

## 8. Noise

### 8.1 Introduction

- 8.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Scheme with respect to noise. The chapter should be read in conjunction with the **Chapter 3: Description of the Proposed Scheme** and with respect to relevant parts of **Chapter 9: Human health** and **Chapter 10: Transport**, where common receptors have been considered and where there is an overlap or relationship. This chapter supplements the noise chapter in the 2014 Planning Permission 2012 ES.
- 8.1.2 This noise assessment has assessed the likely significant effects arising from the proposed change to Condition 8 to raise the passenger throughput cap to 19 mppa, and those arising from the proposed increases to the daytime and night-time noise contours, through the variation of Condition 10, for the period to the end of 2027, and from 2028 onwards (see **Section 3.2**).

### 8.2 Limitations of this assessment

- 8.2.1 The proposed condition variations have been based upon forecasts for future aircraft operations and the resultant noise levels. There is an inherent uncertainty in forecasting aircraft movements which is based on multiple factors including fleet mix assumptions.
- 8.2.2 Aircraft operation forecasts for the Proposed Scheme's scenarios have been supplied by LLAOL<sup>126</sup> and are therefore assumed to be correct at the time of writing. It is understood that the assumed numbers of new generation aircraft are based on airline orders for the relevant aircraft between now and 2026, and this has been represented in LLAOL's fleet mix assumptions.

### 8.3 Relevant legislation, planning policy, and technical guidance

- 8.3.1 A full explanation of the relevant legislation, policy and guidance is presented in **Appendix 8A** in **Volume 3: Figures and Appendices**. The following provides a summary of key documents used within this assessment.

#### Legislative context

- 8.3.2 The following legislation is relevant to the assessment of the effects on noise receptors:
- The *Civil Aviation Act*<sup>127</sup>;
  - The *Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003*<sup>128</sup>
  - *Directive 2002/30/EC*<sup>129</sup>;
  - *European Union (EU) Regulation 598*<sup>130</sup>;

<sup>126</sup> A discussion on how the forecasts are used within the noise modelling software is provided within Appendix 10B.

<sup>127</sup> Civil Aviation Act, 2006 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2006/34/contents> [Accessed 10 November 2020].

<sup>128</sup> The Aerodromes (Noise Restrictions) (Rules and procedures) Regulations, 2003 [online]. Available at: <https://www.legislation.gov.uk/uksi/2003/1742/contents/made> [Accessed 10 November 2020].

<sup>129</sup> Directive 2002/30/EC. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0030&from=EN> [Accessed 10 November 2020].

<sup>130</sup> Regulation (EU) 598/2014, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0598&from=EN> [Accessed 10 November 2020].

- *Environmental Noise Directive (2002/49/EC)*<sup>131</sup> (END); and
- *Environmental Noise (England) Regulations 2006* (as amended)<sup>132</sup>.

## Planning policy context

8.3.3 The main policy documents which are referred to within this assessment are further summarised in **Table 8.1**.

Table 8.1 Policy relevant to the noise assessment

Policy reference	Policy issue
<b>National planning policies</b>	
<b>Noise Policy Statement for England (NPSE) (Defra, 2010)</b> <sup>133</sup>	<p>The NPSE sets out the long-term vision of the Government and within the context of policy on sustainable development aims to:</p> <ul style="list-style-type: none"> <li>• avoid significant adverse impacts on health and quality of life;</li> <li>• mitigate and minimise adverse impacts on health and quality of life; and</li> <li>• where possible, contribute to the improvement of health and quality of life.</li> </ul> <p>It introduces three 'Effect Levels' relevant to the assessment of noise; the two of concern within this assessment are:</p> <ul style="list-style-type: none"> <li>• <b>LOAEL: Lowest Observed Adverse Effect Level</b> – this is the level above which adverse effects on health and quality of life can be detected; and</li> <li>• <b>SOAEL: Significant Observed Adverse Effect Level</b> – this is the level above which significant adverse effects on health and quality of life occur.</li> </ul> <p>The aim of the NPSE is to avoid all noise occurring at the SOAEL level and to minimise, as far as possible, all noise occurring between the LOAEL and SOAEL brackets.</p>
<b>The Planning Practice Guidance for Noise (PPG-N) (MCHLG, 2019)</b> <sup>134</sup>	<p>Published by the Ministry of Housing, Communities and Local Government introduces a fourth effect level not included in the NPSE:</p> <p><b>UAEL – Unacceptable Adverse Effect Level</b> – this is the level above which extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physical effects occurs.</p>
<b>Aviation Policy Framework (APF) (2013)</b> <sup>135</sup>	<p>By defining the Government's objectives and policies on the impacts of aviation, the APF sets out the framework within which decisions on aviation ought to be made to deliver a balanced approach to securing the benefits of aviation and to support economic growth.</p> <p>The APF states that the "<i>Government wants to see the best use of existing airport capacity</i>" and that in the short-term, a key priority for Government is to continue to work with the aviation industry and other stakeholders to make better use of existing runways at all UK airports to improve performance, resilience and the passenger experience.</p>

<sup>131</sup> Directive 2002/49/EC, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN> [Accessed 10 November 2020].

<sup>132</sup> The Environmental Noise (England) Regulations, 2006 [online]. Available at: <http://www.legislation.gov.uk/ukxi/2006/2238/contents/made> [Accessed 10 November 2020].

<sup>133</sup> Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England [online]. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69533/pb13750-noise-policy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf) [Accessed 12 November 2020].

<sup>134</sup> Ministry of Housing, Communities and Local Government (2019), The Planning Practice Guidance for Noise [online]. Available at: <https://www.gov.uk/guidance/noise--2> [Accessed 12 November 2020].

<sup>135</sup> Secretary of State for Transport (2013) Aviation Policy Framework [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/153776/aviation-policy-framework.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf) [Accessed 12 November 2020].

Policy reference	Policy issue
<b>Consultation Response on UK Airspace Policy: A Framework for Balanced Decisions on the Design and use of Airspace<sup>136</sup></b>	<p>The Consultation Response confirms: "The government has issued revised Air Navigation Directions and Air Navigation Guidance to the CAA which will take effect from 1 January 2018". With regard to aircraft noise the Consultation Response sets out that:</p> <ul style="list-style-type: none"> <li>"The Government's current aviation policy is set out in the Aviation Policy Framework (APF). The policies set out within this document provide an update to some of the policies on aviation noise contained within the APF and should be viewed as the current government policy."</li> <li>"Consistent with the Noise Policy Statement for England, our objectives in implementing this [UK airspace] policy are to: ... limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise."</li> <li>"The specific daytime and night-time values proposed for the LOAEL: 51 dB <math>L_{Aeq, 16hr}</math> and 45 dB <math>L_{night}</math> also received broad support" and therefore "We [the Government] will set a LOAEL at 51 dB <math>L_{Aeq, 16hr}</math> for daytime noise .... and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45 dB <math>L_{Aeq, 8hr}</math> rather than <math>L_{night}</math> to be consistent with the daytime metric."</li> <li>"The Government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB <math>L_{Aeq, 16hr}</math> as occurred at 57 dB <math>L_{Aeq, 16hr}</math> in the past."</li> <li>the Government continues to expect airport operators to offer households exposed to levels of noise of 69 dB <math>L_{Aeq, 16h}</math> or more, assistance with the costs of moving;</li> <li>the Government also expects airport operators to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB <math>L_{Aeq, 16h}</math> or more; and</li> <li>"As a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential dwellings which experience an increase in noise of 3 dB or more which leaves them exposed to levels of noise of 63 dB <math>L_{Aeq, 16h}</math> or more."</li> </ul>
<b>Development plan policies</b>	
<b>Luton local plan (2011-31), adopted 2017</b>	<p>Policy LLP6: London Luton Airport Strategic Allocation, states in relation to airport expansion that proposals for development will only be supported where:</p> <ul style="list-style-type: none"> <li>"iv. 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;</li> <li>v. achieve further noise reduction or no material increase in day or night time noise or otherwise cause excessive noise including ground noise at any time of the day or night and in accordance with the airport's most recent Airport Noise Action Plan;</li> <li>vi. include an effective noise control, monitoring and management scheme that ensures that current and future operations at the airport are fully in accordance with the policies of this Plan and any planning permission which has been granted;</li> <li>vii. include proposals that will, over time, result in a significant diminution and betterment of the effects of aircraft operations on the amenity of local residents, occupiers and users of sensitive premises in the area, through measures to be taken to secure fleet modernisation or otherwise"</li> </ul>

<sup>136</sup> Department for Transport (2017) Consultation Response on UK Airspace Policy: a framework for balanced decisions on the design and use of airspace, [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf) [Checked July 2020].

Policy reference	Policy issue
	<i>Policy LLP38: 'Pollution and Contamination'</i> considers the effects of noise associated with new development and states that where adverse impacts are identified, appropriate mitigation will be required.

### Technical guidance

8.3.4 The main guidance documents and standards which are referred to within this assessment are further summarised in **Table 8.2**.

Table 8.2 Guidelines relevant to the noise assessment

Guidance	Relevance
<b>World Health Organization (WHO) Environmental Noise Guidelines for the European Region (2018)</b> <sup>137</sup>	The 2018 guidelines present health-based recommendations for environmental noise exposure, including for aircraft noise. The guidelines recommend reducing noise levels produced by aircraft below 45 dB $L_{den}$ to mitigate adverse health effects. For night-time, the guidelines recommend reduction in noise levels produced by aircraft to below 40 dB $L_{night}$ to help mitigate adverse effects on sleep.
<b>IEMA Guidelines for Environmental Noise Impact Assessment (2014)</b> <sup>138</sup>	The guidelines describe how the assessment of noise effects should be presented within the EIA process. The IEMA guidelines cover aspects such as scoping assessments, baseline prediction and definitions for significance criteria.

## 8.4 Data gathering methodology

- 8.4.1 Historically airports in the UK use one of two noise models to calculate aircraft noise; the UK civil aircraft noise contour model (ANCON), developed and maintained by the CAA, or the Integrated Noise Model (INM), produced by the US Federal Aviation Administration (FAA).
- 8.4.2 In 2015 INM was replaced by the Aviation Environmental Design Tool (AEDT), which is also produced by FAA. INM is now considered by the FAA as legacy software. Due to the release of AEDT, the FAA stopped supporting INM and will therefore not update the model or its associated database with new aircraft technology.
- 8.4.3 For the 2014 Planning Permission 2012 ES, all modelling was undertaken using INM. For consistency with the modelling underpinning the 2014 Planning Permission 2012 ES, the INM model has been retained for use for the purposes of this assessment.
- 8.4.4 Air traffic movements presented in **Appendix 8C in Volume 3: Figures and Appendices**, have been provided by LLAOL and consist of forecasts based on predicted passenger numbers and fleet mixes. The runway and departure route split for all scenarios (including an update of the original 12.5 mppa 2028 future baseline) is based on a five-year average over the years 2015 to 2019. Noise levels, for individual aircraft, have been validated against actual operation for the most frequently operating types.
- 8.4.5 Details of the modelling methodology are contained in **Appendix 8B in Volume 3: Figures and Appendices**.

