LADACAN comments on submissions by Deadline 10 IP ref 20040757

LADACAN's comments on the Applicant's REP10-045 submission

Table 2.1, ID 1 (Climate Change and Greenhouse Gases)

LADACAN remains of the view that Green Controlled Growth environmental Limits should explicitly include the Jet Zero trajectory upon which the Applicant states it confidently relies to reduce aviation carbon emissions in line with Net Zero commitments, for the reasons given in REP9-081 Section 1 p2.

Table 2.6, ID 9 (Need Case)

LADACAN remains of the view that a WebTAG assessment of the impacts on health and wellbeing caused by the proposed 70% increase in night flights should have been conducted (in line with similar practice in the current London Gatwick Airport DCO application) in order better to inform the process of weighing those impacts against claimed economic benefits, for the reasons given in REP9-081 p4 and in previous submissions.

Table 2.7 ID 2 (Noise and Vibration)

We refer to the Applicant's Response to our previous submissions including REP9-081 regarding the noise contour modelling. LADACAN has subsequently discussed these issues in an online meeting with the Applicant's noise experts and the noise expert representing the Joint Host Authorities. To avoid duplication, we summarise here the matters discussed and the outcome of the discussion.

Clarification of terminology

LADACAN's understanding of the process and terminology used in noise monitoring at London Luton Airport (LLA) was circulated in advance of the meeting and is documented below:

1) All of LLA's fixed and mobile monitors register slow-weighted SPL every second and feed this back to the Tanos system either in real time, or in batches in the case of an intermittent data link.

2) Parameters are set in Tanos for each monitoring session which include the lat/lon location of the monitor, its altitude, the start/stop cutoff thresholds for SEL calculation, and the LASmax cutoff threshold (which defines the minimum below which noise peaks are not assessed for correlation with flights).

3) The LASmax values for given flights passing given monitoring locations vary over a range depending on aircraft type, monitoring location, loading, weather, temperature, attenuation factors etc. It follows that if the LASmax cutoff is set too high, flight noise samples associated with flights having an LASmax below that cutoff will be lost.

4) The LASmax cutoff only affects which noise peaks may become flight noise (LASmax and SEL) measurement samples - the monitor of course continues to record SPL data values regardless of the LASmax cutoff value.

5) The SEL-related start/stop cutoffs need ideally to be set so that there is 10dB or more available between the lowest required flight noise LASmax values (ie business jets may be jettisoned) and the *ambient background noise value in a given location. If the LASmax cutoff is set too low, the SEL values for the quieter flights may be compromised. This can become difficult in more remote locations where LASmax for quieter individual flights is not 10dB above ambient noise levels.*

6) LLA's Community Noise Monitoring Reports (CNRs) normally include a histogram plotting "Number of noise events" versus dB. It is clear (from the values, the shapes and the sample sizes) that these show the distribution of correlated aircraft noise measurements in the sample, not the distribution of noise readings from the monitor.

7) To achieve reliable noise samples, a monitor should be located with clear line of sight to the passing swathe of flights, and ideally as close to the centre line as possible so as to avoid lateral attenuation and scattering from low elevation angles, or a very wide range of elevation angles.

It was agreed that the Applicant's response in REP10-045 reflected a difference in understanding of terminology regarding cutoffs, and the above statements 1-6 were broadly agreed as resolving this.

The Applicant reserves its position on the limited extent to which individual noise monitoring results would affected the model, however LADACAN referred the effect of a controversial "revalidation" of the LLA INM noise model in 2015 which led to a 6% reduction in 48dB contour area based on a short 3-week period of monitoring in South Luton over the unrepresentative New Year period, noting that "close in" monitoring was of significance since it would be likely to have an effect on noise contours which (of importance to communities) affected the Limits applied under Green Controlled Growth.[1]

Additional evidence to support concerns

LADACAN evidenced the availability of more recent mobile noise monitoring data from South Luton in Jan-May 2022 (not affected by the later Noise Abatement Departure Procedure trials) and from Dagnall in May-Jun 2022 which contain significantly different results to those in the 2019 reports.

