

## Comments on REP5-054 Applicant's Response to AS-156

**Author: Michael Reddington**

**Unique Reference: 20037459**

Please note that items considered 'Closed' have been deleted. In others the text of 'Deadline 3 Submission' and Luton Rising's Response' is reduced or deleted in order to improve readability.

ID	Topic	Deadline 3 submission (Verbatim)	Luton Rising's Response	M. Reddington Reply
4	Climate Change / Greenhouse Gases	Para. 3: 'Climate Change' Noted, however ANPS Paragraph states:"5.78 The Secretary of State will need to be satisfied that the mitigation measures put forward by the applicant are acceptable, including at the construction stage. "	The Applicant notes that the scope of carbon emissions covered by paragraph 5.78 of the <i>Airports National Policy Statement (ANPS)</i> (Ref 4) cover airport ground operations and not carbon from aircraft in the air, Subsequently, the <i>Jet Zero Strategy</i> has set out a target for airport operations to be zero emission by 2040 and the	Applicant's response is noted. However is there not also a requirement for all <u>domestic</u> flights to be Net Zero by 2040 and does the Applicant not have to include this as a consideration ?
9	Air Quality			Applicant to respond to Actions #22 and #25 from <b>ISH8 [EV15-013]</b> .  CLOSED in this Written Representation.
10	Surface Access	'Surface Access': The Applicant is proposing to implement parking control areas around the airport in order to dissuade opportunistic parking by airport users. Unless the parking control system is free to residents, this is a totally unacceptable situation. Residents will be punished - by having to buy a permit.	The implementation of control measures to dissuade on-street parking by airport users will only be implemented if necessary and if supported by the applicable highway authority	Applicant's reply noted but ignores the key point in that those benefitting financially from airport expansion, i.e. Luton Rising, should pay the relevant Local Authority/Authorities for the Capital and Operational costs of these schemes. <u>It must not fall to the residents.</u>

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14	Noise and Vibration/Compensation	<p>Para. 2 'Noise/Compensation' With reference to the Statements of Common Ground [TR20001/APP/8.13-8.17]</p> <p>Local Authorities (LAs) have only accepted the insulation scheme 'in principle'. Neither the proposed Noise Insulation Scheme extents-by street or property-nor Test Document (Refer to Response #19 below) thoroughly defined and these will need to be secured with the Local Authorities once the detail of the proposed insulation scheme and its implementation have been comprehensively defined as per Response #70 below..</p>		<p>There is still an issue to be clarified by Deadline 6 with respect to insulation eligibility (ref. ID#71 below).</p> <p>Statements of Common Ground will need to be updated subsequently, possibly by Deadline 7: REF2-020 (LBC) REF2-021 (Central Beds) REF2-022 (Hertfordshire ) REF2-023 (NHDC) REF2-024 (Dacorum)</p>
19	Noise and Vibration/Compensation	<p>Para. 4 'Noise/Compensation' The Applicant to specify how the survey will be carried out on each property prior to works andty after works have been completed. The Applicant should produce three documents as follows:</p> <ol style="list-style-type: none"> <li>1. Eligibility Document</li> <li>2. Offer Letter</li> <li>3. Test Document</li> </ol>	<p><b>Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]</b> includes these</p>	<p>Attached for information is Appendix C below which is the set of insulation tests that the Airport Operator claims to carry out, and for which we have yet to see any test results (given that the current insulation scheme has been in operation for some time).</p> <p>Note that 'reverberation' * is determined to be unique for each room so it would suggest that the sample size for before-and-after testing should be small.</p> <p>* (Note: BS8233 defines reverberation as: "time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped")</p>

