

## **LONDON LUTON AIRPORT**

A11060 N39 DCH 2019

09 August 2019

### **2019 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 2019 methodology which will be used for all 2019 contours. The only change between this and the previous (2018) methodology, reported in the note A11060-N17-DR, 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 2018.

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 2018 contours were produced using INM version 7.0d, which was released on 30<sup>th</sup> 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 This has been replaced by the FAA with the Aviation Environmental Design Tool (AEDT) as of May 2015.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 specific departure tracks used.

### **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 2018 methodology.

### **6.0 STAGE LENGTH**

In the INM software, departure profiles and weights 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 2017 measured data, has been updated. This has been based on measured results in 2018. 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 2017 and 2018 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)		
		2017 Average <sup>[1]</sup>	2018 Average <sup>[1]</sup>	Validated INM Prediction <sup>(1)</sup>
Airbus A319	Arrival	84.7	84.7	84.5
	Departure	84.0	83.7	83.9
Airbus A320	Arrival	84.4	84.4	84.2
	Departure	84.2	84.0	84.2
Boeing 737-800	Arrival	85.8	85.7	86.5
	Departure	85.8	86.2	85.9

<sup>[1]</sup> 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 considered 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 remain similar from 2017 to 2018 for all three aircraft. The measured departure noise levels for the Airbus A319 and the Airbus A320 have decreased slightly in 2018 whereas the measured departure levels for the Boeing 737-800 have slightly increased. Due to the small magnitude of the increases the only change made to the validation was to increase the predicted level for the Boeing 737-800, which changed by the largest amount, in order to keep the prediction difference below 1 dB.

Aside from these main types the measured noise levels were relatively consistent for most aircraft types. Due to changes in the measured noise levels, small changes have been made to the modelled departure noise levels for the Boeing 737-400 and Boeing 737-900. Specifically, the modelled noise levels have been increased by 0.8 dB for the Boeing 737-400 and decreased by 0.5 dB for the Boeing 737-900.

Two aircraft which were newly validated this year were the Airbus A321neo and Airbus A330-200. Strictly the Airbus A321neo validated has primarily used results from 2019 as it is a new aircraft and therefore very few results for 2018 are available. For the A321neo a dedicated type is not yet in the modelling software database so it was modelled with the type it replaces, the Airbus A321-232. Compared to the existing A321ceo, no change was made for arrivals and a decrease of 2.0 dB was made to the modelled departure noise level. The Airbus A330-200 was modelled using the A330-301 INM aircraft type and required no adjustment.

The Boeing 737-300 aircraft type was validated in 2018 but not in 2019 due to the aircraft type no longer operating in sufficient numbers. In 2019 this aircraft is modelled using the default INM assumption.

## 8.0 CONTOUR COMPARISON

The contours for quarter 1 of 2019 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 <sub>Aeq,8h</sub> )	Jan – Mar 2019 Contour Area (km <sup>2</sup> )		
	2018 Methodology	2019 Methodology	Change (%) <sup>[1]</sup>
48	28.4	29.1	2.3%
51	16.2	16.6	2.5%
54	9.1	9.3	2.1%
57	5.2	5.4	2.3%
60	2.6	2.7	3.1%
63	1.5	1.5	2.3%
66	0.9	0.9	2.4%
69	0.6	0.6	2.2%
72	0.4	0.4	2.3%

<sup>[1]</sup> Percentage change based on unrounded contour areas.