Aircraft Type	Number of movements	Average Noise (dB)
A306	110	77.0
A319	740	76.2
A320 CEO	1,342	75.6
A20N (A320 NEO)	318	72.1
A321 CEO	946	77.1
A21N (A321 NEO)	85	74.9
B738	606	79.6

South Luton Oct-Dec 2019 departures (LLAOL)

Aircraft Type*	Number of movements	Average Noise (dB)
A306	58	80.6
A319	711	79.7
A320 CEO	1,613	79.0
A320 NEO (A20N)	572	75.9
A321 CEO	475	80.8
A321 NEO (A21N)	473	80.0
B737-800 NG (B738)	749	83.2
B737 Max 8 (B38M)	49	78.5

South Luton Jan-May 2022 departures (LLAOL)

Aircraft Type	Number of movements	Average Noise (dB)
A306	67	77.6
A319	346	74.2
A320 CEO	612	73.3
A20N (A320 NEO)	182	71.9
A321 CEO	486	72.6
A21N (A321 NEO)	42	74.2
B738	332	76.7

South Luton Oct-Dec 2019 arrivals (LLAOL CNR)

Aircraft Type	Number of movements	Average Noise (dB)
A306	50	88.7
A319	766	83.5
A320 CEO	1,542	82.4
A320 NEO (A20N)	551	81.7
A321 CEO	567	82.1
A321 NEO (A21N)	490	83.0
B737-800 NG (B738)	818	84.8
B737 Max 8 (B38M)	48	83.1

South Luton Jan-May 2022 arrivals (LLAOL CNR)

[1] See Bickerdike Allen report "2015 contouring methodology update" appended to this submission, and its p4 of 4

Aircraft Type	Number of movements	Average Noise (dB)
A306	46	68.0
A319	408	65.7
A320	759	65.8
A20N (A320 Neo)	54	65.7
A321	167	65.9
A21N (A321 Neo)	19	65.7
B738	337	66.2

Dagnall May-Jul 2019 arrivals (LLAOL CNR)

Aircraft Type	Number of movements	Average Noise (dB)
A306	23	66.6
A319	422	62.6
A320 CEO	553	63.0
A320 NEO (A20N)	239	62.4
A321 CEO	263	62.7
A321 NEO (A21N)	184	62.6
B737-800 NG (B738)	339	63.0
B737 Max 8 (B38M)	28	62.1

Dagnall May-Jun 2022 arrivals (LLAOL CNR)

Even allowing for the different proximities to the swathe, the variation in LASmax results between the 2019 and 2022 monitoring in South Luton is very striking indeed:

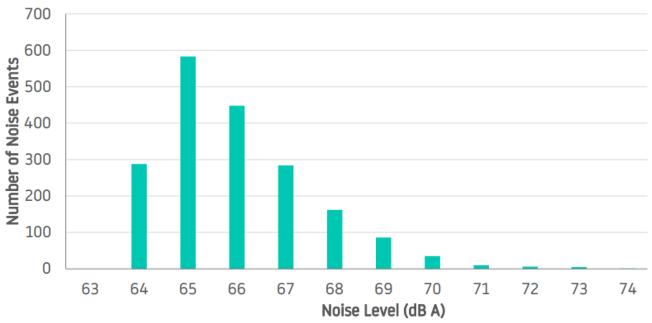
On departures, an increase for each aircraft type of between **+3.4dB** (A320) and **+5.1dB** (A321neo).

On arrivals, an increase for each aircraft type of between **+8.1dB** (B738) and **+11.1dB** (A306).

