LONDON LUTON AIRPORT

A11060-N17-DR

9th August 2018

2018 CONTOURING METHODOLOGY UPDATE

1.0 INTRODUCTION

Since quarter 1 of 2012, London Luton Airport Operations Limited (LLAOL) have retained Bickerdike Allen Partners LLP (BAP) 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 2018 methodology which will be used for all 2018 contours. The only change between this and the previous (2017) methodology, reported in the note A11060-N01-NW, is 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, i.e. those for the calendar year of 2017.

Sections 2.0 to 7.0 describe the main assumptions used in the modelling and highlight any changes to the previous methodology. Section 8.0 assesses the effect of the update in methodology by comparing the recently produced contours, those for the first quarter of 2018, produced under both methodologies.

2.0 SOFTWARE

The 2017 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 This has been replaced by the FAA with the Aviation Environmental Design Tool (AEDT) as of May 2015.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 for use at Luton Airport, 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). From runway 08 there are three modelled initial departure tracks; one to Compton, one to Olney, and one to Match/Detling. From runway 26 there are four; these are to the same set of destinations however the route to Match/Detling has an additional track for the RNAV version of the route. The majority of aircraft now use the RNAV version of the route. The movement data supplied by the airport gives details of departure tracks.

4.0 LOCAL TERRAIN

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

5.0 DEPARTURE PROFILES

For the majority of aircraft, the standard INM departure profiles have been used. For the Airbus A319, Airbus A320, Airbus A320neo and Boeing 737-800, modified departure profiles have been used. These were developed as part of the 2015 methodology update, based on information received from airlines and measured results from a mobile noise monitor when it was based in south Luton. These assumptions are identical to those used in the 2017 methodology.

6.0 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.

7.0 UPDATE OF VALIDATION

The validation exercise undertaken by BAP has 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 2016 measured data, has been updated. This has been based on measured results in 2017. The measured sound exposure levels (SELs) obtained for the three main aircraft types operating at Luton Airport, the Airbus A319, Airbus A320, and the Boeing 737-800, from the fixed Noise Monitoring Terminals (NMTs) in 2016 and 2017 are shown in Table 1. These are the averages of thousands of results for each operation.

Aircraft Type	Operation	Movement-Weighted NMT Noise Level, SEL dB(A)		
		2016 Average[1]	2017 Average[1]	Validated INM Prediction(1)
Airbus A319	Arrival	84.2	84.7	84.5
	Departure	83.9	84.0	83.5
Airbus A320	Arrival	83.8	84.4	84.2
	Departure	84.2	84.2	83.9
Boeing 737-800	Arrival	85.3	85.8	86.5
	Departure	85.5	85.8	84.9

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

Table 1: Comparison of Measured Sound Exposure Levels – Fixed NMTs

For the detailed validation the average at each individual monitor is considered, and the validation attempts to achieve the best fit with the results. In this it is taken into account that the results from NMT 3, due to its proximity to the motorway, are likely to overstate the aircraft noise.

The measured arrival noise levels have increased slightly from 2016 to 2017 for all three aircraft, as have the measured departure noise levels for the Airbus A319 and the Boeing 737-800. However due to the small magnitude of the increases no changes have been made to the validation. Measured departure noise levels for the Airbus A320 in 2017 are the same as those in 2016.

Aside from these main types the measured noise levels were relatively consistent for most aircraft types, although there were small increases on average in the measured arrival noise levels. Due to changes in the measured noise levels, small increases have been made to the modelled arrival noise levels for the Boeing 737-400 and the modelled departure noise levels for the Airbus A321 and Gulfstream V. Specifically the modelled noise levels have been increased by 0.2 dB for the Boeing 737-400, 0.2 dB for the Airbus A321, and 1 dB for the Gulfstream V.

Two aircraft which were newly validated this year were the Boeing 737-300 and 737-900. The Boeing 737-300 did not require an adjustment to either its arrival or departure noise levels. The INM does not specifically include the Boeing 737-900 so a substitute type has been used. This did not require an adjustment to its arrival noise levels but did require an increase of 2.8 dB to model the departure noise levels.

Five aircraft types that were validated in 2017 were not validated in 2018 due to them no longer operating in sufficient numbers, these were the Cessna 560XL, the Bombardier Challenger 300, Challenger 600 and Global Express and the Gulfstream IV. In 2018 these now just use the default INM assumptions.

8.0 CONTOUR COMPARISON

The contours for quarter 1 of 2018 have been computed using both methodologies and are compared in Figure 01. The areas of the contours are given in Table 2.

Contour Value (dB $L_{Aeq,8h}$)	Jan – Mar 2018 Contour Area (km^2)		
	2017 Methodology	2018 Methodology	Change (%)[1]
48	23.0	23.1	0.5%
51	12.6	12.6	0.4%
54	6.7	6.8	0.4%
57	3.7	3.7	0.6%
60	1.9	1.9	0.6%
63	1.2	1.2	0.5%
66	0.7	0.7	0.5%
69	0.5	0.5	0.6%
72	0.3	0.3	0.6%

[1] Percentage change based on unrounded contour areas.