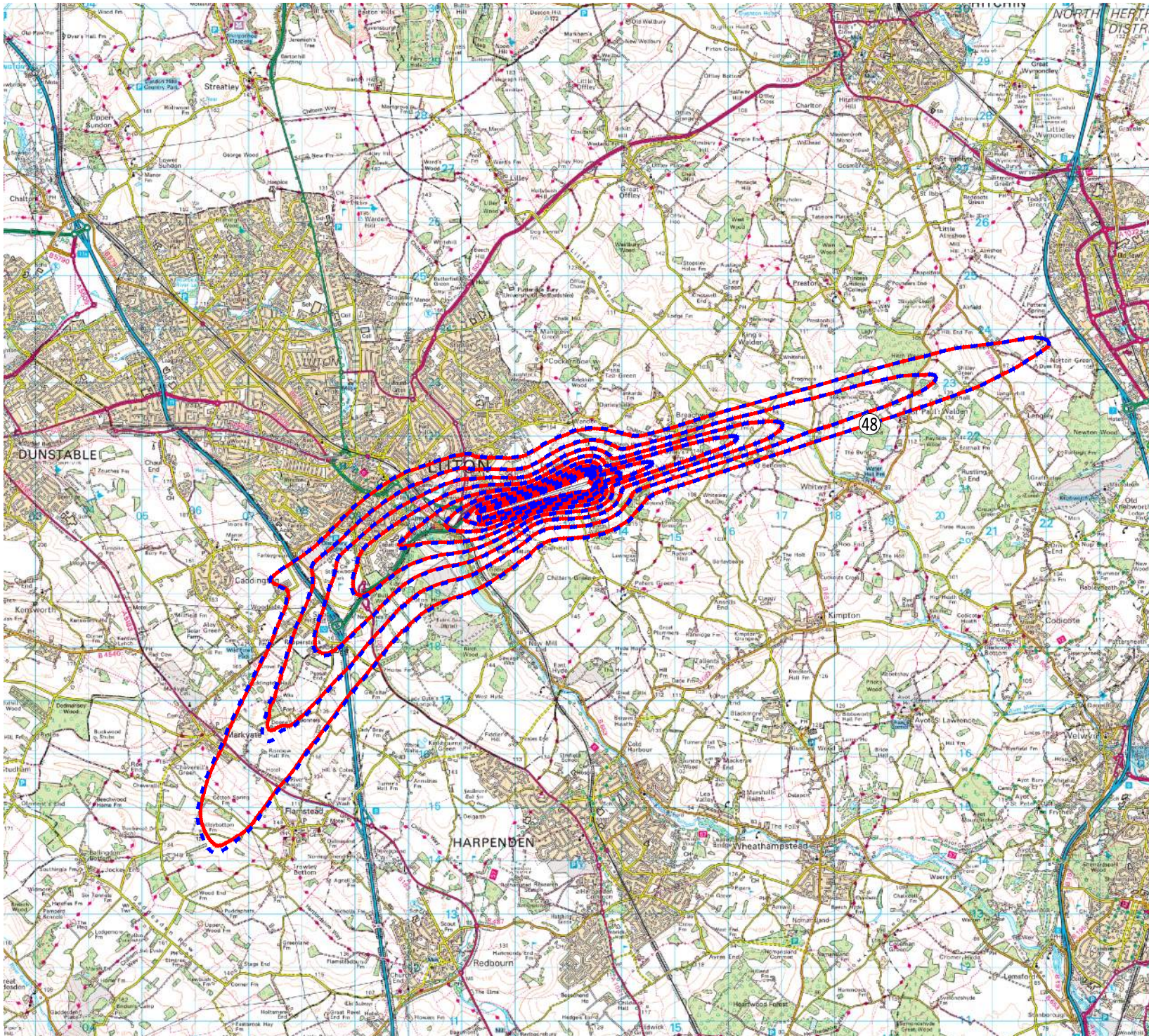
**Table 2: Comparison of Night Time Noise Contour Areas**

As can be seen from Figure 01, the methodology update results in a small change to the contours. There is an increase in contour area of around 2-3% in all contour bands, with the largest difference being the 60 dB band which has an increase of 3.1%. This is due to the validation update, and in particular the small increase made to the modelled departure noise level of the Boeing 737-800 to reflect the higher measured noise levels.

**Dean Chapman**  
for Bickerdike Allen Partners LLP

**David Charles**  
Partner





This drawing contains Ordnance Survey data © Crown Copyright and database right 2019.

#### LEGEND:

- Noise Contours (2018 Method),  
48 to 72 dB LAeq,8h in 3 dB steps
- Noise Contours (2019 Method),  
48 to 72 dB LAeq,8h in 3 dB steps

#### REVISIONS

**Bickerdike  
Allen  
Partners**  
Architecture  
Acoustics  
Technology

121 Salusbury Road, London, NW6 6RG  
Email: [mail@bickerdikeallen.com](mailto:mail@bickerdikeallen.com)  
[www.bickerdikeallen.com](http://www.bickerdikeallen.com)

T: 0207 625 4411  
F: 0207 625 0250

London Luton Airport  
Regular Contouring

Airborne Aircraft Noise Contours  
Jan-Mar 2019 Average Night time  
Methodology Comparison

DRAWN: DCH

CHECKED: NW

DATE: August 2019

SCALE: 1:100000@A4

FIGURE No:

**A11060/N39/01**