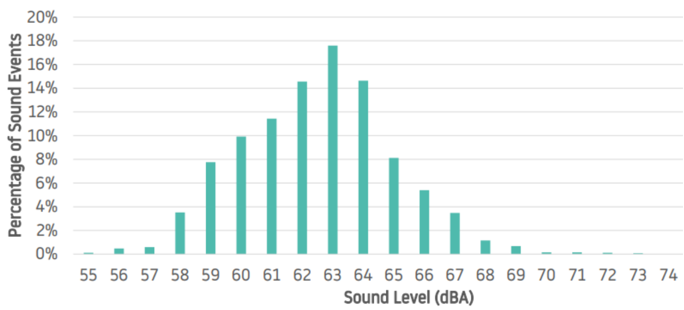
The evidence we submitted in REP10-079 Section 2 regarding the 2019 South Luton mobile monitoring location suggests that the predominant cause of such large differences was the shadowing effect of the very proximate 3-storey building and lack of any clear line of sight from monitor to aircraft, which was made even worse for the arrivals due to scattering and attenuation caused by their much lower angle of elevation.

In the case of Dagnall, where all the results are for arrivals, a reduction for each aircraft type is seen, of between **1.4dB** (A306) and **3.3dB** (A320neo) with five of the seven values being by more than 3dB.

The evidence we submitted in REP9-081 Section 2 page 9 suggests that an erroneously high LASmax cutoff value in 2019 is the most likely explanation, since the 'distribution of noise results' histogram is quite different between the two monitoring exercises, with that in 2019 clearly truncated at the left:



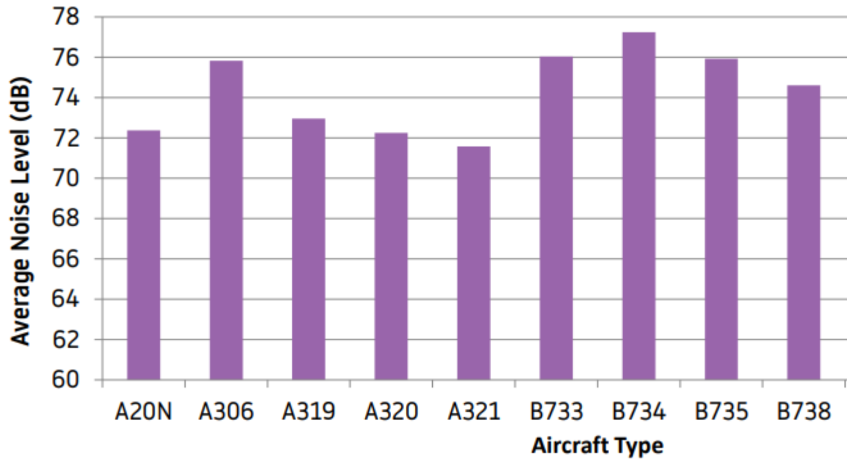
Dagnall May-Jul 2019 arrivals (LLAOL CNR)



Dagnall May-Jun 2022 arrivals (LLAOL CNR)

The effect of this would be to exclude flights with lower-than-64dB LASmax from the correlated data sample, thereby erroneously skewing the average or 50th percentile values of LASmax and SEL in 2019.

Finally, in respect of the mobile noise monitoring at Breachwood Green ("LTN_BG" site in REP9_017), for which in REP10-079 we evidenced very low angles of elevation for arrivals, there appears to be no better data available: the mobile monitoring exercise in 2018 was considerably worse in that respect.



Breachwood Green Jul-Oct 2018 arrivals (LLAOL CNR)

Monitoring location declared in Community Noise Report as approximately 500m North of route centreline at altitude of 482ft above msl, on the eastern side of Breachwood Green.

As a result, the majority of arrivals were at an elevation angle of 20 degrees or less and hence results unreliable.

Aircraft Type	Number of movements	Average Noise (dB)
A306	114	79.1
A319	758	75.3
A320 CEO	1,377	74.3
A20N (A320 NEO)	310	72.8
A321 CEO	952	73.5
A21N (A321 NEO)	85	75.0
B738	594	77.2

Breachwood Green Oct-Dec 2019 arrivals (LLAOL CNR)

Monitoring location declared in Community Noise Report as approximately 250m North of route centreline at altitude of 482ft above msl, on the eastern side of Breachwood Green.

As a result, half the arrivals were at an elevation angle of 27 degrees or less and hence results unreliable.

The effect of greater distance and further reduced elevation angle makes the 2018 results up to **3dB** lower than those measured in 2019, which themselves are unsafe due to the low and widely variable elevation angles evidenced in REP10-079 Section 2 p10.

