

**TOWN AND COUNTRY PLANNING ACT 1990, SECTION 77
TOWN AND COUNTRY PLANNING (INQUIRIES PROCEDURE) (ENGLAND) RULES 2000
APPLICATION BY LONDON LUTON AIRPORT OPERATIONS LIMITED
FOR VARIATION OF CONDITIONS 8 (PASSENGER THROUGHPUT CAP), 10 (NOISE
CONTOURS), 22 (CAR PARKING MANAGEMENT), 24 (TRAVEL PLAN) AND 28
(APPROVED PLANS AND DOCUMENTS) TO PLANNING PERMISSION
15/00950/VARCON (DATED 13 OCTOBER 2017)**

**LPA REFERENCE NUMBER 21/00031/VARCON
PINS REFERENCE NUMBER: APP/B0230/V/22/3296455**

Proof of Evidence – Noise

Rupert Thornely-Taylor

30 August 2022

Rupert Taylor Limited
Saxtead Hall
Saxtead, Woodbridge
Suffolk, IP13 9QT
United Kingdom
Tel +44 (0) 1728 727 424

Contents

1.	Introduction	5
1.1	Qualifications and Experience	5
1.2	Factual Background	5
	The Section 73 Application	5
	The Planning History and Environmental Information	8
1.3	Issues in the Secretary of State's call-in letter and raised by Inspectors	9
1.4	Scope of Evidence	10
2.	Policy Context	11
2.1	Introduction	11
2.2	The Luton Local Plan 2011-2031 November 2017	11
	<i>Airport Expansion</i>	11
2.3	National Policy and Guidance	12
	Jet Zero Strategy	12
	Flightpath to the future	12
	Making best use of existing runways	13
	National Planning Policy Framework	13
	Noise Policy Statement for England	13
	The Aviation Policy Framework	14
2.4	Aviation 2050	17
3.	Other Material Guidance, Strategies and Surveys	19
3.1	Air Navigation Guidance 2017	19
3.2	Planning Practice Guidance	19
3.3	Aviation Strategy: Noise Forecast and Analyses, CAP 1731	20
3.4	Survey of Noise Attitudes 2014 (SoNA) Second Edition	20
3.5	WHO Environmental Noise Guidelines for the European Region 2018	21
3.6	WHO Night Noise Guidelines for Europe 2009	22
3.7	WHO Guidelines for Community Noise (1999)	23
3.8	Themes Emerging from a Review of Noise Policy and other guidance	24
4.	The Regulatory Framework at the Airport	25
4.1	Regulatory Framework	25
	International and European Regulation	25
	National Regulation	25
5.	Existing Mitigation Measures at the Airport	28
5.1	Mitigation measures have already been put in place by the Airport	28
	Slot allocations	30
	Working with Local Communities and Industry Stakeholders	30
	Airspace modernisation	32
6.	The Application Proposals	34

6.1	Introduction	34
6.2	Outline of the proposals	34
6.3	Physical features of the proposals that affect noise	34
6.4	Operational features of the proposals that affect noise	34
6.5	Effects of Re-fleeting	35
6.6	The principles of the proposed mitigation	36
	Noise Insulation and Compensation	36
7.	Assessment Methodology	38
7.1	Introduction	38
7.2	Assessment Metrics and Significance	38
7.3	Alternative Metrics considered in the assessment	39
	N Metrics	39
8.	Assessment of Effects	41
8.1	Introduction	41
8.2	Significance	43
	Day	43
	Night	43
8.3	Exceedance of SOAEL	43
	Day	43
	Night	43
8.4	Non-residential receptors	44
8.5	Health effects of the proposed scheme due to noise.	44
9.	Proposed Mitigation	48
9.1	Noise insulation mitigation	48
10.	Compliance with policy requirements	50
10.1	The Luton Local Plan	50
10.2	National Noise Policy	50
11.	Response to Issues raised by Rule 6 parties	52
11.2	Luton And District Association for the Control of Aircraft Noise (LADACAN)	52
11.3	Campaign to Protect Rural England (CPRE)	53
12.	Conclusions	54
	Appendix A – Glossary of Terms	56
	Appendix B – Calculation And Assessment Of Noise	59
1.1	Noise measurement	59