<sup>137</sup> World Health Organization (2018) Environmental Noise Guidelines for the European Region [online]. Available at: [https://www.euro.who.int/\\_data/assets/pdf\\_file/0008/383921/noise-guidelines-eng.pdf](https://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf) [Accessed 12 November 2020].

<sup>138</sup> Institute of Environmental Management and Assessment (2014) Guidelines for Environmental Noise Impact Assessment, London.



- 8.4.6 The assessment of aircraft noise is based on an 'average summer's day' period from 16<sup>th</sup> June to 15<sup>th</sup> September. This 92-day period is used to account for the increased aircraft traffic during the summer season seen at many UK airports and consistent with the  $L_{Aeq,16hr}$  and  $L_{Aeq,8hr}$  index.
- 8.4.7 For the purpose of the noise assessment, population growth calculations used to inform the assessment present a larger increase in population than those schemes granted planning permission since 2011 (i.e. the 2014 Planning Permission 2012 ES baseline assessment). The population growth calculations have been used in the assessment of cumulative effects. It should be noted that the population data utilised for the 2014 Planning Permission 2012 ES is now considered out of date and as such, the population and dwellings counts have been updated with more recent population data for 2018. The 2018 population data is supplied under licence for this Proposed Scheme by CACI and applies population forecasts to the latest UK population census of 2011.

## 8.5 Consultation

- 8.5.1 For the assessment of the 19 mppa scenario, an initial approach to the noise assessment methodology was sent to Luton Borough Council (LBC) on 28 January 2020, with comments received back from the Council and LBC's acoustic consultant. The responses are presented in **Table 8.3**, with notes on and how these have been considered within the assessment. **Table 8.3** also provides an overview of noise issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 8.3 LBC comments and considerations from pre-submission consultation

Comment	Consultee	Consideration within this assessment	Considered in section
If it [the application] is a s73 then it is varying conditions (8 and 10 possibly) on the application that was submitted in 2012 (12/01400/FUL) and varied in 2017 (15/00950/VARCON) and so you would need to be looking at the difference from then to now – there is a lot of data available as LLAOL provide their quarterly reports (and annual monitoring report). You would also need to consider the difference between the permission for 18 mppa (what is happening on the ground currently) and the additional 1 mppa.	LBC	There is limited data to undertake comparative assessments with the 2014 Planning Permission 2012 ES, which was based on a short-term assessment against the 2011 baseline and a future baseline in 2028. It is considered that 2028 is the key year of assessment and that the increased mppa should be assessed against both the change in Condition 10 as a result of the proposal and also the difference with the original future year assessment of the 2014 Planning Permission 2012 ES. As it is expected that the effect of the proposals will diminish over time, the worst-case year of airport noise above that allowed for in the existing Condition 10 has also been assessed.	<b>Section 9.8</b>
For the avoidance of doubt, we do expect to see plotted noise contours. We also assume that the same schedule of non-residential receptors will be used.	LBC	Noise contours have been plotted and the same non-residential receptors have been used as in the previous S73 application in 2019 (19/00428/EIA or 19/01253/EIASCRC).	<b>Appendix 9E</b> in <b>Volume 3: Figures and Appendices</b>
You refer to changes to the level and frequency of $L_{Amax}$ and then say a significant effect will be identified if the frequency or level	LBC	An $L_{Amax}$ 80 dB noise contour is considered to be the threshold of potential significant effects. We have undertaken an assessment of the changes in fleet mix and ATMs to identify if there would likely be an increase in $L_{Amax}$ events above 80 dB.	<b>Section 9.8</b>

Comment	Consultee	Consideration within this assessment	Considered in section
increases substantially - have you a view as to what level is considered to be substantial and the level at which you will define a significant effect?			
In terms of N contours; whilst it may not be an 'official assessment process' it is another metric to consider in line with Govt advice (so not just $L_{Aeq\ 16hr}$ OR $L_{Aeq\ 8hr}$ ).	LBC	N-Contours have been considered.	<b>Appendix 9F</b> in <b>Volume 3: Figures and Appendices</b>
Traffic noise needs to consider this in relation to sensitive receptors.	LBC	Consideration for traffic noise was added to the Screening assessment to scope that source of noise out from further assessment; it was deemed to result in negligible effects. No comment was received from LBC as to significant effects from traffic noise.	<b>Section 9.6</b>
You make no mention of ground noise and would need to consider that and determine whether it can be scoped out (or not). If there is an overall increase in the number of ATMs (which may be the case with 19 mppa compared to 18 mppa), then there could be an increase in ground noise (and there are some residents in the area who complain about ground noise from the airport, though to date I am not sure that LLAOL have been able to pick it up in dealing with the residents).	LBC	Ground noise has been considered within the Screening document to determine whether an EIA is required. Additional ATMs were assessed without taking into account any potential benefit of reduced noise from modernisation. Short-term and long-term effects of the 19 mppa scenario were considered negligible.	<b>Section 9.6</b>
Your final point about no construction noise, etc, is accepted assuming that the application is purely for 19 mppa and has no operational development associated with it.	LBC	The growth to 19 mppa will be accommodated without any new on-airport infrastructure as described in <b>Chapter 3: Description of the Proposed Scheme</b> . There have been no changes to agreed approach.	<b>Section 9.6</b>
Comments were received that expressed concerns about the impact of the proposals on local noise level.	Various	The noise assessment has assessed likely significant effects arising from the Proposed Scheme. It explains the likely significant effects arising from the proposed change to Condition 8 to raise the passenger throughput cap to 19 mppa, and those arising from the proposed increases to the daytime and night-time noise contours through the variation of Condition 10 for the period to the end of 2027, and from 2028 onwards.	<b>Section 9.10</b>
Comments were received that requested noise monitoring be carried out, and that noise levels be continually reviewed and reported to local communities on a monthly basis.	Various	Luton Airport has three fixed noise monitoring terminals that constantly monitor the noise from aircraft. They also have four portable noise monitoring terminals, which are used to measure noise levels in local communities. Live updates of the noise monitoring (with a 20 min delay) can be seen from the fixed monitoring stations here: <a href="https://travisltn.topsonic.aero/">https://travisltn.topsonic.aero/</a> .  The findings from the noise monitoring are reported in regular and publicly available reports, which can be found through the following links:	

Comment	Consultee	Consideration within this assessment	Considered in section
		<ul style="list-style-type: none"> <li>Community noise reports: <a href="https://www.london-luton.co.uk/corporate/community/noise/community-noise-reports">https://www.london-luton.co.uk/corporate/community/noise/community-noise-reports</a></li> <li>Quarterly noise reports: <a href="https://www.london-luton.co.uk/corporate/community/noise/quarterly-monitoring-report">https://www.london-luton.co.uk/corporate/community/noise/quarterly-monitoring-report</a></li> <li>Annual noise reports: <a href="https://www.london-luton.co.uk/corporate/community/noise/annual-monitoring-reports">https://www.london-luton.co.uk/corporate/community/noise/annual-monitoring-reports</a></li> </ul>	
Some comments received provided recommendations for noise mitigation or management measures.	Various	Environmental measures embedded into the Proposed Scheme to manage and mitigate noise are presented in <b>Section 8.7</b> and in <b>Table 8.28</b> .	<b>Section 8.7, Table 8.28</b>

- 8.5.2 A formal request to LBC for a Screening Opinion under Regulation 5(2) of the *Town and Country Planning (Environmental Impact Assessment) Regulations 2017* was submitted (see **Appendix 1A** and **Appendix 1B** in **Volume 3: Appendices and Figures**). This included an initial assessment of noise from the proposed variation. The screening assessment concluded that the proposed variation would not have a significant effect on noise sensitive receptors. In particular, the screening assessment considered the following:
- increase in road traffic noise effects as a result of increased traffic from the rise in passengers;
  - increase in aviation ground noise from aircraft taxiing; and
  - increase in aviation ‘in-air’ noise.
- 8.5.3 Based on the increase in the number of dwellings that would be exposed to noise levels above the Significant Observed Adverse Effect Level (SOAEL) as a result of ‘in-air’ noise, LBC considered that the Proposed Scheme was likely to have a significant environmental effect and therefore required an EIA.
- 8.5.4 In conjunction with the screening request, a standalone Noise Impact Assessment report was submitted to LBC in July 2020 associated with the 19 mppa application. The report received comments from both the Council and the Council’s third-party acoustic consultant. The comments were considered within the revision of the assessment as provided within this chapter. The key comments and how they have been addressed are presented in **Table 8.4**.

Table 8.4 LBC comments and considerations from the Noise Impact Assessment

Comment	Consideration within this assessment	Considered in section
The assessment does not justify this extent of relaxation. Seeking a greater relaxation than is technically justified by the noise assessment purely to cover matters of forecasting uncertainty is not an appropriate approach.	The amendment to Condition 10 has been revised with new forecasting and noise predictions. The relaxation submitted is only that required by predicted noise levels based on forecasted flows.	<b>Section 1.2</b>
We do not accept that reference to an entirely separate application (which we understand will be withdrawn once the 19 mppa application is made) can in any way be used to justify the extent of relaxation being sought in this case.	References to the previous S73 (19/00428/EIA or 19/01253/EIASCR) has been removed.	N/A



