to the previous ones, but then reduce thrust earlier, resulting in significantly reduced noise levels in that area. Once the aircraft reach 3,000 ft, the updated profiles are again similar to the previous ones.

Contour Value (dB $L_{Aeq,8h}$)	Jan – Mar 2015 Contour Area (km^2)		
	2014 Methodology	2015 Methodology	Change (%)
48	16.9	15.9	-6%
51	9.4	8.3	-12%
54	5.4	4.6	-15%
57	2.8	2.4	-14%
60	1.4	1.4	-6%
63	0.9	0.8	-4%
66	0.6	0.5	-3%
69	0.4	0.3	-3%
72	0.2	0.2	-4%

Table 3: Comparison of Night Time Noise Contour Areas

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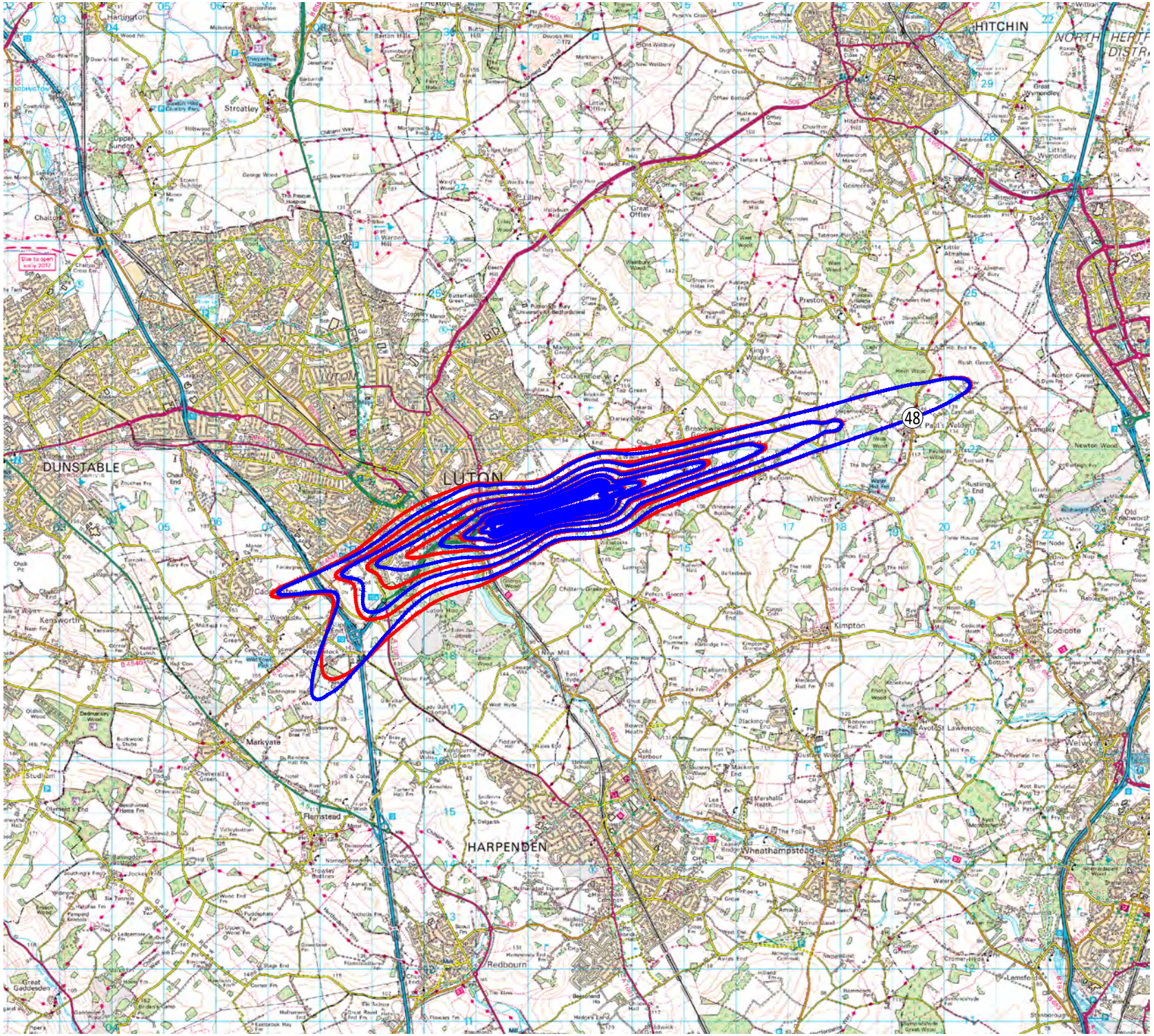

LEGEND:

Noise Contours (2014 Method), 48 to 72 dB $L_{Aeq,8h}$ in 3 dB steps

Noise Contours (2015 Method), 48 to 72 dB $L_{Aeq,8h}$ in 3 dB steps

REVISIONS

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London Luton Airport
Regular Contouring

Airborne Aircraft Noise Contours
Jan-Mar 2015 Average Night time
Methodology Comparison

DRAWN: NW CHECKED: DC

DATE: 14/08/2015 SCALE: 1:100000@A4

FIGURE No:

A9457/N15/01