Appendix C – Secretary of State Decision Letters regarding avoidance of SOAEL.	64
Appendix D – Table 8B.1 from ESA4	65

1. Introduction

1.1 Qualifications and Experience

- 1.1.1 My name is Rupert Maurice Thornely-Taylor.
- 1.1.2 I am a Fellow and a founder member of the Institute of Acoustics (and recipient of their Rayleigh Medal, for outstanding contributions to acoustics). I am also a Fellow of the International Institute of Acoustics and Vibration and a Member of the Institute of Noise Control Engineering of the USA. I am also a past President and Honorary Member of the Association of Noise Consultants. I have specialised exclusively in the subjects of noise, vibration and acoustics for more than 58 years. I have been the head of the Rupert Taylor Ltd consultancy practice, and an independent consultant in these areas for the past 54 years.
- 1.1.3 I have been consultant to the planning authorities for, promoters of, objectors to, and claimants against many airport development schemes including Heathrow, Gatwick, Stansted, Luton, London City, East Midlands, Birmingham, Manchester, Farnborough, Rochester, Dublin, Belfast City, Leeds Bradford, Robin Hood, Southend, Hong Kong and Nanjing as well as a number of smaller aerodromes, and proposals that did not proceed such as Maplin and Filton. I was consultant to the Inspector at the Dublin Airport oral hearing and am part of the team advising the Airport Noise Competent Authority for that airport. My practice has carried out aircraft noise studies for the UK Department for Environment, Food and Rural Affairs (Defra). I was a member of the External Review Group of the World Health Organization Environmental Noise Guidelines for the European Region 2018 (WHO ENG 2018).

1.2 Factual Background

The Section 73 Application

- 1.2.1 On 11 January 2021 London Luton Airport Operations Limited ('LLAOL') made an application under section 73 of the Town and Country Planning Act 1990 ('the 1990 Act') to Luton Borough Council ('LBC') for the following:
 - 'Variation of Conditions 8 (passenger throughput cap), 10 (noise contours), 22 (car parking management), 24 (travel plan) and 28 (approved plans and documents) to Planning Permission 15/00950/VARCON (dated 13th October 2017) to accommodate 19 million passengers per annum and to amend the day and night noise contours.'

- 1.2.2 The S73 Application seeks the variation of certain conditions attached to the existing planning permission for Luton Airport ("the Airport") dated 13 October 2017 with reference number 15/00950/VARCON ("the Variation Permission"). The Variation Permission dated 13 October 2017 is described as such as it was itself a variation of a planning permission granted in June 2014 for the expansion of the Airport involving, inter alia, the dualling of Airport Way, extensions to the terminal, a new pier and walkway, extensions to taxiways, enlargement of car parks and the construction of a multi-storey car park (ref: 12/01400/FUL) ("the 2014 Permission").
- 1.2.3 The S73 Application proposes amendments to five conditions. In short summary:
- a. the proposed variation of condition 8 is to increase the passenger cap by 1 million passengers per annum ('mppa') from 18mppa to 19mppa;
 - b. the amendments to condition 10 are temporary amendments to the summer day and night-time noise contours and these are explained further below.
 - c. the proposed variation of condition 22 provides for an update to the approved car parking management plan which is required as a result of the increase in passenger numbers;
 - d. the proposed variation of condition 24 provides for an update to the passenger travel plan which is also a result of the increase in passenger numbers;
 - e. the proposed variation of condition 28 is required to reflect the variations of the car parking management plan and the passenger travel plan.
- 1.2.4 At present, condition 10 of the Variation Permission states:
- 'The development shall be operated in accordance with the Noise report approved on 2 March 2015 (ref: 14/01519/DOC), including providing details of forecast aircraft movements and consequential noise contours as set out in that report.
- The area enclosed by the 57dB LAeq(16hr) (0700-2300hrs) contour shall not exceed 19.4 sq km for daytime noise, and the area enclosed by the 48dB Leq(8hr) (2300-0700hrs) contour shall not exceed 37.2 sq km for night-time noise, when calculated by the Federal Aviation Authority Integrated Noise Model version 7.0-d (or as may be updated and amended).
- Within five years of the commencement of development a strategy shall be submitted to the Local Planning Authority for their approval

which defines the methods to be used by LLAOL or any successor or airport operator to reduce the area of the noise contours by 2028 for daytime noise to 15.2 sq km for the area exposed to 57dB LAeq(16hr) (0700-2300hrs) and above and for night-time noise to 31.6 sq km for the area exposed to 48dB(A) Leq8hr (2300-0700) and above.'