Comment	Consideration within this assessment	Considered in section
<p>Given current uncertainties within the airline industry associated with Covid-19, how confident is LLOAL that 2021 will indeed be the worst-case operational year? Any further delay in the resurgence of the industry beyond what is currently foreseen might put pressure on 2024 as the year for re-normalisation of Condition 10.</p>	<p>Forecasts have been updated to take into account the latest understanding of how the airlines will operate.</p>	<p><b>Section 2.2</b></p>
<p>The assessment and appendices are confusing and appear contradictory, and the explanations provided were not totally understandable. A clear and coherent link between forecast numbers and noise model inputs is required.</p>	<p>A modelling report is presented in the Appendix to provide the necessary explanation in one place. Assessment scenarios and results have been updated.</p>	<p><b>Appendix 8B in Volume 3: Figures and Appendices</b></p>
<p>Three separate years as providing baselines against which the 2028 19 mppa noise case is to be compared. There is no text justifying or explaining the merits of these comparisons. They do not include 2019, which by all reasonable standards could be considered the most recent year for which noise contours are available, i.e. the baseline year. BAP Appendix B contains summer's day, day time and night-time movement numbers for 2019 suggesting that this has been the subject of noise modelling.</p>	<p>Assessment scenarios have been updated. The reason for not using 2019 as a baseline was because the noise limits imposed by Condition 10 were already being exceeded during that year and therefore it was not considered an appropriate baseline.</p>	<p><b>Section 8.8</b></p>
<p>The acid test of noise effects for any application to vary aircraft operations is the 'with Proposed Scheme' vs. without Proposed Scheme' comparison for the year of full capacity (in this case 2028). By convention, comparison of the 'with Proposed Scheme' case against baseline is also undertaken. We think the basis of this analysis needs to be rationalised and justified</p>	<p>The assessment scenarios are the worst-case year for identification of mitigation, the following years after worst-case year to show reduction in effect, and 2028 both 'with' and 'without' Proposed Scheme mppa increase and baseline.</p>	<p><b>Section 8.8</b></p>
<p>No reference is made in the NIA to the plotted contours contained as part of BAP Appendix D. Plots are provided for values of 57 dB daytime and 48 dB night-time in each of years 2021, 2024 and 2028 'with Proposed Scheme' (19 mppa) and 'without Proposed Scheme' (18 mppa). This would not be considered adequate for an ES noise chapter, as contours should as a minimum be plotted at LOAEL, SOAEL, and UAEL as well 54 dB LAeq,16h day as this is now considered to represent the onset for significant community annoyance. Good practice is to plot contours at 3 dB intervals from LOAEL up to UAEL, as was prepared for the S.73 application (19/00428/EIA or 19/01253/EIASCR). In this way, locations affected by noise at different average levels during the daytime and night-time can be identified.</p>	<p>Figures referenced in the chapter and include contour values.</p>	<p><b>Section 8.9 and Appendix 8E in Volume 3: Figures and Appendices</b></p>
<p>We believe the method for assessing the magnitude of change to be an unnecessarily convoluted and not 100% reliable way of assessing the noise level difference between two scenarios given that the noise model is able to identify the actual range of differences across the entire assessment grid.</p>	<p>Method has been amended to use a matrix of noise level change and absolute noise levels at receptor points, so the convoluted calculation method is not required.</p>	<p><b>Section 8.9</b></p>
<p>A large amount of data is presented in tabular form in the appendices. It seems to be excessive given the additional information that can be gleaned from L<sub>Amax</sub> flyover effects.</p>	<p>The assessment within the chapter is considered to be sufficiently concise. The appendices provide all supporting information required for reviewing the application.</p>	<p><b>Section 8.9 and Appendix 8E in Volume 3: Figures and Appendices</b></p>

Comment	Consideration within this assessment	Considered in section
The commitment to funding of the SIGS appears to fall short to the tune of £1,300,000. There is no reference to any funding post 2021.	The mitigation has been revised and detailed within the chapter.	<b>Section 8.7</b>

## 8.6 Scope of the assessment

### Spatial scope

- 8.6.1 The spatial scope of the assessment of noise covers the area of the Proposed Scheme, together with an area extending to the worst-case noise attributed to aviation for the 51 dB  $L_{Aeq,16hr}$  daytime contour and 45 dB  $L_{Aeq,8hr}$  night-time contour<sup>139</sup>. Additional locations have been modelled outside of these noise contour areas to show the predicted noise levels at nearby communities.

### Temporal scope

- 8.6.2 The key assessment year is the future year of 2028, which corresponds to the future year identified within the 2014 Planning Permission 2012 ES. However, there are years prior to this that also need assessment for three reasons:

- 1) The variation to Condition 10 presents a new area limit for the daytime 57 dB  $L_{Aeq, 16 hr}$  and night-time 48 dB  $L_{Aeq, 8 hr}$  assessment, which is based on the widest area, predicted to be in 2021 with 18 mppa.
- 2) As modernization reduces the noise effect from the airport operations, the 2028 year would not be the worst-case scenario. To ensure that environmental measures required to minimise significant noise effects encompass the worst-case effect from the Proposed Development, interim years between 2021 and 2028 also need to be assessed. The worst-case year has been identified as 2022. Additional years of 2023 and 2024 have been included as information to show how noise decreases, supporting the conclusion that 2022 is the worst-case year for significant effect.
- 3) 2024 has also been assessed because this is the first year where 19 mppa is predicted to be reached.

To undertake the assessment of the key year of 2028, the predicted noise contours for the Proposed Scheme are compared to the baseline condition. As the proposal is to vary a condition of the 2014 Planning Permission, it is considered relevant to use the baseline of 12.5 mppa in 2028, as was assumed for the 2012 ES (as updated with runway operation and population numbers). By undertaking this comparison, it is possible to analyse the effect as would have been identified in 2012 with this different condition (given necessary adjustments for the latest knowledge). For years prior to 2028 which encompass both the change to the Condition 10 and worst-case year, it is more appropriate to compare with what it is permissible currently, i.e. what is the actual effect that could be experienced at residences, assuming what is permissible with the existing Condition 10 contour area.

- 8.6.3 In summary, three non-variation scenarios are considered as a baseline for comparison:

- the extent of the existing Condition 10 for 2021 to 2027 inclusive, which provides a noise limit for airport 'in-air' operation;

<sup>139</sup> These contours relate to the Lowest Observable Adverse Effect Level, which is discussed in **Section 8.8**.

- the extent of the existing Condition 10 for 2028 onwards, which provides a future noise limit for airport in-air operation; and
- the 'without Proposed Scheme' 2028 scenario of 12.5 mppa as assessed in the 2014 Planning Permission 2012 ES but updated to take into account the latest knowledge of fleet mix and runway split.

## Receptors

- 8.6.4 The closest residential areas to the airport are located to the west and south-west of Luton but there are more densely populated areas to the north. There are several small villages within relatively close proximity of LLA. Breachwood Green and Whitwell are located to the east and are affected by easterly departures and westerly arrivals. Residential areas to the west, such as Slip End, Caddington, Flamstead, and Markyate are affected by easterly arrivals or westerly departures. Due to the scale of the study areas the effect of aviation noise will be assessed in terms of dwellings in different noise contours rather than identifying noise at specific residential receptors.
- 8.6.5 The assessment considers the effect of the Proposed Scheme on the residents adversely affected, and significantly adversely affected, by the proposed variations, taking into account absolute levels of noise and the magnitude of change. Additional commentary is provided for other indicators, including N-contours and  $L_{Amax}$  levels.
- 8.6.6 Noise at non-residential receptors will be assessed; particularly education, healthcare, and religious centres are considered sensitive to increases in noise. Noise levels indicating thresholds for the onset of potentially significant effects for non-residential noise sensitive receptors are dependent on their use. The magnitude of change in noise is applied to assess significance on non-residential receptors.
- 8.6.7 The list of non-residential receptors presented in the 2014 Planning Permission 2012 ES have been reviewed and community locations which did not represent any non-residential noise sensitive receptors have been removed and the specific non-residential noise sensitive receptors identified. The receptors identified in **Table 8.5** are not exhaustive but relate to the closest modelled point.

Table 8.5 Non-residential noise sensitive receptors

Location	Receptors
<b>Old Knebworth</b>	Knebworth Country Park
<b>Caddington</b>	Caddington Village School, Heathfield Lower School
<b>Park Town, Luton</b>	The Linden Academy, Wonderland Day Care Nursery
<b>Whitwell</b>	St Paul's Walden Primary School, The Whitwell Surgery
<b>Breachwood Green</b>	Breachwood Green JMI School
<b>St Pauls Walden</b>	All Saints Church
<b>Farley Hill, Luton</b>	Stockwood Park Academy, St Margaret of Scotland Catholic Primary School
<b>Slip End</b>	Slip End Lower School
<b>Harpenden</b>	Roundwood Park School, King's School, Highfield's Pre-school, Manland Primary School, St George's School, Spire Harpenden Hospital
<b>Walkern</b>	Walkern Primary School

Location	Receptors
<b>Stevenage (Eastern Perimeter)</b>	Camps Hill Community School, Noble School, Lodge Farm Primary School
<b>Stevenage Station</b>	North Hertfordshire College
<b>Luton (Wandon End)</b>	Wigmore Park
<b>Kensworth</b>	Kensworth Primary School
<b>Hudnall Corner</b>	Hudnall Park
<b>Flamstead</b>	Flamstead School
<b>Markyate</b>	Markyate Village School & Nursery

## Likely significant effects

- 8.6.8 The assessment considers the impact of the Proposed Scheme from the initial 2021 forecast with 18 mppa, upon which the amendment to Condition 10 is based. The following years are also assessed until 2024, which is the first year of increased throughput to 19 mppa. Based on the changing fleet mix with increased modernisation, these chosen scenario years show both the worst-case years for noise effect and how the noise levels start to decrease thereafter. A future year of 2028 is also assessed to understand the long-term effects of the Proposed Scheme in line with the original methodology within the 2014 Planning Permission 2012 ES.
- 8.6.9 This assessment is for airborne aircraft 'in-air' noise only, which is principally from aircraft arriving and landing and from aircraft taking-off and departing. 'In-air' aircraft noise that is considered in this assessment includes noise that occurs when, aircraft are on the runway:
- for start of take-off roll (SoR);
  - after landing;
  - when aircraft are rolling down the runway; and
  - when aircraft are using reverse thrust for braking.
- 8.6.10 Road traffic noise effects and aviation ground noise are not considered within this report as they have already been considered within the screening report (see **Appendix 1A** in **Volume 3: Figures and Appendices**) and have been shown not to have a significant effect. There are no construction works or operational building services plant to assess as there are no infrastructure requirements associated with the Proposed Scheme.

## 8.7 Environmental measures embedded into the Proposed Scheme

- 8.7.1 To ensure that noise levels decrease year on year the following commitments will be made as part of the Proposed Scheme:
- For Summer 2021 and all subsequent seasons, no night-time slots (22:00 to 05:59 GMT) will be allocated to aircraft with a quota count (QC) value greater than 1;
  - No further daytime slots will be allocated to aircraft with a QC value greater than 1 (06:00 to 21:59 GMT) between 1 June and 30 September;
  - No further night slots to be allocated to series flights (22:00-05:59 GMT) between 1 June and 30 September;

- No new slot applications with an aircraft QC value greater than 0.5 will be permitted between 22:00 and 05:59 GMT;
- Only scheduled arriving aircraft will be accepted between 04:45 and 06:00 GMT. All other arriving aircraft must land after 06:00 GMT, arrivals earlier than the scheduled arrival time will not be accepted; and
- No re-scheduling of existing allocated slots from the day time (06:00 to 21:59 GMT) into the night-time (22:00 to 05:59 GMT) 1 June – 30 September.