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				<p>Comments on the Applicant's response to Issue Specific Hearing 3 Action 26: <b>Noise Insulation Delivery Programme [REP4-079]</b> is the subject of a separate Written Representation.</p>
25	Noise and Vibration	<p>'Noise/Fleetmix'. Do not agree. ICAO report (Applicant ref. 3.14) states: "The 2018 contour area is 16,486 square-km. This value decreases to 9,451 square-km in 2020 due to the COVID-19 downturn and increases to 15,530 square-km by 2024. In 2050 the technology freeze (Scenario 1) total global contour area is 31,407 square-km and decreases to 15,196 square-km and 21,570 square-km, with advanced and low technology improvements, respectively" In the absolute best case therefore the average 55dBA DNL noise contour reduces only by 334sq.kms out of 15,530 sq.kms (-2%). Worst case, the contour area actually grows by 6,040 sq.kms (+39%) a very significant increase..</p>	<p>The quoted section of the International Civil Aviation Organization report (Ref 5) is referring to the global contour area for 319 airports and how they may change with predicted growth over time. In all scenarios assessed the improvements from individual next-generation aircraft are between 0 and 0.2dB per year. No scenario was assumed in which next-generation aircraft are louder.</p>	<p>Chapter 16 clause 16.9.108 states: "As described in <b>Section 16.6</b>, the assessment is based upon the assumption that next-generation aircraft (expected to transition into the fleet from the mid-2030s) are no quieter than new-generation aircraft."</p> <p>This would accord with the ICAO report Scenario 1 – no net improvement per annum. Refer to Figure 1-10. The ICAO report also describes Scenarios 2-4 Scenario 2 (0.1dB per annum improvement 2109-2050 ), Scenario 3 ('Covid' : 0.2dB per annum improvement between 2024-2050) and Scenario 4 (0.2dB per annum improvement between 2019-2050).</p> <p>The Applicant has selected the 'advanced' technology path of 0.2dB per annum, but has not considered Scenario 2 which is the 'low technology' path.</p> <p>(The ICAO reports also adds a seemingly random 2% improvement for Scenarios 2-</p>

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				4. Nor is there any detail of how the ICAO have selected the dB improvements per Scenario.)
28	Need Case	Para. 2 'Planning/Need case' With respect to surface movements, if all airports had similar facilities that argument may have some weight. However Luton Airport has a limited runway length therefore cannot support long-haul flights, so those (Local) passengers wishing to go long haul have to go elsewhere.	As explained at paragraphs 6.3.27 to 6.3.35 of the <b>Need Case [AS-125]</b> ,	Comments on the Need Case <b>[AS-125]</b> is the subject of a separate Written Representation.
46	Noise and Vibration	'Noise' The Applicant's response is vague and passes the responsibility for securing the mitigation to the Consultative Committee.	It is not the case that the responsibility for securing the mitigation is passed to the Consultative committee. The Noise Insulation Sub Committee of the London Luton Airport Consultative Committee has a role in determining the priority of roll out of eligible properties.	<b>Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]</b> provides a more extensive role to the Noise Insulation Sub-committee. Secondly the Applicant, not the Airport Operator, provides the funding for insulation, which is secured in the Funding Statement so funding limitations should not be a matter of conflict.
52	Noise and Vibration			The Applicant has introduced Ground Noise and its mitigation in <b>Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]</b> .  Noted also that the Applicant had advised at <b>ISH8</b> that the characteristics of Air Noise and Ground Noise are different, therefore cannot be summed

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				<p>It is noted that the Applicant confirmed verbally at <b>ISH9</b> that ground noise is not measured, only modelled, and this model will be reviewed annually.</p> <p>CLOSED.</p>
53	Noise and Vibration/Green Controlled Growth	<p>'Noise/GCG'</p> <p>Noted that the current insulation Scheme does not form part of the Application but there is still a requirement to insulate properties to the current specification. Given that there are few authorised and experienced noise insulation contractors, there is a risk that programmes could be impacted.</p> <p>Refer to the Programme section in Response #70 below.</p>	<p>The Applicant has provided commentary on the market supply and rollout of the noise insulation scheme in <b>Applicant's response to Issue Specific Hearing 3 Action 26: Noise Insulation Delivery Programme [REP4-079]</b>.</p>	<p>Our Action #34 of ISH9 [<b>EV16-009</b>], which is to comment on the Applicant's response to Issue Specific Hearing 3 Action 26: <b>Noise Insulation Delivery Programme [REP4-079]</b>, is the subject of a separate Written Representation.</p>
61	Noise and Vibration	<p>Para. 1 'Noise/Planning'</p> <p>Section 4 on Noise Insulation does not mention Ground Noise and is therefore deficient.</p> <p>The Applicant is proposing to increase noise levels which is contrary to the Local Plan. The Local Plan prescribes that there be a further noise reduction or no material increase in day or night time noise- which we know there will be. The reader has to look elsewhere to find information on Ground Noise. Refer to Response #70 below.</p>	<p>A separate ground noise insulation scheme has been introduced in <b>Draft Compensation Policies, Measures and Community First [REP4-042]</b>.</p> <p>It is not agreed that the Proposed Development is contrary to the Local Plan. Table 16.2 of <b>Chapter 16 of the Environmental Statement [REP1-003]</b> notes how the Proposed Development addresses national and local policies including the Luton Local Plan (Ref 6).</p>	<p>Noted that Ground Noise Insulation proposal now included in REP4-042 Table 1.1 et al. Closed</p> <p>With regards to the Local Plan, it is not yet certain that the proposed development meets the Luton Local Plan. Action #23 on the Applicant from ISH9 [<b>EV16-009</b>] on 30<sup>th</sup> November 2023 states:</p> <p><i>"Explain how the proposed approach to increased noise levels relative to the 18 or 19mppa consents meets the requirements of Luton Local Plan policies LLP6Bv and LLP6Bvii. "</i></p>