- 1.2.5 The proposed amendments to the condition are shown in bold and underlined in the below text:

'The development shall be operated in accordance with the Noise report approved on 2 March 2015 (ref: 14/01519/DOC), including providing details of forecast aircraft movements and consequential noise contours as set out in that report.

The area enclosed by the 57dB LAeq(16hr) (0700-2300hrs) contour shall not exceed ~~19.4 sq km~~ **21.6 sq km** for daytime noise, and the area enclosed by the 48dB Leq(8hr) (2300-0700hrs) contour shall not exceed ~~37.2 sq km~~ **42.9 sq km** for night-time noise, when calculated by the Federal Aviation Authority Integrated Noise Model version 7.0-d (or as may be updated and amended) **for the period up to the end of 2027.**

Within ~~five years~~ **12 months** of the **date of this permission** commencement of development a strategy shall be submitted to the Local Planning Authority for their approval which defines the methods to be used by LLAOL or any successor or airport operator to reduce the area of the noise contours by 2028 for daytime noise to ~~15.2 sq km~~ **15.5 sq km** for the area exposed to 57dB LAeq(16hr) (0700-2300hrs) and above and for night-time noise to ~~31.6 sq km~~ **35.5 sq km** for the area exposed to 48dB(A) Leq8hr (2300-0700) and above.

Post 31 December 2027 the area enclosed by the 57dB LAeq16hr (0700-2300hrs) contour shall not exceed 15.5 sq km for daytime noise, and the area enclosed by the 48dB LAeq(8hr) (2300-0700hrs) contour shall not exceed 35.5 sq km for night-time noise.

Post 31 December 2030 the area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 15.1 sq km for daytime noise, and the area enclosed by the 48dB Leq(8hr) (2300-0700hrs) contour shall not exceed 31.6 sq km for night-time noise.

A report on the actual and forecast aircraft movements and consequential noise contours (Day, Night and Quota Periods) for the preceding and forthcoming calendar year shall be

reported on the 1st December each year to the LPA, which shall utilise the standard 92 day summer contour.'

- 1.2.6 It can therefore be seen that the expansion proposed for summer daytime and night-time contours is temporary only. By 2031 the proposed condition requires the night-time contours to return to the same size as those required under the Variation Permission. Further, the proposed condition requires summer daytime noise contours to be smaller than those which are required under the Variation Permission by 2031.

The Planning History and Environmental Information

- 1.2.7 A short summary of the Airport's planning history and environmental information relevant to this S73 Application is as follows:

- a. In December 2012 LLAOL submitted a planning application (12/01400/FUL) accompanied by an Environmental Statement (dated November 2012) ("the 2012 ES"). This was for the expansion of the Airport involving *inter alia* the dualling of Airport Way, extensions to the terminal, a new pier and walkway, extensions to taxiways, enlargement of car parks and the construction of a multi-storey car park;
- b. On 23 June 2014 the Council granted planning permission 12/01400/FUL;
- c. On 25 June 2015 LLAOL made a section 73 Application (15/00950/VARCON) for the variation of condition 11(i) relating to nighttime noise levels. This was accompanied by an ES Addendum dated July 2015 ("ESA1");
- d. On 13 October 2017 the Council granted planning permission 15/00950/VARCON, the Variation Permission;
- e. On 21 January 2021 LLAOL made this S73 Application for:

Variation of Conditions 8 (passenger throughput cap), 10 (noise contours), 22 (car parking management), 24 (travel plan) and 28 (approved plans and documents) to Planning Permission 15/00950/VARCON (dated 13th October 2017) to accommodate 19 million passengers per annum and to amend the day and night noise contours. (21/00031/VARCON)

This application was accompanied by an ES Addendum dated January 2021 ("ESA2")