Table 2: Comparison of Night Time Noise Contour Areas

As can be seen from Figure 01, the methodology update results in very little change to the contours. There is a small increase in contour area of around 0.5%. This is due to the validation update, which made a small increase to the modelled departure noise levels of two aircraft types and the modelled arrival noise levels of one aircraft type to account for the slight increase in measured noise levels.

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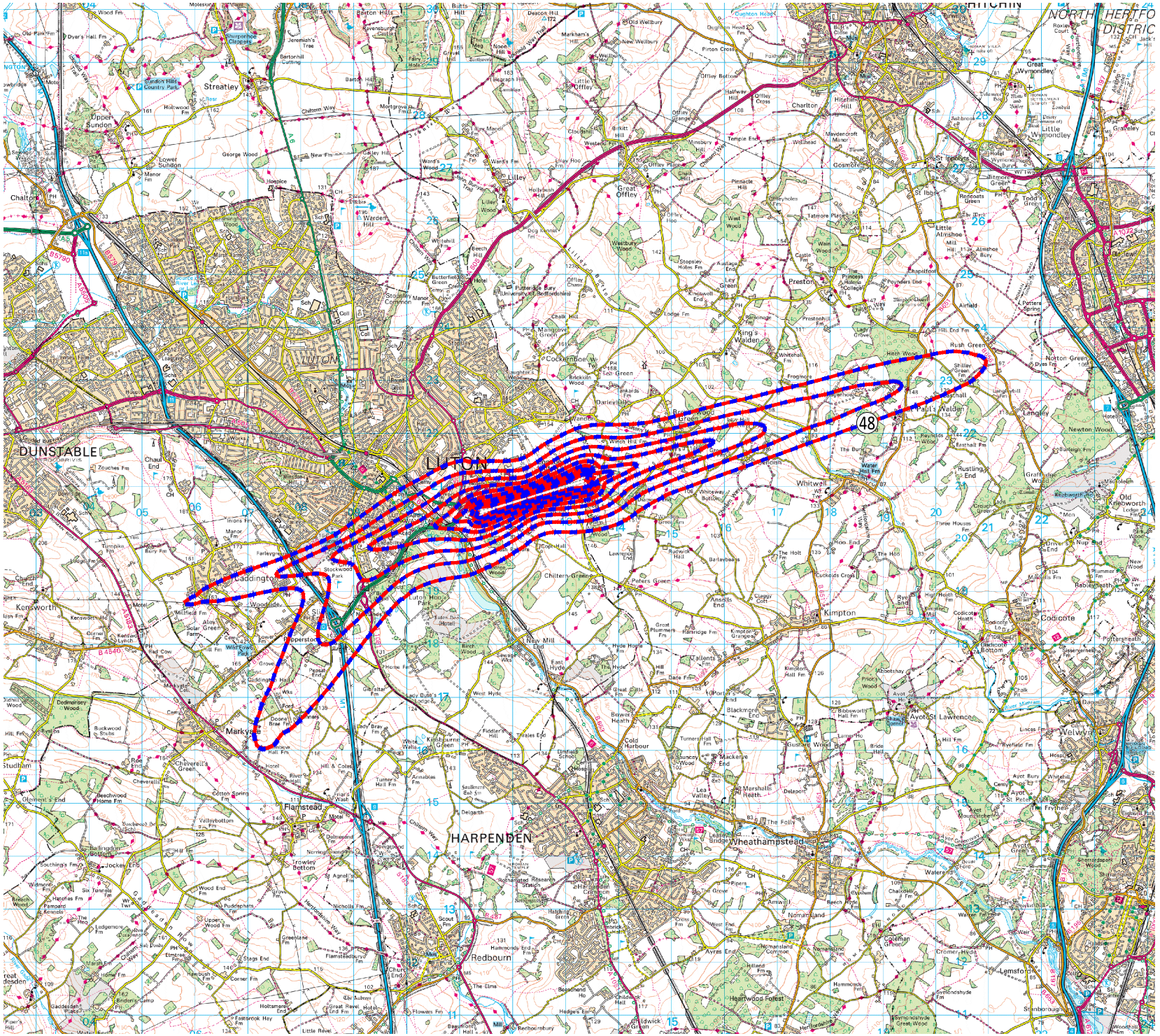

LEGEND:

- Noise Contours (2017 Method), 48 to 72 dB $L_{Aeq,8h}$ in 3 dB steps
- Noise Contours (2018 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 2018 Average Night time
Methodology Comparison

DRAWN: DR
CHECKED: NW

DATE: July 2018
SCALE: 1:100000@A4

FIGURE No:

A11060/N17/01