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				<p>It is important to note that the Luton Local Plan covers the time period from 2011 to 2031.</p> <p><b>ExA: We would greatly appreciate if this action was to be extended to include LLP6B iii and LLP6B iv:</b></p> <p><i>“LLP6B iii: are in accordance with an up-to-date Airport Master Plan published by the operators of London Luton Airport and adopted by the Borough Council; iv: ”.</i></p> <p><b>LLP6B iv:</b> <i>“they fully assess the impacts of any increase in Air Transport Movements on surrounding occupiers and/or local environment (in terms of noise, disturbance, air quality and climate change impacts), and identify appropriate forms of mitigation in the event significant adverse effects are identified;”</i></p> <p>In respect of LLP6B iii a Google search under Luton Borough Council produces only one such Master Plan, dated 2012 and which only looks to expand passenger numbers to 18mppa by 2031.</p> <p>In respect of LLP6B iv additional comments on the Need Case <b>[AS-125]</b> are</p>

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				the subject of a separate Written Representation.
63	Legal	Para. 2 'Noise/Compensation'	Once agreed, the S106 Agreement will be secured through the Development Consent Order.	Applicant to confirm that the Section 106 agreement will secure that the <u>Airport Operator</u> will procure the before-and-after insulation testing of eligible premises.
64	Noise and Vibration/Compensation	Para. 2 'Noise/Compensation' <i>The <b>Draft Compensation Policies, Measures and Community First</b> has been updated to include an online compensation look-up tool post consent that will allow residents to find out which noise insulation scheme they may be eligible for, avoiding the need to interpret contour maps. "</i> The Applicant does not advise how the availability of the tool will be made public knowledge.	The commitment to providing the look up tool is made in <b>Draft Compensation Policies, Measures and Community First [REP4-042]</b> which will be secured via the Section 106 agreement.	Noted and discussed at <b>ISH9. [EV16-009]</b> Action #36 on Applicant: " <i>Confirm the date when the 'look up tool' for eligibility for noise insulation programme would be made available.</i> "
70	Noise and Vibration/Compensation			Applicant has clarified eligibility and compensation Schemes for Air Noise as required by ISH9 <b>[EV16-009 ]</b> Action #48. See Appendix A below.. Closed
71	Noise and Vibration/Compensation	'Noise/Compensation' The Applicant advises that the eligibility cut-off date is for properties <b>built</b> before October 2019 (i.e. by 30th September 2019), the year of first Statutory Consultation. This appears draconian since it excludes buildings granted Planning Permission by LBC - and other Local Authorities (LAs) - but not built. at that date.	a) The date of October 2019 is a prior knowledge date because from that point those planning to develop within the airport area will have been aware of the Applicants proposals for expansion of the airport. The inclusion of a prior knowledge date is well established as a principle when promoting nationally	<b>Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]</b> paragraph 6.1.16 confirms that the latest date for a property to be constructed and occupied (and hence ineligible for insulation compensation) is 16/10/2019 . We consider this to be wholly unacceptable and have set out our reasons in <b>Appendix B</b> below.