- f. In July 2021 LLAOL produced a further ES Addendum (“ESA3”) in response to a Regulation 25 request for clarifications on the noise assessment;
- g. After considering the S73 Application over two evenings on 30 November 2021 and 1 December 2021, the Development Management Committee of LBC agreed with officers, and resolved to grant planning permission for the Scheme, subject to the Applicant and LBC entering into a section 106 agreement;
- h. On 6 April 2022, the Secretary of State for Levelling Up, Housing and Communities called-in the Application for his own determination and directed that it should be referred to him instead of being dealt with by LBC;
- i. On 11 May 2022, the Secretary of State for Transport made a direction under section 266(1A) of the Town and Country Planning Act 1990 for a joint determination of the Application;
- j. In July 2022 LLAOL produced a further ES Addendum in support of its application. The purpose of this addendum was to update the ES in relation to some changes to the description of the proposed wording of Condition 10 and also due to the passage of time since the original application (“ESA4”).

1.2.8 The application involves no new infrastructure nor any other physical development.

1.3 Issues in the Secretary of State’s call-in letter and raised by Inspectors

1.3.1 In his call-in letter dated 6 April 2022, the Secretary of State for Levelling Up, Housing and Communities set out a list of the matters about which he particularly wishes to be informed for the purposes of the consideration of the S73 Application, as follows:

- a) The extent to which the proposed development is consistent with Government policies for meeting the challenge of climate change, flooding and coastal change (NPPF Chapter 14).
- b) The extent to which the proposed development is consistent with Government policies for conserving and enhancing the natural environment (NPPF Chapter 15).

c) The extent to which the proposed development is consistent with the development plan for the area; and

d) any other matters the Inspector considers relevant

- 1.3.2 At the pre-inquiry meeting on 6th July 2022 the Inspectors set out a list of the main considerations for the inquiry. These included '[T]he effect of noise associated with the proposal on health, quality of life and the character of the area.'

1.4 Scope of Evidence

- 1.4.1 My evidence deals with the effects of noise from aircraft and takes account of the following matters:

- ▶ Description of noise effects of the proposals on the health and quality of life for local residents (including users of local institutions such as schools/libraries) having regard to both air and ground noise;
- ▶ Consideration of any significant effects;
- ▶ Mitigation (where appropriate) of the effects described; and
- ▶ Conformity of the proposals with development plan policy and central Government policy.

2. Policy Context

2.1 Introduction

- 2.1.1 This section will outline relevant aspects of government and local government policy relating to noise and airport developments.

2.2 The Luton Local Plan 2011-2031 November 2017

- 2.2.1 The Luton Local Plan [CD 09.07] Policy LLP6 includes the following provision

Airport Expansion

B. Proposals for expansion of the airport and its operation, together with any associated surface access improvements, will be assessed against the Local Plan policies as a whole taking account of the wider sub-regional impact of the airport. Proposals for development will only be supported where the following criteria are met, where applicable/ appropriate having regard to the nature and scale of such proposals:

- i. they are directly related to airport use of development;*
- ii. they contribute to achieving national aviation policies;*
- iii. are in accordance with an up-to-date Airport Master Plan published by the operators of London Luton Airport and adopted by the Borough Council;*
- iv. 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;*
- 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;*
- 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;*
- 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;*

viii. incorporate sustainable transportation and surface access measures that, in particular, minimise use of the private car, maximise the use of sustainable transport modes and seek to meet modal shift targets, all in accordance with the London Luton Airport Surface Access Strategy;

ix. incorporate suitable road access for vehicles including any necessary improvements required as a result of the development.

2.3 National Policy and Guidance

Jet Zero Strategy

- 2.3.1 In July 2022 the Government published Jet Zero Strategy Delivering net zero aviation by 2050. While the document is focussed on emissions it recognises that the emerging new generation of aircraft engines also has co-benefits in reduced noise. The document cross-refers to the CAA's Airspace Modernisation Strategy 2022 to which I refer below.

Flightpath to the future

- 2.3.2 On 22 May 2022 the Secretary of State for Transport published the strategic framework "Flightpath to the Future". This document does not expressly state that it replaces pre-existing policy documents although where it contains statements on matters included in previous documents it is assumed that it takes priority.