## 8.8 Assessment methodology

### Approach

- 8.8.1 The assessment of effects in this chapter differs from the generic project-wide approach to the assessment methodology as set out in **Chapter 4: Approach to preparing the Environmental Statement**. The generic approach of comparing the Proposed Scheme with a baseline has informed this noise assessment. However, the identification of receptor sensitivity and magnitude is unnecessary as there exists in NPSE the framework for identifying significant effects on health, albeit the level by which this occurs is a matter of professional judgment.
- 8.8.2 Aircraft noise effects have been assessed by calculating and comparing predicted aircraft noise levels for the airport operating to the extent of the proposed variations against a selection of baseline scenarios as described in **Section 8.6**. As described in **Section 2.1**, in seeking to increase the passenger numbers to 19 mppa, Condition 10 needs to be varied both in the area limits up to 2027 inclusive and the area limits set for 2028 and onwards. The worst-case year for significant noise effects is not necessarily aligned with either the largest area contained within Condition 10 daytime or night-time contours 57 dB and 48 dB respectively or the years of maximum 19 mppa capacity. It is therefore necessary to analyse noise modelling results for a number of years between 2021 and 2028 to ascertain the years of highest impact in relation to significance and mitigation requirements.
- 8.8.3 The primary means of assessing aviation noise is by using the daytime (07:00 - 23:00)  $L_{Aeq, 16hr}$  and night-time (23:00 - 07:00)  $L_{Aeq, 8hr}$  metrics. The N65 and N60 contours and  $L_{Amax}$  contours have also been considered, but are only presented as additional information, so conclusions regarding significant effect have not been drawn from those results.

### Assessment scenarios

- 8.8.4 Aviation noise described using the  $L_{Aeq}$  metric has been assessed using the following scenarios as discussed in **Section 8.6**:
- comparison of the 'with Proposed Scheme' scenarios: 2021 (with the amended Condition 10 limits), 2022, and 2023 18 mppa scenarios with the existing Condition 10 limits for 2021 - 2027 showing the short-term change in noise levels prior to the projected year that the 19 mppa would take effect
  - comparison of the 'with Proposed Scheme' 19 mppa 2024 scenario with the existing Condition 10 limits for 2021 - 2027 showing the short-term change in noise levels prior to the change in Condition 8.
  - comparison of the 2028 19 mppa scenario (with the amended Condition 10 limits) with the 2028 baseline ('without Proposed Scheme') 12.5 mppa scenario as would have been expected for the 2014 Planning Permission's ES (as assessed in the 2012 ES); and

- comparison of the 2028 19 mppa scenario (with the amended Condition 10 limits) with the existing Condition 10 limits for 2028 onwards for long-term effects.

## Assessment criteria

- 8.8.5 Following government policy terminology<sup>140</sup>, adverse effects can be detected from calculated noise at a residential receptor when between LOAEL and SOAEL, and significant adverse effects occur when above SOAEL. Reference to the NPSE criteria is made within this assessment and mitigation considered accordingly to minimise absolute levels of noise. However, determining whether, the difference between baseline scenarios and the Proposed Scheme, would be considered a significant effect is also dependent on the magnitude of change.

## Assessment criteria for residential receptors

- 8.8.6 The aircraft noise thresholds shown in **Table 8.6** have been used within this assessment for residential receptors.

Table 8.6 Summary of aircraft noise thresholds for residential receptors

Period	Lowest Observed Adverse Effect Level (LOAEL)	Significant Observed Adverse Effect Level (SOAEL)	Unacceptable Adverse Effect Level (UAEL)
<b>Day time (07:00 to 23:00)</b>	51 dB $L_{Aeq,16hr}$	63 dB $L_{Aeq,16hr}$	71 dB $L_{Aeq,16hr}$
<b>Night-time (23:00 to 07:00)</b>	45 dB $L_{Aeq,8hr}$	55 dB $L_{Aeq,8hr}$	66 dB $L_{Aeq,8hr}$

## Daytime aircraft noise

- 8.8.7 The airborne noise assessment method prescribed in the 2014 Planning Permission 2012 ES was based on noise policy contained in the withdrawn *Future of Air Transport White Paper* (ATWP)<sup>141</sup>. The 2014 Planning Permission 2012 ES therefore assessed amenity noise effects when aircraft noise exceeded 57 dB, 63 dB, and 69 dB  $L_{Aeq,16hr}$  as endorsed in the White Paper.
- 8.8.8 For the purposes of this assessment, the daytime noise policy thresholds of 63 dB and 69 dB used for the 2014 Planning Permission 2012 ES have been retained; however consistent with updated airspace policy guidance, this assessment also considers noise above 51 dB  $L_{Aeq,16hr}$ .
- 8.8.9 The level of **71 dB  $L_{Aeq,16hr}$**  has been considered a suitable value for a daytime UAEL relating to 10 dB above BS 8233<sup>142</sup> internal noise target levels assuming a precautionary outdoor to indoor noise level difference of 26 dB with windows closed<sup>143</sup>.

<sup>140</sup> Department for Agriculture and Rural Affairs (2010). *Noise Policy Statement for England*. Available [online] at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69533/pb13750-noise-policy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf) [Accessed 23 November 2020].

<sup>141</sup> Department for Transport (2003). *The Future of Air Transport*. Available [online] at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/685595/6046.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685595/6046.pdf) [Accessed 23 November 2020].

<sup>142</sup> British Standards Institution (BSI, 2014) *British Standard BS 8223:2014 Guidance on sound insulation and noise reduction for buildings*. London, BSI.

<sup>143</sup> This is based on the UAEL identified within the Heathrow Preliminary Environmental Information Report (PEIR), Appendix 7.1 Annex F: Overview of LOAEL, SOAEL and UAEL values (Heathrow Airport Limited, 2019), available at <https://aec.heathrowconsultation.com/wp->

- 8.8.10 The level of **63 dB  $L_{Aeq,16hr}$**  has been considered a suitable value for the SOAEL for the assessment of likely significant adverse effects and is based upon paragraphs 3.37-3.39 from the APF<sup>144</sup>, which indicates that above 63 dB  $L_{Aeq,16hr}$ , airports should provide financial assistance towards noise insulation at noise-sensitive buildings and residential dwellings.
- 8.8.11 The level of **51 dB  $L_{Aeq,16hr}$**  has been considered a suitable value for LOAEL based on the Air Navigation Guidance (ANG, 2017)<sup>145</sup> which states that “*We [the Government] will set a LOAEL at 51 dB  $L_{Aeq,16hr}$  for daytime noise*”.

### Night-time aircraft noise

- 8.8.12 With regards to night-time aircraft noise, this was assessed in the 2014 Planning Permission 2012 ES according to the area of the 90 dB Sound Exposure Level (SEL) footprint<sup>146</sup> for the most frequently operated aircraft and the area of the 55 dB and the 48 dB  $L_{Aeq,8hr}$  contour.
- 8.8.13 The level of **66 dB  $L_{Aeq,8hr}$**  has been considered a suitable value for a night-time UAEL relating to 10 dB above BS 8233<sup>147</sup> internal noise target levels assuming a precautionary outdoor to indoor noise level difference of 26 dB with windows closed<sup>148</sup>.
- 8.8.14 For the purposes of this assessment, it is considered that a suitable value for the night-time SOAEL is **55 dB  $L_{Aeq,8hr}$** . This is based on the WHO Night Noise Guidelines for Europe<sup>149</sup> ‘interim target value’ of 55 dB  $L_{Aeq,8hr}$ . The interim target is recommended by WHO for countries where the night noise guideline (NNG) of 40 dB cannot be achieved in the short-term for several reasons.
- 8.8.15 Consistent with updated policy and guidance this assessment considers **45 dB  $L_{Aeq,8hr}$**  as suitable value for LOAEL.

### Assessment criteria for non-residential noise sensitive buildings

- 8.8.16 The threshold criteria for assessing the effect of the Proposed Scheme upon non-residential noise-sensitive receptors are presented in **Table 8.7**. A significant effect is potentially identified where the aircraft noise exceeds the relevant threshold; identified exceedances are then assessed using magnitude of change criteria.

[content/uploads/sites/5/2019/06/23-Volume-3-PEIR-Chapter-17-Noise-and-vibration-Appendices.pdf](#) [Accessed 23 November 2020], which itself refers to Figure 2 within ProPG: Planning & Noise. Professional Planning Guidance on Planning and Noise. New Residential Development (May 2017) available at <https://www.ioa.org.uk/sites/default/files/14720%20ProPG%20Main%20Document.pdf> [Accessed 23 November 2020].

<sup>144</sup> Department for Transport (2013). *Aviation Policy Framework*. Available [online] at <https://www.gov.uk/government/publications/aviation-policy-framework> [Accessed 23 November 2020].

<sup>145</sup> Department for Transport (2017) Air Navigation Guidance [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/918507/air-navigation-guidance-2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918507/air-navigation-guidance-2017.pdf) [Accessed on 12 November 2020].

<sup>146</sup> Sound Exposure Level is the constant sound level that has the same amount of energy in one second as the original noise event.

<sup>147</sup> British Standards Institution (BSI, 2014), *Op. cit.*

<sup>148</sup> As per footnote 143, based on UAEL within Heathrow PEIR (2019) and ProPG (2017).

<sup>149</sup> The World Health Organisation, Night Noise Guidelines for Europe, 2009 [Available [online] at: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0017/43316/E92845.pdf](http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf)] [Accessed 23 November 2020].

Table 8.7 Threshold criteria for establishing potentially significant effects on noise-sensitive non-residential receptors

Receptor(s)	Threshold criteria	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
<b>Acoustical resources</b> i.e. Auditoria; concert halls; sound recording, broadcast studios and theatres	50 dB $L_{Aeq, 16h}$ <sup>1</sup>	50 dB $L_{Aeq, 8h}$
<b>Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; small auditoria or halls</b>	50 dB $L_{Aeq, 16h}$ <sup>2</sup>	N/A
<b>Healthcare facilities</b> Including hospitals and out-patient clinics	50 dB $L_{Aeq, 16h}$	45 dB $L_{Aeq, 8h}$ <sup>3</sup>
<b>Hotels</b>	50 dB $L_{Aeq, 16h}$	45 dB $L_{Aeq, 8h}$ <sup>3</sup>
<b>Educational facilities</b> Including schools, colleges, and libraries	50 dB $L_{Aeq, 16h}$	N/A
<b>Offices</b>	55 dB $L_{Aeq, 16h}$ <sup>4</sup>	N/A
<b>External amenity spaces</b>	55 dB $L_{Aeq, 16h}$ <sup>5</sup>	N/A

1. Based on an internal level of 25  $L_{Aeq,T}$  consistent with BS 8233. To require these criteria the internal sound levels due to existing sources (internal and external) must already be reduced to these criteria or lower. Given typical environments this would suggest any such receptor would have a level of sound insulation from the building shell (including windows and ventilation penetrations) that would reduce external levels by at least 25 to 30 dB.

2. Based on an internal level of 35 dB  $L_{Aeq,T}$  consistent with Building Bulletin 93 and BS 8233. Equivalent external level assuming 10-15 dB for a partially open window.

3. Based on an internal level of 30 dB  $L_{Aeq,T}$  consistent with BS 8233, WHO guidelines. Equivalent external level assuming 10-15 dB for a partially open window.