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		<p>Secondly, a Statutory Consultation should not constitute a line in the sand for Planning, as the requirements may change subsequently AND Planning departments in local authorities must have advised builders of these conditions in advance of construction, as part of Planning Permission.</p> <p><b>ExA</b> We would be grateful if the ExA could instruct the Applicant to:</p> <p>(a) provide detailed reasons for the selection of this cut-off date and</p> <p>(b) confirm with LBC Planning and other LAs whether they too advised relevant parties of the changes to conditions at that time</p>	<p>significant infrastructure projects, particularly when discretionary schemes are being planned and the promoters want to eliminate potential for cost increases which are outside its control.</p> <p>b) confirmation of whether the relevant local planning authorities advised planning applicants is a matter for the LPAs to respond to.</p>	<p>Note: From ISH8 [EV15-013] there is an Action #35 on the Applicant to respond to this issue by Deadline 6.</p>
81	Noise and Vibration/Compensation	<p>‘Noise/Compensation’ The Committee has no executive powers so cannot influence outcomes for residents. LLAOL have the final say as to budget (unknown), timing (unknown), priorities (unknown). The Committee needs ‘teeth’.</p>	<p>. As noted in <b>Draft Compensation Policies, Measures and Community First [REP4-043]</b>, the LLACC will be provided data on eligible properties and public buildings under the various noise insulation schemes and will determine the priority for the rollout, in accordance with the priorities specified.</p>	<p>Our Action #34 of ISH9 [EV16-009], which is to comment on the Applicant’s response to Issue Specific Hearing 3 Action 26: <b>Noise Insulation Delivery Programme [REP4-079]</b>, is the subject of a separate Written Representation.</p>
87	Noise and Vibration	<p>‘Noise’ This comment was raised to demonstrate that not only is the Current Noise Action Plan (NAP) incorrect, but that the Draft NAP for 2024-2028 appears also to be in error. The Applicant advised at the ISH3 hearing on 27th September 2003 that this document was out for comment.</p>	<p>This comment is not understood and it is not clear what is ‘incorrect’ or ‘in error’ with regards to the Noise Action Plans. Regardless, the Noise Action Plan is produced by the Airport Operator, not the Applicant.</p>	<p>It is noted that it is the responsibility of the Airport Operator (LLAOL) to produce the NAP but it is not clear what body scrutinises the NAP to ensure it complies with</p>



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		<p>The Applicant should review and correct such errors AND to include actions in respect of measurements of Ground and other noise sources, not just Air Noise.</p> <p><b>ExA</b></p> <p>It would be appreciated if the ExA will instruct the Applicant to ensure the NAP for 2024-2028 is reviewed and amended as above.</p>		<p><i>“Guidance for Airport Operators to produce noise action plans under the terms of the Environmental Noise (England) Regulations 2006 (as amended) July 2013”</i>. Since the airport expansion is the Applicant’s proposal it would be reasonable to expect they would assume a review role of the amended NAP in addition to other Interested Parties.</p> <p>The current NAP (2019-2023) mentions noise insulation but does not give a timescale to complete all eligible properties. Neither does the draft 2024-2028 NAP. Both NAPS promise a testing regime (of which we have never seen results) as well as a satisfaction survey (of which we have not seen results either). Budgetary estimate for insulation in the 2019-2023 NAP was £100,000 but this has been increased substantially since first published.</p> <p>The NAP promises a reduction in overall noise contours in future years but an increase to 32mppa will only increase these contour areas significantly relative to the ‘Do Minimum’ scenario.</p>

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### ExA:

With reference to ID10 above (Surface Access) would greatly appreciate this point being secured in the Development Agreement, as otherwise if implemented is just another unnecessary financial drain on innocent residents who will also be subject to increased noise, congestion and pollution.

### REFERENCES

- 1 Department for Transport (2022) Jet Zero Strategy: Delivering net zero aviation by 2050
- 2 Department for Transport (2022) Jet zero: modelling framework
- 3 Department for Transport (2023) Jet Zero strategy: one year on
- 4 Department for Transport (2018) Airports National Policy Statement
- 5 International Civil Aviation Organization (2022), Environmental Trends in Aviation to 2050
- 6 Luton Borough Council (2017), Local Luton Plan 2011-2031

### GLOSSARY

ATM	Air Traffic Movement
ICCAN	Independent Commission on Civil Aviation Noise
JZMF	Jet Zero Modelling Framework
LA	Local Authority
LBC	Luton Borough Council
LR	Luton Rising
LOAEL	Lowest Observable Adverse Effect Level
LLA	London Luton Airport
LLAOL	London Luton Airport Operations Limited
NAP	Noise Action Plan
NIS	Noise Insulation Sub-committee (of the Consultative Committee)
mppa	million passengers per annum
SOAEL	Significant Observed Adverse Effect Level
UAEL	Upper Adverse Effect Level
UKHSA	UK Health Security Agency