Sample sizes and data consistency

Sample sizes in much of the mobile monitoring were surprisingly small. As shown in Annex A of REP9-081, the maximum and minimum sample sizes for important aircraft types at LLA are:

B738 on Arrival: max 803 (LTN_KNS), min 332 (LTN_SLTN)
B738 on Departure: max 1803 (LTN_MRK), min 298 (LTN_BG)

A320neo on Arrival: max 310 (LTN_BG), min 54 (LTN_DGN)
A320neo on Departure: max 609 (LTN_FLM), min 142 (LTN_BG)

A321neo on Arrival: max 85 (LTN_BG), min 19 (LTN_DGN)
A321neo on Departure: max 186 (LTN_FLM), min 43 (LTN_BG)

We would have expected the effect of some of these very low sample sizes to have been highlighted by Standard Deviation or Confidence Interval data.

The extracts we reproduced in REP9-081 Annex A do indicate 95% confidence intervals, and for the low sample-size data these intervals can be relatively large. For example:

a) At LTN_KNS for the A321neo around **1dB**, at LTN_CAD around **0.9dB**

b) At LTN-DGN for the A320neo around **0.7dB**, for the A321neo around **1.6dB**

c) At LTN_SVG for the A321neo around **1dB**

d) At LTN_BG for the A321neo around **1.6dB** (arrivals), and **0.8dB** (departures)

e) At LTN_SLTN for the A321neo around **1dB** (arrivals), and **1.2dB** (departures)

f) At LTN_PPR for the A321neo around **0.9dB** (departures)

The 2019 CNR from Dagnall confirms that 60% of the flights had been discarded (by the cutoff):

"4,716 aircraft landed on the Runway 08 whilst the monitor was located in Dagnall." (page 3)

"For the monitoring period in Dagnall the Noise Monitoring Terminal collected results for 1,914 aircraft. However, 2,802 aircraft did not register noise events as they were either too high or too quiet, 6 results were excluded for weather reasons as outlined above, which left 1,908 noise results to analyse." (page 8)

The important issue here (setting aside whether arithmetic averages or 50th percentiles are used) is whether sufficient and properly representative noise measurement samples were made available by LLAOL to the Applicant for adequate validation of the noise contour model.

Overall observations

LADACAN's position on the noise assessment accompanying this Application remains that it has been, overall, poor. From the 'ambient noise' survey in the PEIR, upon which we commented in REP1-095 section 7.4.1 paras 147-157 to the provision of informally gathered and (for all the reasons we have evidenced) in many instances unreliable 2019 mobile noise monitoring results by the Airport Operator for the assessment process, this appears to us a textbook case of how not to conduct a noise survey.

We ultimately invite the ExA to regard this noise survey as unsatisfactory given the scope and scale of the proposed development, and the fact that one of its major environmental impacts would be noise. The Applicant's noise experts have done their best to create a model using data which in the case of Breachwood Green arrivals, South Luton arrivals and departures, and Dagnall arrivals measurements is simply not fit for purpose.

There was plenty of time available to the Applicant to organise and perform a carefully surveyed and professional-standard noise assessment, if necessary using the monitoring and correlation equipment installed by the Airport Operator, rather than very late in the day[2] being provided with the available informal mobile monitoring measurements and having to make the best of a bad job.

[2] Email LLAOL rep to NEDG members 6 Dec 2019: "at this time we would not be willing to provide the data"

Conclusions and proposal

If the ExA is minded to accept this noise model as sufficiently representative upon which to base the Environmental Assessment, we request inclusion of a provision (discussed with the Applicant's noise experts and agreed in principle) that should in future and a more accurate validation of the model be conducted, and as a result the Environmental Scrutiny Group accepts based on reliable evidence that the contours calculated by the model for the Limits to be applied in Green Controlled Growth should be reduced, then the process to reduce Limits would make provision for that to happen.

We accept this proposal without prejudice to our overall position that the noise survey underlying the noise modelling for the Application was of inadequate quality and this weighs against the Application.

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.