- 2.3.3 On noise, Flightpath to the Future states:

Pages 6 and 10: We will also continue to work with the sector to reduce the localised impacts of aviation from noise and air pollution.

Page 35: Air quality emissions and noise from aviation can have detrimental impacts on local communities, and addressing these impacts is an important aspect of a sustainable future for the sector.

Page 35: In addition, the Government set out new policy proposals to tackle these localised impacts through the Aviation 2050 consultation (2018). These included a clearer noise policy framework alongside measures to incentivise best operational practice to reduce noise and measures to improve airport noise insulation schemes. As the sector recovers, and air travel volumes increase again, these aims remain very relevant and we will set out next steps in 2022/23.

Page 39: We will deliver on our commitments by...Reviewing the effectiveness of the policy framework for noise, including its application to new types of aircraft, and set out new measures where appropriate.

Making best use of existing runways

- 2.3.4 In June 2018 the Government published "Beyond the horizon The future of UK aviation Making best use of existing runways" [CD 10.13]. This document stated (amongst other things):

"1.29 Therefore the government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations. This policy statement does not prejudge the decision of those authorities who will be required to give proper consideration to such applications. It instead leaves it up to local, rather than national government, to consider each case on its merits"

National Planning Policy Framework

- 2.3.5 The National Planning Policy Framework (NPPF) [CD 09.05] was published in March 2012 and replaced Planning Policy Guidance Note 24: 'Planning and Noise' (PPG24). The NPPF was last updated in 2021.
- 2.3.6 The NPPF paragraph 109 states that the planning system should contribute to and enhance the natural and local environment by:
- "preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land instability".*
- 2.3.7 The NPPF does not define what it considers to be an 'unacceptable risk' or an 'unacceptable level'. To this end, it is the role of assessors and decision makers to determine what is and is not acceptable in each case.

Noise Policy Statement for England

- 2.3.8 The Noise Policy Statement for England (NPSE) [CD 13.06] published in 2010 sets out the long term vision of Government noise policy. The Noise Policy Vision is to:
- "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*
- 2.3.9 The Noise Policy Statement for England contains the following aims:
- "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

1. *Avoid significant adverse impacts on health and quality of life;*
2. *Mitigate and minimise adverse impacts on health and quality of life; and*
3. *Where possible, contribute to the improvement of health and quality of life."*

- 2.3.10 The Statement refers to two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organization, namely the "*No Observed Effect Level*" (NOEL) and the "*Lowest Observed Adverse Effect Level*" (LOAEL). This is the level above which adverse effects on health and quality of life can be detected. It also introduces the concept of "*Significant Observed Adverse Effect Level*" (SOAEL). This is the level above which significant adverse effects on health and quality of life can occur.
- 2.3.11 The first aim of the NPSE is stated to be that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development. The second aim of the NPSE refers to the situation where the impact lies somewhere between the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL). It requires that all reasonable steps should be taken to mitigate and minimise adverse effects in health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur but that effort should be focused on minimising such effects. The third aim seeks, where possible, to improve health and quality of life through the proactive management of noise, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society.
- 2.3.12 The NPSE observes (para 2.22) that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently the SOAEL is likely to be different for different noise sources, and for different receptors and at different times.
- 2.3.13 The NPSE is directly referenced by the Aviation Policy Framework discussed below. The Aviation Policy Framework considers that its objective with respect to noise is consistent with the aims and objectives of the NPSE.

The Aviation Policy Framework

- 2.3.14 The Aviation Policy Framework [CD 10.04] sets out the Government's overall policy on aviation noise which is, subject to the updates contained in Flightpath to the Future:

"3.12 to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise"

- 2.3.15 The policy states (Paragraph 3.13) that this is consistent with the Government's Noise Policy as set out in the NPSE.
- 2.3.16 Along with its overall objectives, the APF also sets out the Government's policy and position with respect to aircraft noise quantification, management and mitigation measures, including sound insulation and compensation schemes.
- 2.3.17 It makes clear recommendations as to what the Government expects airport operators to provide with respect to mitigation and insulation, and provides advice and guidance on what other measures can be used to minimise aircraft noise.
- 2.3.18 With regard to the assessment aircraft noise, the APF reaffirms the use of the $L_{Aeq, 16hr}$ metric and the value of 57 dB as the "approximate onset of significant community annoyance". The APF states (3.17)

"We will continue to treat the 57dB $L_{Aeq, 16 \text{ hour}}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance. However, this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise."