4. Based on an internal level of 40 dB  $L_{Aeq,T}$  consistent with BS 8233, BCO guidelines etc. Equivalent external level assuming 10-15 dB for a partially open window.

5. Based upon guidance from World Health Organization 'Guidelines for community noise'.

### Magnitude of noise change criteria for residential and non-residential receptors

- 8.8.17 Where predicted aviation noise levels at residences exceed the LOAEL or SOAEL there is the potential for adverse or significant adverse effects, respectively. A notable exceedance of criteria is deemed to occur if aviation noise exceeds the LOAEL by at least 3.0 dB and the SOAEL by at least 1.0 dB.
- 8.8.18 For non-residential receptors, any increase of at least 1 dB where the noise level is above the threshold criteria would be considered a significant effect.
- 8.8.19 The approach takes account of the increasing severity of the effect when the SOAEL is exceeded. PPG-N<sup>150</sup> states that where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring. It is therefore considered appropriate to assign a greater degree of importance to noise change above the SOAEL.

<sup>150</sup> Ministry of Housing, Communities and Local Government, Planning Practice Guidance: Noise (2014) [Available online: <https://www.gov.uk/guidance/noise--2>] [Accessed 23 November 2020].

- 8.8.20 Where pertinent, additional factors are taken into account when determining adverse or significant adverse effects, such as the time over which the effect occurs and the context of the increases, and the increase or decrease in population (associated with dwellings) exposed at or above SOAEL.
- 8.8.21 Reductions in noise can provide a beneficial or significant beneficial effect.
- 8.8.22 Any increases or decreases less than the stated change above would result in a negligible effect.

## N-Contours

- 8.8.23 There was no evidence from the findings within CAP 1506<sup>151</sup> that suggested N65 or N70 contours correlated better with annoyance than  $L_{Aeq,16hr}$  and there are no planning criteria available for the N65/N60 metrics.
- 8.8.24 The 'Number above' contours outline the extent of the area exposed to a certain  $L_{Amax}$  noise level a certain number of times per day. An 'N65, 200 contour' outlines the area exposed to at least 65 dB  $L_{Amax}$  at least 200 times per day. Due to the nature of these contours, they can be very sensitive to small changes in the movements used to produce them. For instance, if an airport had 190 movements per day it would have no N65, 200 contour, however this does not mean that the 190 movements do not have an impact. Equally if the airport had ten extra movements there would be an N65 200 contour, although any impact of the 10 extra movements is likely to be small.
- 8.8.25 Despite the potential issues, N-contours are considered to be informative indicators of the noise environment generated by aircraft in flight not fully expressed using the  $L_{Aeq,T}$ . As such, the N65 and N60 contours have been identified for both the current limit contours of the existing Condition 10 and the proposed Condition 10 limit contours, both short-term (as identified by 18 mppa 2021 forecasts) and long-term (19 mppa 2028 forecasts). The results of the N contours analysis is presented in **Appendix 8E** in **Volume 3: Figures and Appendices**.

## $L_{Amax}$ Assessment

- 8.8.26 The assessment of effects from maximum noise levels of aircraft movements have focused on the following:
- daytime disturbance of educational establishments with a potential onset of adverse effects of above 80 dB  $L_{Amax, daytime}$ . This is based on the design requirement within *Acoustic design of schools: Performance standards*<sup>152</sup> for regular discrete noise events to not exceed 60 dB  $L_{A1, 30}$  minutes. The external level is calculated by adding 15 dB for attenuation through a slightly open window and also a conservative estimation of the difference between  $L_{A1}$  and  $L_{Amax}$  of 5 dB for one event in 30 minutes. Schools and colleges are the most common sensitive non-residential receptor within identified receptors locations (as per **Table 8.5**).
  - night-time disturbance of sleep within health care and residences with a potential onset of adverse effects of above 80 dB  $L_{Amax, night-time}$ . This is based on research described within CAP 725<sup>153</sup> that referred to research showing a statistical relationship between sleep arousal rates and aviation noise of approximately 80 dB upwards.

<sup>151</sup> Civil Aviation Authority, CAP 1506: Survey of noise attitudes 2014: Aircraft (2017) [Available online: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7744>] [Accessed 23 November 2020].

<sup>152</sup> Department for Education, Acoustic design of schools: performance standards (Building bulletin 93), 2015. UK Government. Available [online] at: <https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards> [Accessed 23 November 2020].

<sup>153</sup> Civil Aviation Authority, CAP 725: Airspace Change Process Guidance Document (2017) [Available [online] at: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=395>] [Accessed 23 November 2020].

- 8.8.27 For non-residential receptors, computer noise modelling has been undertaken to predict noise from the loudest aircraft types at specific locations. For residences,  $L_{Amax}$  contours have been produced to provide an area (sq.km), number of dwellings and population included within various aircraft type noise contours. The data for the  $L_{Amax}$  predictions are presented in **Appendix 8E** in **Volume 3: Figures and Appendices**.
- 8.8.28 An appreciation of how  $L_{Amax}$  could either decrease or increase has been gathered by examining the change in forecasted ATMs as a result of the 19 mppa proposed variation and the fleet mix between older, louder planes and the new, quieter planes. Adverse effects would potentially be identified where there is an overall increase in the louder planes causing exposure above  $L_{Amax}$  80 dB at noise sensitive receptors.
- 8.8.29 Recent non-compliance with Condition 10 (based on the  $L_{Aeq, 16 \text{ hour}}$  and  $L_{Aeq, 8 \text{ hour}}$ ) does not involve the  $L_{Amax}$  metric. Therefore, the  $L_{Amax}$  assessment is restricted to 19 mppa scenarios. Instead of the use of the existing Condition 10 noise levels, the  $L_{Amax}$  assessment compares the 19 mppa scenario with the 18 mppa scenarios for 2024 and 2028. Existing Condition 10 results are not based on forecasts and do not have the detail of fleet mix necessary upon which to compare in an  $L_{Amax}$  assessment.

## 8.9 Assessment of noise effects

### Residential $L_{Aeq}$ noise contour assessment

- 8.9.1 This section presents a discussion of the results, presented in full in **Appendix 8D** in **Volume 3: Figures and Appendices**, used to identify noise effects for the operation of LLA. The tables present the total area, dwellings and population encompassed by the contours pertaining to the relevant baseline and Proposed Scheme scenario. Tables are split into noise contours for the purposes of assessing effects on residences, and specific receptor locations in the community for the purposes of assessing effects on non-residential receptors. The tables identify the levels of interest; LOAEL, SOAEL, and existing Condition 10 limits.
- 8.9.2 Applying the change criteria in **Section 8.8**, the assessment is carried out in three steps by comparing the Proposed Scheme Scenarios with the baseline scenarios:
- identify whether there are changes of 3 dB or more between the LOAEL or SOAEL contour levels when comparing the 19 mppa and relevant baseline scenario;
  - identify whether there are changes of 1 dB or more within the SOAEL contour when comparing the 19 mppa and baseline scenario; and
  - identify any change in number of receptors exposed within the SOAEL contour in the 19 mppa scenarios.

### General Comments

- 8.9.3 **Table 8.8** summarises the results with the numbers of dwellings above LOAEL, the 54 dB  $L_{Aeq, 16hr}$  contour (the onset of significant annoyance) and SOAEL for the various baseline and Proposed Scheme scenarios. **Table 8.9** provides the difference between the key assessment years.
- 8.9.4 The results show more dwellings would be predicted to experience noise above the LOAEL, SOAEL, and level identified with the onset of significant annoyance for most scenarios from the Proposed Scheme. The exception to this is less dwellings are predicted to experience noise above SOAEL during the night-time when compared with the 12.5 mppa 2028 future baseline updated scenario.

- 8.9.5 The worst case-year for the number of dwellings above SOAEL is 2022, when 724 additional dwellings would be predicted to experience noise above SOAEL during the night-time with the Proposed Scheme in comparison with the existing Condition 10 limits. The number of additional dwellings above the night-time SOAEL remains constant until 2023 and then decreases thereafter.
- 8.9.6 No dwellings are predicted to be within the noise contour for UAEL for either daytime or night-time in any scenario.

Table 8.8 Number of dwellings within operational aviation noise contour levels in key assessment years ( $L_{Aeq,T}$  dB)

Contour level ( $L_{Aeq,T}$ )	Number of dwellings							
	Existing Condition 10 noise contour (2021 - 2027)	2021 18 mppa Noise contour	2022 18 mppa Noise contour	2023 18 mppa Noise contour	2024 19 mppa Noise contour	Existing future Condition 10 noise contour (2028 onwards)	12.5 mppa future baseline 2028 Noise Contour	2028 19 mppa noise contour
<b>Daytime contour level (<math>L_{Aeq,16hr}</math>)</b>								
51	13,981	16,746	16,411	15,547	14,644	10,003	9,990	10,276
54	7,080	7,661	7,827	7,619	7,258	5,582	5,560	5,816
63	720	758	805	776	720	411	331	460
<b>Night-time contour level (<math>L_{Aeq,8hr}</math>)</b>								
45	19,490	25,426	24,906	24,815	22,328	15,597	16,706	19,637
55	1,184	1,790	1,908	1,908	1,742	1,012	1,406	1,385

Table 8.9 Comparisons of numbers of dwellings within operational aviation noise contour levels in key assessment years ( $L_{Aeq,T}$  dB)

Contour level ( $L_{Aeq,T}$ )	Change in number of dwellings					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
<b>Daytime contour level (<math>L_{Aeq,16hr}</math>)</b>						
51	2,765	2,430	1,566	663	273	286
54	581	747	539	178	234	256
63	38	85	56	0	49	129
<b>Night-time contour level (<math>L_{Aeq,8hr}</math>)</b>						
45	5,936	5,416	5,325	2,838	4,040	2,931
55	606	724	724	558	373	-21



### Comparison of noise change

- 8.9.7 **Table 8.10 to Table 8.21** show how the difference in number of dwellings between the Proposed Scheme scenarios and baseline scenarios relate to different noise contours to enable an assessment.
- 8.9.8 The numbers will not correlate with the numbers in **Table 8.8** or **Table 8.9** as they are based on different change parameters. Numbers in **Table 8.8** and **Table 8.9** are a comparison between total absolute values between scenarios (e.g. comparing total numbers of dwellings experiencing noise of 55 dB and higher) and **Table 8.10 to Table 8.21** are a comparison of changes in noise level between scenarios (e.g. comparing dwellings that would experience a change in noise levels of at least 1.0 to 1.9 dB within a noise contour range of 55.0 to 55.9 dB). It is therefore not possible to compare the 724 dwellings above SOAEL in the 2022 night-time in **Table 8.9** when looking at the dwellings within the 1-1.9 dB change bracket for noise contours of 55 dB and above in **Table 8.13**.