## **Appendix A - Air Noise Compensation Schemes**

**Author: Michael Reddington**

### **Introduction**

The following statements set out the trail of requirements for the various Compensation schemes for Residential properties set out in **Draft Compensation Policies, Measures and Community First**:

1. The Applicant has advised that compensation above 63dB LAeq,16h is not mandatory, the language in policy is the 'government expects...'. The first policy in which compensation is mentioned is the [2013 Aviation Policy Framework](#), paragraph 3.39. This was then updated in the [2017 consultation response to the draft airspace policy](#), paragraph 2.39, to remove the 'increase in noise of 3dB or more' from the policy. Whilst this was a consultation response document, paragraph 9 clarifies that it updates the relevant policies from the APF. Finally, in 2018 government issued the [Aviation 2050 consultation](#) which notes the intention to move insulation policy threshold to 60dB LAeq,16h. This has yet to be adopted in any actual policy documents, but is a clear aspiration:

3.122 Such schemes, while imposing costs on the industry, are an important element in giving impacted communities a fair deal. The government therefore proposes the following noise insulation measures:

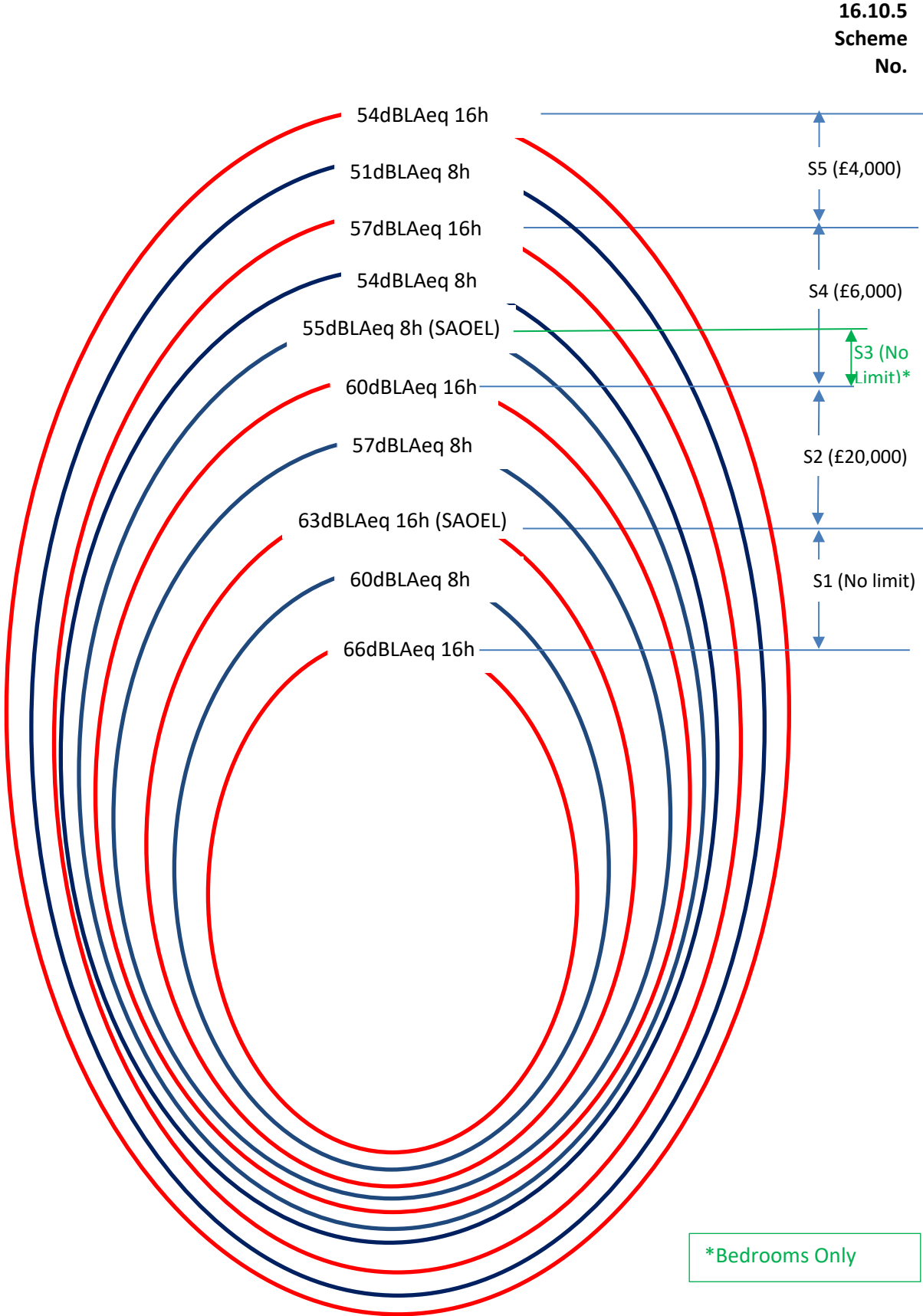
- **to extend the noise insulation policy threshold beyond the current 63dB LAeq 16hr contour to 60dB LAeq 16hr**