- 2.3.19 The APF adds at 3.19:

"Average noise exposure contours are a well established measure of annoyance and are important to show historic trends in total noise around airports. However, the Government recognises that people do not experience noise in an averaged manner and that the value of the L_{Aeq} indicator does not necessarily reflect all aspects of the perception of aircraft noise. For this reason we recommend that average noise contours should not be the only measure used when airports seek to explain how locations under flight paths are affected by aircraft noise. Instead the Government encourages airport operators to use alternative measures which better reflect how aircraft noise is experienced in different localities⁹⁶ developing these measures in consultation with their consultative committee and local communities. The objective should be to ensure a better understanding of noise impacts and to inform the development of targeted noise mitigation measures."

- 2.3.20 Footnote 96 states:

"Examples include frequency and pattern of movements and highest noise levels which can be expected."

Noise Insulation Schemes

- 2.3.21 With regard to noise insulation schemes, the APF is clear on what the Government expects Airport operators to provide as a minimum for residential and community buildings.

2.3.22 Paragraph 3.37 of the APF states that:

"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 $L_{Aeq,16h}$ or more. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered."

2.3.23 It goes on to state in Paragraph 3.39 that where airports are considering development that would result in an increase in noise, airports should:

"... review their compensation schemes to ensure that they offer appropriate compensation to those potentially affected. As a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3dB or more which leaves them exposed to levels of noise of 63 dB $L_{Aeq,16h}$ or more."

2.3.24 Finally, the APF does not rule out airports using alternative criteria for or having additional noise insulation schemes for night noise. It recommends in Paragraph 3.41 that Airport Consultative Committees should be involved in reviewing these proposals and be invited to give views on the criteria which should be used.

Relocation Assistance Compensation

2.3.25 The APF indicates that there are levels of aircraft noise exposure that are sufficient to warrant assistance to those that are exposed. Paragraph 3.36 of the APF states that:

"The Government continues to expect airport operators to offer households exposed to levels of noise of 69 dB $L_{Aeq,16h}$ or more, assistance with the costs of moving."

2.3.26 The APF does not clarify the extent to which financial assistance should be afforded.

UK Airspace Policy

2.3.27 In 2017 the Department for Transport (DfT) reported on the outcome of consultations regarding changes to UK airspace [CD 10.07]. The document states in paragraph 9:

"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. The government also intends to develop aviation noise policy further through the Aviation Strategy consultation process. As part of the Aviation Strategy consultation on sustainable growth planned for 2018 the Government intends to consider the roles, structures and powers that currently exist

and what, if any, new ones will be necessary to bring about the network wide, co-ordinated and complex changes needed for airspace modernisation”.

2.3.28 The Government stated that it would implement a range of proposals including:

- The creation of an Independent Commission on Civil Aviation Noise (ICCAN) as an advisory non-departmental public body;
- The removal of the 3 dB minimum change requirement for financial assistance towards acoustic insulation to residential properties in the 63 dB $L_{Aeq,16h}$ level or above;
- A level of 54 dB $L_{Aeq,16h}$ is now acknowledged to correspond to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF.
- Some adverse effects of annoyance can now be seen to occur down to 51 dB $L_{Aeq,16h}$. LOAEL of 51 dB $L_{Aeq,16h}$ and 45 dB L_{night} , for daytime and night-time noise respectively, these are to be used in assessing and comparing noise impacts of airspace changes (N.B. Following consultation with the CAA, the Government consider it appropriate to use 45 dB $L_{Aeq,8h}$ as the LOAEL for air space change assessment, for consistency with daytime noise).

2.3.29 ICCAN was closed by the Government in September 2021 when many of its functions were transferred to the CAA.

2.3.30 The DfT published the draft *Air navigation guidance on airspace and noise management and environmental objectives*. The guidance proposes that rather than limiting the number of people exposed to any level of aircraft noise, the number of people experiencing significant adverse effects should be limited. For the purposes of assessing and comparing the noise impacts of airspace changes, a LOAEL of 51dB L_{Aeq} for daytime noise and 45dB L_{night} for night time noise is proposed.