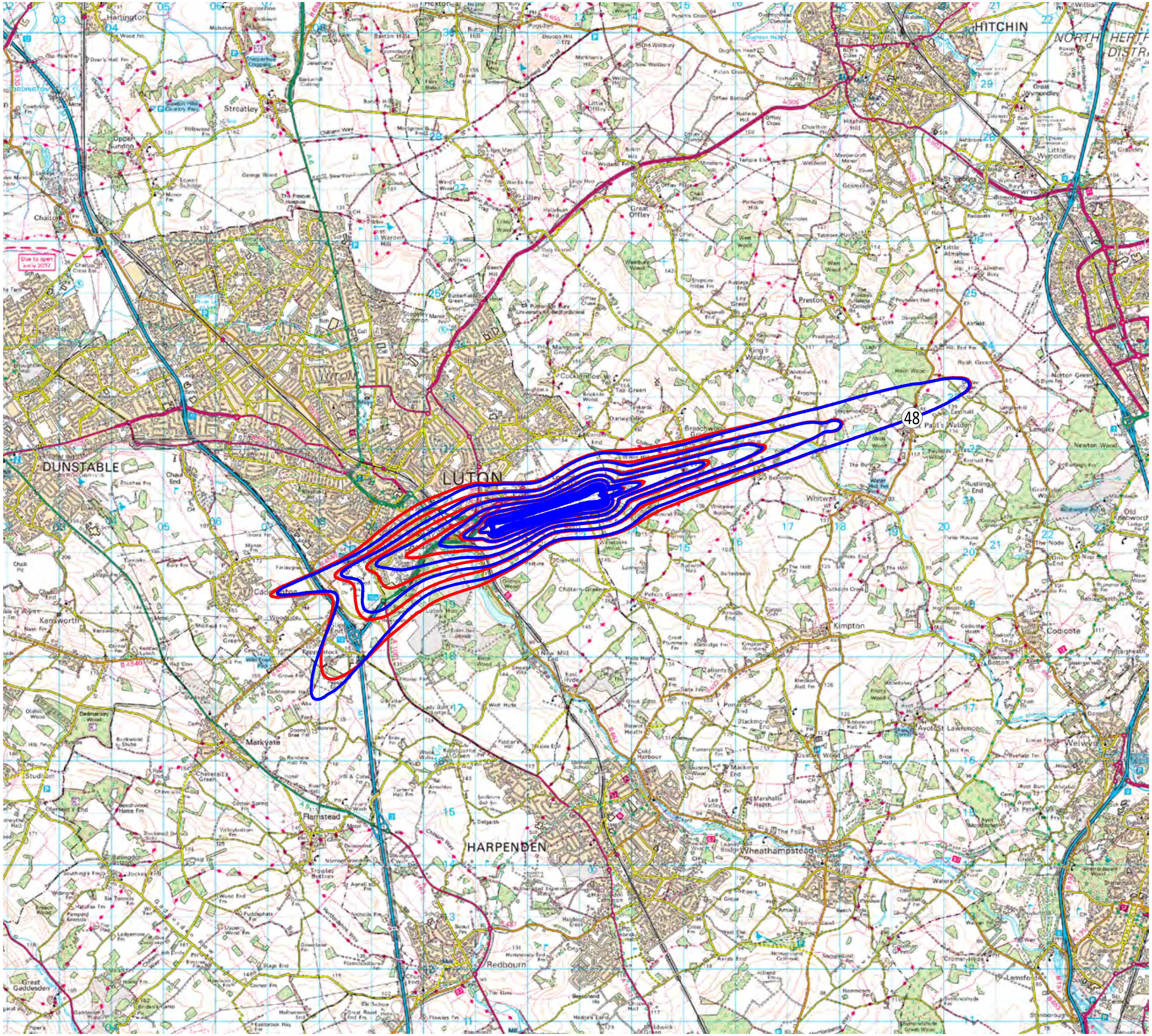
7.0 CONTOUR COMPARISON

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

Nick Williams	**David Charles**	**Peter Henson**
for Bickerdike Allen Partners	**Associate**	**Partner**



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