Note that none of these documents mention insulation eligibility using the night-time LAeq,8h, or insulation eligibility below 60dB LAeq,16h.

2. These minimum mandatory requirements for compensation have been extended in the DCO to Daytime (54dBA) and Night-time (55dBA) using 5 no. Schemes set out in **Draft Compensation Policies, Measures and Community First**.
3. The schematic previously provided in AS-156 – See Figure 1 below – has been revised to remove the Day and Night contours lower than 54dB LAeq 16h as these are not liable for compensation. Note that the Applicant has advised that these are INDICATIVE contours which may vary with time and more definite data.
4. The only stipulation in respect of 'rooms' is that Scheme S3 applies only to bedrooms: all other Schemes relate to 'Habitable rooms', which includes bedrooms, and which may vary between properties.
5. Therefore, Schemes 1,2 4 and 5 will also provide insulation to bedrooms if this is what the householder prefers, within the stated budget.
6. The one anomaly is Scheme 3 which provides insulation to bedrooms only but with an unlimited budget, whereas properties in Scheme have a maximum budget of £20,000 for ALL Habitable rooms, For example, depending on the property, £20,000 is likely to be sufficient to provide insulation for a full 4-5 bedroom house, including bedrooms and other habitable rooms. See response to CAH1 Action 25 in [\[REP4-070\]](#), page 7. (The Applicant has advised that S3 was added after feedback from Statutory Consultation and appears to sit separately from the other Schemes 1,2,4,5 which also include night-time eligibility).

7. The Applicant has advised that before-and-after testing of insulation will be carried out at the cost of the airport operator LLAOL and will not count towards the monetary limit for each Scheme.
8. Residential Homes  
The Applicant has confirmed that Residential Homes are classified as Residential properties (as opposed to Non-Residential properties) in respect of insulation compensation.
9. Non-Residential properties  
Non-Residential properties are also eligible for insulation subject to the limitations set out in **Draft Compensation Policies, Measures and Community First.**

**Figure 1: Simplified Air Contour Schematic -Daytime (Red) and Night-time (Blue) for Residential Properties**



## Appendix B Moratorium Date for Eligibility for Insulation

**Author: Michael Reddington**

### Introduction

With reference to **Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]** paragraph 6.1.16 and discussions at **ISH9** on 30/11/2023 about Applicant's response **REP5-054 ID #71**.