Table 8.10 Number of dwellings by change of daytime noise level (dB), per noise contour ( $L_{Aeq, T}$  dB), as a result of comparing the 2021 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq, 16hr}$	Change in noise level ( $L_{Aeq, 16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	4,178	0	0	0
52.0 to 52.9	0	0	0	2,989	0	0	0
53.0 to 53.9	0	0	0	1,916	2	0	0
54.0 to 54.9	0	0	0	822	0	0	0
55.0 to 55.9	0	0	0	1,267	0	0	0
56.0 to 56.9	0	0	0	842	0	0	0
57.0 to 57.9	0	0	0	781	0	0	0
58.0 to 58.9	0	0	0	692	0	0	0
59.0 to 59.9	0	0	0	1,117	0	0	0
60.0 to 60.9	0	0	0	539	0	0	0
61.0 to 61.9	0	0	0	595	0	0	0
62.0 to 62.9	0	0	0	248	0	0	0
63.0 to 63.9	0	0	0	199	0	0	0
64.0 to 64.9	0	0	0	161	0	0	0
65.0 to 65.9	0	0	0	387	0	0	0
66.0 to 66.9	0	0	0	2	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
67.0 to 67.9	0	0	0	7	0	0	0
68.0 to 68.9	0	0	0	2	0	0	0

8.9.9 When comparing the 2021 18 mppa daytime noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2021 would not be significant.**

Table 8.11 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2021 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	6,038	1,142	0	0
46.0 to 46.9	0	0	0	5,009	636	0	0
47.0 to 47.9	0	0	0	3,132	847	0	0
48.0 to 48.9	0	0	0	1,106	219	0	0
49.0 to 49.9	0	0	0	1,109	294	0	0
50.0 to 50.9	0	0	0	554	385	0	0
51.0 to 51.9	0	0	0	795	144	0	0
52.0 to 52.9	0	0	0	594	92	0	0
53.0 to 53.9	0	0	0	815	132	0	0
54.0 to 54.9	0	0	0	398	195	0	0
55.0 to 55.9	0	0	0	640	138	0	0
56.0 to 56.9	0	0	0	227	0	0	0
57.0 to 57.9	0	0	0	197	0	0	0
58.0 to 58.9	0	0	0	128	0	0	0
59.0 to 59.9	0	0	0	309	6	0	0
60.0 to 60.9	0	0	0	135	0	0	0
61.0 to 61.9	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	9	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.10 When comparing the 2021 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 144 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2021 would be significant.**

Table 8.12 Number of dwellings by change of daytime noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2022 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	3,926	0	0	0
52.0 to 52.9	0	0	0	2,939	0	0	0
53.0 to 53.9	0	0	0	1,719	0	0	0
54.0 to 54.9	0	0	0	907	0	0	0
55.0 to 55.9	0	0	0	1,291	0	0	0
56.0 to 56.9	0	0	0	870	0	0	0
57.0 to 57.9	0	0	0	703	0	0	0
58.0 to 58.9	0	0	0	756	0	0	0
59.0 to 59.9	0	0	0	929	0	0	0
60.0 to 60.9	0	0	0	713	0	0	0
61.0 to 61.9	0	0	0	554	0	0	0
62.0 to 62.9	0	0	0	299	0	0	0
63.0 to 63.9	0	0	0	156	0	0	0
64.0 to 64.9	0	0	0	251	0	0	0
65.0 to 65.9	0	0	0	387	0	0	0
66.0 to 66.9	0	0	0	2	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	$\leq -3$	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	$\geq 3$
67.0 to 67.9	0	0	0	5	0	0	0
68.0 to 68.9	0	0	0	4	0	0	0

8.9.11 When comparing the 2022 18 mppa daytime noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during day time of 2022 would not be significant.**

Table 8.13 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2022 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	$\leq -3$	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	$\geq 3$
45.0 to 45.9	0	0	0	4,315	1,957	0	0
46.0 to 46.9	0	0	0	3,841	1,985	0	0
47.0 to 47.9	0	0	0	1,880	1,641	0	0
48.0 to 48.9	0	0	0	587	1,122	0	0
49.0 to 49.9	0	0	0	417	705	0	0
50.0 to 50.9	0	0	0	275	860	0	0
51.0 to 51.9	0	0	0	177	629	0	0
52.0 to 52.9	0	0	0	147	627	0	0
53.0 to 53.9	0	0	0	180	695	0	0
54.0 to 54.9	0	0	0	251	707	0	0
55.0 to 55.9	0	0	0	6	522	0	0
56.0 to 56.9	0	0	0	0	494	0	0
57.0 to 57.9	0	0	0	0	164	0	0
58.0 to 58.9	0	0	0	2	191	0	0
59.0 to 59.9	0	0	0	6	198	0	0
60.0 to 60.9	0	0	0	16	299	0	0
61.0 to 61.9	0	0	0	1	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
62.0 to 62.9	0	0	0	0	9	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.12 When comparing the 2022 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,877 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2022 would be significant.**

Table 8.14 Number of dwellings by change of daytime noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2023 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	3,712	0	0	0
52.0 to 52.9	0	0	0	2,533	0	0	0
53.0 to 53.9	0	0	0	1,683	0	0	0
54.0 to 54.9	0	0	0	883	0	0	0
55.0 to 55.9	0	0	0	1,348	0	0	0
56.0 to 56.9	0	0	0	666	0	0	0
57.0 to 57.9	0	0	0	781	0	0	0
58.0 to 58.9	0	0	0	711	0	0	0
59.0 to 59.9	0	0	0	1,020	0	0	0
60.0 to 60.9	0	0	0	629	0	0	0
61.0 to 61.9	0	0	0	528	0	0	0
62.0 to 62.9	0	0	0	277	0	0	0
63.0 to 63.9	0	0	0	217	0	0	0
64.0 to 64.9	0	0	0	163	0	0	0
65.0 to 65.9	0	0	0	385	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
66.0 to 66.9	0	0	0	2	0	0	0
67.0 to 67.9	0	0	0	5	0	0	0
68.0 to 68.9	0	0	0	4	0	0	0

8.9.13 When comparing the 2023 18 mppa day time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2023 would not be significant.**

Table 8.15 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2023 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	4,376	1,957	0	0
46.0 to 46.9	0	0	0	3,812	1,878	0	0
47.0 to 47.9	0	0	0	1,917	1,641	0	0
48.0 to 48.9	0	0	0	596	1,089	0	0
49.0 to 49.9	0	0	0	415	870	0	0
50.0 to 50.9	0	0	0	266	677	0	0
51.0 to 51.9	0	0	0	177	629	0	0
52.0 to 52.9	0	0	0	147	627	0	0
53.0 to 53.9	0	0	0	228	695	0	0
54.0 to 54.9	0	0	0	203	707	0	0
55.0 to 55.9	0	0	0	6	522	0	0
56.0 to 56.9	0	0	0	0	494	0	0
57.0 to 57.9	0	0	0	0	164	0	0
58.0 to 58.9	0	0	0	2	191	0	0
59.0 to 59.9	0	0	0	19	198	0	0
60.0 to 60.9	0	0	0	3	299	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
61.0 to 61.9	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	0	9	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.14 When comparing the 2023 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,877 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2023 would be significant.**

Table 8.16 Number of dwellings by change of day time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2024 19 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	3,587	0	0	0
52.0 to 52.9	0	0	0	2,453	0	0	0
53.0 to 53.9	0	0	0	1,346	0	0	0
54.0 to 54.9	0	0	0	806	0	0	0
55.0 to 55.9	0	0	0	1,265	0	0	0
56.0 to 56.9	0	0	0	620	0	0	0
57.0 to 57.9	0	0	0	836	0	0	0
58.0 to 58.9	0	0	0	883	0	0	0
59.0 to 59.9	0	0	0	882	0	0	0
60.0 to 60.9	0	0	0	440	0	0	0
61.0 to 61.9	0	0	0	644	0	0	0
62.0 to 62.9	0	0	0	162	0	0	0
63.0 to 63.9	0	0	0	198	0	0	0
64.0 to 64.9	0	0	0	206	0	0	0



Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
65.0 to 65.9	0	0	0	307	0	0	0
66.0 to 66.9	0	0	0	0	0	0	0
67.0 to 67.9	0	0	0	9	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.15 When comparing the 2024 19 mppa day time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2024 would not be significant.**

Table 8.17 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2024 19 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	4,739	1,195	0	0
46.0 to 46.9	0	0	0	4,254	1,084	0	0
47.0 to 47.9	0	0	0	1,864	761	0	0
48.0 to 48.9	0	0	0	522	634	0	0
49.0 to 49.9	0	0	0	611	748	0	0
50.0 to 50.9	0	0	0	380	562	0	0
51.0 to 51.9	0	0	0	287	599	0	0
52.0 to 52.9	0	0	0	112	581	0	0
53.0 to 53.9	0	0	0	262	603	0	0
54.0 to 54.9	0	0	0	224	564	0	0
55.0 to 55.9	0	0	0	81	403	0	0
56.0 to 56.9	0	0	0	6	441	0	0
57.0 to 57.9	0	0	0	27	64	0	0
58.0 to 58.9	0	0	0	8	243	0	0
59.0 to 59.9	0	0	0	68	256	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq, 8hr}$ dB), night-time						
	$\leq -3$	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	$\geq 3$
60.0 to 60.9	0	0	0	74	61	0	0
61.0 to 61.9	0	0	0	6	0	0	0
62.0 to 62.9	0	0	0	2	2	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.16 When comparing the 2024 19 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,470 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2024 would be significant.**

Table 8.18 Number of dwellings by change of daytime noise level (dB), per noise contour ( $L_{Aeq, T}$  dB), as a result of comparing the 2028 19 mppa scenario with the existing future Condition 10 noise limits for 2028

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq, 16hr}$ dB), daytime						
	$\leq -3$	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	$\geq 3$
51.0 to 51.9	0	0	0	2,065	0	0	0
52.0 to 52.9	0	0	0	1,075	0	0	0
53.0 to 53.9	0	0	0	1,320	0	0	0
54.0 to 54.9	0	0	0	931	0	0	0
55.0 to 55.9	0	0	0	756	0	0	0
56.0 to 56.9	0	0	0	789	0	0	0
57.0 to 57.9	0	0	0	834	0	0	0
58.0 to 58.9	0	0	0	790	0	0	0
59.0 to 59.9	0	0	0	547	0	0	0
60.0 to 60.9	0	0	0	362	0	0	0
61.0 to 61.9	0	0	0	87	0	0	0
62.0 to 62.9	0	0	0	260	0	0	0
63.0 to 63.9	0	0	0	317	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
64.0 to 64.9	0	0	0	133	0	0	0
65.0 to 65.9	0	0	0	6	0	0	0
66.0 to 66.9	0	0	0	4	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.17 When comparing the 2028 19 mppa daytime noise levels with the existing future Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). In addition, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during daytime of 2028 would not be significant.**

Table 8.19 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2028 19 mppa scenario with the existing future Condition 10 noise limits in 2028