1. Moratorium  
The current position as stated in REP5-054 ID 71 is that any building constructed after 16<sup>th</sup> October 2019 will not be eligible for insulation under the provisions of the DCO **Draft Compensation Policies, Measures and Community First Tracked Change Version [REP4-043]** irrespective of its location within the noise contours. (*16<sup>th</sup> October 2019 is the date when the DCO allegedly went out to formal consultation.*)
2. Applicant's position  
The Applicant's position is that this is 'usual practice'. Our contention is that this is draconian.
3. Our Position
  - (a) The requirements for noise insulation will depend upon the building's location within noise contours. These requirements can vary depending on proximity to the runway. There is going to be either one overarching set of requirements that apply to all buildings (i.e. worst case) or a tiered system depending upon exposure.
  - (b) The date of 16<sup>th</sup> October 2019 is a date when the DCO document was released for *formal consultation*. There was no guarantee that the DCO would be permitted so why would a builder take it upon himself to include additional constraints that may never be realised, within his design ? Builders are not psychic.
  - (c) In order to enforce additional constraints Host Authorities would have had to include any such constraints within the relevant Planning Department' processes and procedures PRIOR to the granting of Planning Permission ('PP') for any building;
  - (d) This would necessitate Planning Departments' prior knowledge of the Applicant's specific construction requirements and an instruction (by whom ?) to include within their procedures.
  - (e) Did the Applicant inform the Host Authorities Planning Departments of any particular requirements for inclusion within Planning procedures in a timely manner to influence granting of Planning Permissions; AND with sufficient leeway to allow a builder to construct a property to completion before 16<sup>th</sup> October 2019 ?
4. Extensions  
How would these constraints apply to building extensions that also require PP ?
5. Elapsed Time  
Even assuming the original date of 16<sup>th</sup> October 2019 was 'reasonable' [we think not] and the Applicant's requirements were clearly communicated to the Host Authorities , five years have elapsed since 16<sup>th</sup> October 2019 and the DCO is still not finalised since it is subject to a Planning Inspectorate decision. Therefore, it is not possible to say with any certainty that requirements will be added, amended or deleted related to the construction of properties affected by airport noise, thus rendering buildings constructed before 16<sup>th</sup> October 2019 ineligible for insulation, through no fault of their own.

6. Activity Schedule

Attached is a simplified activity schedule (without durations) showing the steps required for a building to be completed before 16<sup>th</sup> October 2019,  
Also shown in the attached Activity Schedule are the steps we believe should be taken to secure the correct level of noise insulation.

7. Recommendation

The moratorium date of 16<sup>th</sup> October 2019 should be dispensed with immediately. Once requirements are finalised and development is permitted, the Applicant should advise Host Authorities so that these requirements can be included in their Planning processes. Any Planning Permission granted thereafter would then secure that any new buildings are compliant with latest Regulations and hence ineligible for insulation under the DCO specification.





## **Appendix C. Current – claimed – LLAOL Insulation Tests**

### **1. Test arrangements**

Acoustic tests are arranged on a sample of residential properties to measure the building both before and after the sound insulation works are carried out.

### **2. Aircraft noise measurements**

Measurements are made in accordance with an International Standard (BS EN ISO 16283-3). This includes simultaneous measurements of aircraft events both outside the house and inside the house. Measurements are made of individual aircraft events. These last around 20-30 seconds. We typically measure around 10 events per room. However, we look for at least 5 measurements of the more typical Easyjet/Whizz flights.

### **3. Reverberation/echo measurements**

Aircraft sound levels inside habitable rooms will vary depending on how much reverberation/echo there is in a room. Aircraft noise levels will sound much lower in a living room with thick carpets, lots of soft furnishings, curtains etc. Aircraft noise will sound higher in a room with hard floor finish, blinds rather than curtains and little furniture. We therefore measure the amount of reverberation in the room and correct the results to the acoustic conditions of a standard habitable room. This enables a like for like comparison.

### **4. Background measurements**

We also must measure and correct for background noise. We need quiet conditions inside homes to measure aircraft noise accurately and residents are helpful at being quiet for our tests. Nevertheless, there will be continuous background sound which interferes with the measurements. This can be from external sources (A1081 and distant M1 noise) or this can be from internal sources (fridge hum). We measure this background noise and correct our results to minimize this effect.

### **5. Calculations**

We calculate the level difference between inside and outside (after correcting for echo/background). This provides a level difference in decibels. Typically, we would expect a performance of around 35 dB for a property treated under the scheme. We present the results of the test using a  $D_{at,E,2m,nTw}$  metric. This provides an indication of the difference between inside and out. Therefore, if someone is exposed to 63 dB  $L_{Aeq,16h}$  of noise outside then you would expect an internal noise level of  $63-35=28$  dB inside. This is somewhat of an over-simplification but hopefully provides some context as to the results.

### **6. Review**

The results of the testing provide us with evidence as to whether the installation has “worked”. If the result is poor this may indicate that the windows are not well sealed and/or there is an issue with noise coming into the room from a different path (roof for example). We also carry out visual inspections of the installed windows and vents to see if these have been installed well.