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	5,876	0	0	0
46.0 to 46.9	0	0	0	4,253	0	0	0
47.0 to 47.9	0	0	0	1,884	0	0	0
48.0 to 48.9	0	0	0	1,479	0	0	0
49.0 to 49.9	0	0	0	924	0	0	0
50.0 to 50.9	0	0	0	719	0	0	0
51.0 to 51.9	0	0	0	958	0	0	0
52.0 to 52.9	0	0	0	759	0	0	0
53.0 to 53.9	0	0	0	894	0	0	0
54.0 to 54.9	0	0	0	506	0	0	0
55.0 to 55.9	0	0	0	499	0	0	0
56.0 to 56.9	0	0	0	164	0	0	0
57.0 to 57.9	0	0	0	212	0	0	0
58.0 to 58.9	0	0	0	246	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
59.0 to 59.9	0	0	0	252	0	0	0
60.0 to 60.9	0	0	0	2	0	0	0
61.0 to 61.9	0	0	0	10	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.18 When comparing the 2028 19 mppa night-time noise levels with the existing future Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). In addition, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during night-time of 2028 would not be significant.**

Table 8.20 Number of dwellings by change of daytime noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2028 19 mppa scenario with the 12.5 mppa updated 2028 future baseline

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	2,065	0	0	0
52.0 to 52.9	0	0	0	1,075	0	0	0
53.0 to 53.9	0	0	0	1,320	0	0	0
54.0 to 54.9	0	0	0	931	0	0	0
55.0 to 55.9	0	0	0	756	0	0	0
56.0 to 56.9	0	0	0	789	0	0	0
57.0 to 57.9	0	0	0	834	0	0	0
58.0 to 58.9	0	0	0	790	0	0	0
59.0 to 59.9	0	0	0	547	0	0	0
60.0 to 60.9	0	0	0	362	0	0	0
61.0 to 61.9	0	0	0	87	0	0	0
62.0 to 62.9	0	0	0	260	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
63.0 to 63.9	0	0	0	317	0	0	0
64.0 to 64.9	0	0	0	133	0	0	0
65.0 to 65.9	0	0	0	6	0	0	0
66.0 to 66.9	0	0	0	4	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.19

When comparing the 2028 19 mppa daytime noise levels with the 12.5 mppa future baseline for 2028, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during daytime of 2028 would not be significant.**

Table 8.21 Number of dwellings by change of night-time noise level (dB), per noise contour ( $L_{Aeq,T}$  dB), as a result of comparing the 2028 19 mppa scenario with the 12.5mppa updated 2028 future baseline

Night-time $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	3,666	2,210	0	0
46.0 to 46.9	0	0	0	2,657	1,596	0	0
47.0 to 47.9	0	0	0	1,796	88	0	0
48.0 to 48.9	0	0	0	1,479	0	0	0
49.0 to 49.9	0	0	0	924	0	0	0
50.0 to 50.9	0	0	0	719	0	0	0
51.0 to 51.9	0	0	89	869	0	0	0
52.0 to 52.9	0	0	247	512	0	0	0
53.0 to 53.9	0	0	78	816	0	0	0
54.0 to 54.9	0	0	0	506	0	0	0
55.0 to 55.9	0	0	0	499	0	0	0

Night-time $L_{Aeq,16hr}$	Change in noise level ( $L_{Aeq,8hr}$ dB), night-time						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
56.0 to 56.9	0	0	0	164	0	0	0
57.0 to 57.9	0	0	0	212	0	0	0
58.0 to 58.9	0	0	0	246	0	0	0
59.0 to 59.9	0	0	0	252	0	0	0
60.0 to 60.9	0	0	0	2	0	0	0
61.0 to 61.9	0	0	0	10	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.20 When comparing the 2028 19 mppa night-time noise levels with the 12.5 mppa future baseline for 2028, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during night-time of 2028 would not be significant.**

8.9.21 **Table 8.22** provides a summary of the findings of the above tables, showing the peak of effect from the Proposed Scheme in 2022 and 2023, with this effect reducing thereafter. By 2028, the Proposed Scheme would have **no significant adverse effect on residences.**

Table 8.22 Threshold criteria for establishing potentially significant effects on noise-sensitive residential receptors

Adverse effect level	Population number significantly affected by Proposed Scheme (based on magnitude increase and noise level above effect level) for different scenario assessments					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
<b>Day time</b>						
LOAEL	0	0	0	0	0	0
SOAEL	0	0	0	0	0	0

Adverse effect level	Population number significantly affected by Proposed Scheme (based on magnitude increase and noise level above effect level) for different scenario assessments					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
<b>Night-time</b>						
LOAEL	0	0	0	0	0	0
SOAEL	144	1,877	1,877	1,470	0	0

## 8.10 Non-residential receptors $L_{Aeq}$ assessment

8.10.1 **Table 8.23** shows the predicted noise levels for the various Proposed Scheme and baseline scenarios and **Table 8.24** shows the differences within the identified comparisons of interest. The results show that there would be changes of 1 dB or more above the threshold criteria (i.e., changes of 1 dB or more below the threshold criteria are not considered significant) at Caddington (schools), Park Town (academy, nursery), Breachwood Green (school), St Pauls Walden (church), Slip End (school) and at Stevenage Station (college), (highlighted red in **Table 8.24** where relevant, e.g. night-time levels are not pertinent for schools). These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton to 2024 and at Slip End to 2023. **On this basis, the effect of the Proposed Scheme would be significant at these locations.** For the avoidance of doubt, **Table 8.24** identifies where significant effects have been identified.



Table 8.23 Noise levels (L<sub>Aeq,T</sub> dB) predicted for Proposed Scheme and baseline scenarios for non-residential receptors

Location	Noise levels (L <sub>Aeq,T</sub> dB) predicted at non-residential receptors															
	Existing Condition 10 years 2021- 2027		2021 18 mppa		2022 18 mppa		2023 18 mppa		2024 19 mppa		Existing Condition 10 years 2028+		2028 12.5 mppa revised future baseline		2028 19 mppa	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
<b>Old Knebworth Lodge Farm</b>	44	38	45	39	44	39	44	39	44	39	42	37	43	38	42	38
<b>Caddington</b>	54	50	55	51	55	51	54	50	54	50	54	49	54	49	54	50
<b>Park Town, Luton</b>	60	54	61	55	61	56	61	56	61	55	59	54	59	55	59	55
<b>Whitwell</b>	47	42	48	43	48	43	47	43	47	42	46	41	46	42	46	42
<b>Breachwood Green</b>	54	49	55	50	55	50	54	50	54	50	53	49	53	49	53	49
<b>St Pauls Walden</b>	53	49	54	49	54	49	54	49	53	49	52	48	53	48	53	48
<b>Farley Hill School Luton</b>	49	43	50	44	50	44	49	44	49	44	48	43	48	43	48	43
<b>Slip End</b>	60	54	61	55	61	55	60	55	60	55	59	53	59	55	59	54
<b>Harpenden Children's Home</b>	39	34	40	35	40	34	40	34	39	34	38	33	38	33	38	33
<b>Walkern</b>	46	42	47	43	46	43	46	42	46	42	46	41	46	41	46	42



Location	Noise levels (L <sub>Aeq, T</sub> dB) predicted at non-residential receptors															
	Existing Condition 10 years 2021- 2027		2021 18 mppa		2022 18 mppa		2023 18 mppa		2024 19 mppa		Existing Condition 10 years 2028+		2028 12.5 mppa revised future baseline		2028 19 mppa	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
<b>Stevenage (Eastern Perimeter)</b>	49	45	49	45	49	45	49	45	49	45	48	44	48	43	48	44
<b>Stevenage Station</b>	52	48	53	49	53	49	52	49	52	48	52	47	52	47	52	48
<b>Luton (Wandon End)</b>	54	48	54	49	54	49	54	49	54	48	52	47	52	48	52	48
<b>Kensworth</b>	50	46	50	46	50	46	50	46	50	46	49	45	49	45	49	46
<b>Hudnall Corner</b>	46	41	48	43	48	42	47	42	47	42	46	40	46	41	46	41
<b>Flamstead</b>	51	45	51	46	51	45	51	45	50	45	49	43	49	45	49	44
<b>Markyate</b>	53	47	53	48	53	48	53	48	53	47	51	46	52	47	51	46

Table 8.24 Differences in noise level (L<sub>Aeq,T</sub> dB) predicted between Proposed Scheme and baseline scenarios for non-residential receptors

Location	2021 18 mppa minus existing Condition 10		2022 18 mppa minus existing Condition 10		2023 18 mppa minus existing Condition 10		2024 19 mppa minus existing Condition 10		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 12.5 mppa future baseline		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Old Knebworth Lodge Farm	0.3	0.9	0.0	1.0	0	1.0	0.0	1.0	0.1	0.7	-0.2	-0.4	No
Caddington	0.5	0.7	1.0	1.0	0.0	0.0	0.0	0.0	0.1	0.7	-0.1	0.6	Yes
Park Town, Luton	0.7	0.8	1.0	2.0	1.0	2.0	1.0	1.0	0.1	0.7	0.6	-0.1	Yes
Whitwell	0.5	0.9	1.0	1.0	0.0	1.0	0.0	0.0	0.1	0.7	-0.2	0.2	No
Breachwood Green	0.5	0.8	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.6	-0.1	0.4	Yes
St Pauls Walden	0.5	0.8	1.0	0.0	1.0	0.0	0.0	0.0	0.1	0.7	-0.1	0.5	Yes
Farley Hill School Luton	0.6	0.8	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.6	0.2	0.0	No
Slip End	0.7	1.0	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.7	-0.2	-1.1	Yes
Harpenden Children's Home	0.9	1.1	1.0	0.0	1.0	0.0	0.0	0.0	0.1	0.6	0.1	-0.2	No
Walkern	0.5	0.7	0.0	1.0	0.0	0.0	0.0	0.0	0.1	0.6	0.1	1.2	No
Stevenage (Eastern Perimeter)	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.1	1.1	No



Location	2021 18 mppa minus existing Condition 10		2022 18 mppa minus existing Condition 10		2023 18 mppa minus existing Condition 10		2024 19 mppa minus existing Condition 10		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 12.5 mppa future baseline		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
<b>Stevenage Station</b>	0.4	0.7	<b>1.0</b>	1.0	0.0	1.0	0.0	0.0	0.1	0.7	0.0	0.8	Yes
<b>Luton (Wandon End)</b>	0.7	1.0	0.0	1.0	0.0	1.0	0.0	0.0	0.1	0.7	0.0	-0.1	No
<b>Kensworth</b>	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.9	No
<b>Hudnall Corner</b>	1.5	1.4	2.0	1.0	1.0	1.0	1.0	1.0	0.1	0.7	-0.1	-0.5	No
<b>Flamstead</b>	0.5	1.0	0.0	0.0	0.0	0.0	-1.0	0.0	0.1	0.7	-0.3	-0.4	No
<b>Markyate</b>	0.6	1.0	0.0	1.0	0.0	1.0	0.0	0.0	0.1	0.6	-0.3	-0.5	No

## 8.11 L<sub>Amax</sub> assessment

### Residential Receptors

8.11.1 The data in **Appendix 9E** in **Volume 3: Figures and Appendices** shows the number of dwellings within noise contours above L<sub>Amax</sub> 80 dB for a variety of aircraft. The data shows that the older A320ceo, B737-800, and A321ceo are notably louder than the more recent aircraft; A320neo, A321neo, and B737Max. The ATM figures during the night-time (the period of interest for sleep disturbance within residences) for these two different sets of aircraft age and loudness are presented in **Table 8.25**, with a comparison between the Proposed Scheme and existing operation in **Table 8.26**. The figures in the tables have been extracted from spreadsheets and have been subjected to rounding. The figures are therefore within one digit of the correct number. They have not been updated in the tables so as to remain consistent with the source information.

Table 8.25 Night-time ATMs for most common aircraft types

Aircraft	2024 18 mppa	2028 18 mppa	2024 19 mppa	2028 19 mppa
<b>A320ceo</b>	1,681	644	1,292	438
<b>A321ceo</b>	229	11	303	0
<b>B737-800</b>	487	301	132	49
<b>Total 'old' aircraft</b>	2,396	957	1,727	487
<b>A320neo</b>	1,194	2,061	829	2,040
<b>A321neo</b>	339	605	926	1,210
<b>B737-Max</b>	330	771	675	758
<b>Total 'new' aircraft</b>	1,863	3,436	2,430	4,008
<b>Total of the above aircraft</b>	4,259	4,394	4,157	4,495

Table 8.26 Comparison of ATMs during the night-time

Aircraft sets	2024 19 mppa minus 2024 18 mppa	2028 19 mppa minus 2028 18 mppa
<b>Old aircraft: A320ceo, A321ceo, B737-800</b>	-669	-470
<b>New aircraft: A320neo, A321neo, B737-Max</b>	+556	571
<b>Total of the above</b>	-103	101

8.11.2 The results show that the proportion of the loudest aircraft is predicted to decrease in comparison with the new quieter aircraft. It should also be noted that in 2024 the total ATMs (i.e. also including other aircraft not included in the above table, see forecasts in **Appendix 3A** in **Volume 3: Figures and Appendices**) would decrease and in 2028 the total increase is very small, equating to an average of two additional flights during the night-time in the 92-day summer period. The absolute L<sub>Amax</sub> level will reduce for a significant number of ATMs.

## Non-residential noise sensitive receptors

- 8.11.3 **Appendix 9E in Volume 3: Figures and Appendices** presents the predicted  $L_{Amax}$  levels at non-residential receptors for the most common and loudest aircraft. The results show that the 80 dB level is only exceeded during the daytime at two locations; Park Town (Luton), and Slip End. In both cases, the exceedance is a result of the A321ceo departing and there is not this same exceedance for the A321neo. In 2024, there is an increase in daytime A321ceo ATMs for the 19 mppa scenario (see forecasts in **Appendix 3A in Volume 3: Figures and Appendices**), but by 2028, the A321ceo is in reduced use in the 19 mppa scenarios. Therefore, despite a general increase in flights these occurrences of  $L_{Amax}$  events over 80 dB(A) would decrease in the long-term. **The effects on non-residential receptors are considered negligible.**

## 8.12 Assessment Summary

- 8.12.1 A summary of the results of the assessment of the noise is provided in **Table 8.27**.

Table 8.27 Summary of significance of adverse effects

Receptor and summary of predicted effects	Significance	Summary rationale
Residences	<b>Significant Adverse</b>	With the Proposed Scheme, residents in 1,877 dwellings would experience a night-time noise level above SOAEL (55 dB LAeq, 8 hour) 1 - 1.9 dB higher than existing Condition 10 limits allow.
Non-residential receptors at Caddington, Park Town in Luton, Breachwood Green, St Pauls Walden, Slip End and Stevenage.	<b>Significant Adverse</b>	Increases in noise level of at least 1 dB <b>and</b> above threshold of effect criteria.

## 8.13 Assessment of cumulative effects

- 8.13.1 As outlined in **Section 4.8**, consideration has been given to whether any of the noise receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative noise effects due to noise effects generated by 'other developments'. However, no 'other developments' have been identified within the study area of this assessment that would contribute to a cumulative noise impact. **No likely significant inter-project effects** are predicted to occur from the Proposed Scheme together with 'other developments'.
- 8.13.2 The potential for inter-related effects has been identified at receptors that could experience noise and health effects, and these are reported in **Chapter 9: Health**. This is because the Health assessment is by its nature cumulative, as it assesses the effects on a variety of determinants of health, one of which is exposure to noise.
- 8.13.3 The air quality, climate, and transport assessments have identified that no likely significant effects are predicted to occur. **No likely significant intra-project effects** involving cumulative noise interactions with these aspects are therefore predicted to occur from the Proposed Scheme.

## 8.14 Consideration of optional additional mitigation

- 8.14.1 The assessment of noise effects identified the 18 mppa 2022 scenario as the worst-case year in terms of significance of effect based on additional dwellings affected by noise above SOAEL. The resulting area and number of dwellings related to the LOAEL and SOAEL are presented in **Table 8.28**.

Table 8.28: LOAEL and SOAEL for various noise model scenarios

	Area of SOAEL (sq.km)	No. Dwellings in SOAEL	Area of LOAEL (sq.km)	No. Dwellings in LOAEL
<b>Daytime</b>				
<b>Current Condition 10 contour</b>	6.3	720	54.1	13,981
<b>Forecast 18 mppa 2022</b>	7.1	805	57.6	16,411
<b>Night-time</b>				
<b>Current Condition 10 contour</b>	9.6	1,184	60.9	19,490
<b>Forecast 18 mppa 2022</b>	11.5	1,908	68.5	24,906

### Mitigation for properties exposed to noise higher than SOAEL

- 8.14.2 The Independent Commission on Civil Aviation Noise (ICCAN) is working towards forming best practice for noise mitigation, but this information is not yet available. Based on current guidance LLAOL have defined two options for mitigation for properties greater than SOAEL; either insulation.
- 8.14.3 Taking the daytime situation, a total of 805 dwellings are forecast to be exposed to noise levels above 63 dB  $L_{Aeq16hr}$  (SOAEL) in the 18 mppa 2022 scenario (day-time worst-case year). Based on the current condition, 720 of these properties would already be exposed to these noise levels. Therefore, 85 new properties would be exposed to an increased level of noise due to the forecasted increase in air traffic in 2022.
- 8.14.4 For the night-time, a total of 1,908 dwellings were predicted to be exposed to noise levels above 55 dB  $L_{Aeq8hr}$  (SOAEL) in the 18 mppa 2022 scenario (worst-case year) and therefore eligible for insulation. There are currently 1,184 properties within the SOAEL based on the current Condition 10. Therefore in 2022 an increase of 724 new properties would be exposed to an increased level of noise due to the forecasted increase in air traffic.
- 8.14.5 It is forecast that the maximum increase of 85 properties in the daytime SOAEL will be fully contained in the 2022 night-time SOAEL contour and therefore mitigation has been defined based on dwellings within the 2022 night-time SOAEL.
- 8.14.6 Additional measures will be needed to minimise the significant effects identified in **Table 8.9**; namely the 724 additional dwellings above SOAEL during the night-time as a result of the Proposed Scheme.
- 8.14.7 As 2022 is forecast to be the worst-case year in terms of noise insulation provision, the 2022 noise insulation eligibility contour would be fixed for 6 years. Therefore, the scheme would not change each year, but would always be based on 2022 data, allowing everyone affected by the worst-case year to be eligible for insulation in future years.

8.14.8

In accordance with the Noise Action Plan for the Airport, noise insulation is provided to residential receptors exposed to noise above SOAEL as required by the first aim of the NPSE. As part of the proposals, LLAOL will increase contributions to the Noise Insulation Fund as shown in **Table 8.29** which compares this increase with existing funding. LLAOL would continue spending up to approximately £3,000 per property to enhance noise insulation. For reference, **Table 8.29** also shows the funding in 2016 to 2020.

Table 8.29: Increased noise insulation funding

Year	Existing funding		Proposed in this version of Section 73 application	
	Proposed funding	Number of properties	Proposed funding	Number of properties
2016	£100,000	33	£100,000	33
2017	£100,000	33	£100,000	33
2018	£100,000	33	£100,000	33
2019	£100,000	33	£100,000	33
2020	£100,000	33	£100,000	33
2021	£100,000	33	£400,000	133
2022	£100,000	33	£900,000	300
2023	£100,000	33	£700,000	233
2024	£100,000	33	£100,000	33
2025	£100,000	33	£100,000	33
2026	£100,000	33	£100,000	33
2027	£100,000	33	£100,000	33
2028	£100,000	33	£100,000	33
<b>Total</b>	<b>£1,300,000</b>	<b>429</b>	<b>£3,000,000</b>	<b>996</b>

8.14.9

Eligible properties are assessed in accordance with the Noise Insulation Scheme Policy v4 (see **Appendix 8F in Volume 3: Figures and appendices**). The order in which properties are contacted for insulation is determined by the independent London Luton Airport Consultative committee. The scheme would continue to give insulation to those dwellings with the highest noise levels as a priority.

8.14.10

The additional budget of £1,700,000 (further to the £1,300,000 funding existing) would be sufficient to noise insulate properties in areas above SOAEL as a result of proposed variation to Condition 10 assuming no more than 78% (567 properties) take-up (i.e. the pick-up of residents offered noise insulation in the past). The current take-up of insulation is approximately 50%, therefore the contribution is considered sufficient. Based on the current acceptance rate, the enhanced Noise Insulation Fund would cover additional dwellings above SOAEL by the end of 2022.

## 8.15 Conclusions of significance evaluation

- 8.15.1 It is considered that existing mitigation and enhanced mitigation are sufficient to meet the Government’s policy aim to mitigate and minimise adverse impacts on health and quality of life as stated in the NPSE.
- 8.15.2 The significant effect described in **Section 8.8** will be temporary and will not persist past 2027, beyond which the difference between the noise from the variation to the conditions and the existing conditions would not be significant.

## 8.16 Implementation of environmental measures

- 8.16.1 **Section 8.7** describes the environmental measures within the Proposed Scheme. **Table 8.28** summarises the key compensatory measures and the means by which they will be implemented.

Table 8.30 Summary of environmental measures to be implemented – relating to noise

Environmental measure	Responsibility for implementation	ES section reference
LLAOL will contribute to the Noise Insulation Fund with an initial budget of £400,000 in 2021, <b>£900,000 in 2022, £700,000 in 2023 and £100,000</b> each year afterwards to 2028 inclusive	LLAOL	<b>Section 8.7</b>