2.3.31 As referred to in Jet Zero, in January 2022, the CAA consulted on its “Draft Airspace Modernisation Strategy 2022-2040”. The report on the consultation has yet to be published.

2.4 Aviation 2050

2.4.1 In December 2018, the Government published *Aviation 2050: The Future of UK Aviation* (Aviation 2050) [CD 10.14]. This Green Paper sets out a policy framework and measures to reduce the harmful effects of aviation on the environment including in respect of noise. The Government recognises that there has been uncertainty with regard to

how current policy (to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise) should be interpreted, measured and enforced. The Strategy sets out that the Government intends to put in place a stronger and clearer framework in order to ensure the sector is sufficiently incentivised to reduce noise, or to put mitigation measures in place where reductions are not possible. New measures are proposed including:

- *"Setting a new objective to limit, and where possible, reduce total adverse effects on health and quality of life from aviation noise";*
- *"Developing a new national indicator to track the long term performance of the sector in reducing noise";*
- *"Routinely setting noise caps as part of planning approvals (for increases in passengers or flights)"; and*
- *"Requiring all major airports to set out a plan which commits to future noise reduction, and to review this periodically".*

2.4.2 Aviation 2050 also sets out that the Government proposes the following noise insulation measures:

- *"To extend the noise insulation policy threshold beyond the current 63dB LAeq,16h contour to 60 dB LAeq,16h";*
- *"To require all airports to review the effectiveness of existing schemes. This should include how effective the insulation is and whether other factors (such as ventilation) need to be considered, and also whether levels of contributions are affecting take-up";*
- *"The Government or the Independent Commission on Civil Aviation Noise (ICCAN) to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency";*
- *"For airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of 3dB LAeq, which leaves a household in the 54 dB LAeq,16h contour or above as a new eligibility criterion for assistance with noise insulation"*

3. Other Material Guidance, Strategies and Surveys

3.1 Air Navigation Guidance 2017

3.1.1 Although this guidance [CD 10.08] relates to the assessment of airspace change, with regard to the approach to noise it states as follows:

"3.5 For the purpose of assessing airspace changes, the government wishes the CAA to interpret this objective to mean that the total adverse effects on people as a result of aviation noise should be limited and, where possible, reduced, rather than the absolute number of people in any particular noise contour. Adverse effects are considered to be those related to health and quality of life. There is no one threshold at which all individuals are considered to be significantly adversely affected by noise. It is possible to set a Lowest Observed Adverse Effect Level (LOAEL) that is regarded as the point at which adverse effects begin to be seen on a community basis. As noise exposure increases above this level, so will the likelihood of experiencing an adverse effect. In line with this increase in risk, the proportion of the population likely to be significantly affected can be expected to grow as the noise level increases over the LOAEL. For the purposes of assessing and comparing the noise impacts of airspace changes, the government has set a LOAEL of 51dB $L_{Aeq16hr}$ for daytime noise and 45dB L_{Aeq8hr} for night time noise and the CAA should ensure that these metrics are considered."

3.2 Planning Practice Guidance

3.2.1 The Planning Practice Guidance (PPG) [CD 09.06] was issued in March 2014 by the Department for Communities and Local Government (DCLG) and the noise section was updated on 22 July 2019.

3.2.2 This guidance defined the concepts of NOEL (No Observed Effect Level), NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is 'noticeable', 'very disruptive' and should be 'prevented' (as opposed to SOAEL, which represents a situation where noise is 'noticeable' and 'disruptive', and should be 'avoided').

3.2.3 The guidance explains in paragraph 013 that the management of the noise associated with aircraft and airports is considered specifically by the Aviation Policy Framework (APF) [CD 10.04]

“The management of environmental effects associated with the development of airports and airfields is considered in detail in the Aviation Policy Framework. Planning authorities and airport operators are encouraged to work together to develop mitigation measures that are proportionate to the scale of the impact. Development that would increase air movements may require an Environmental Impact Assessment (where it meets the relevant threshold in Schedule 2 to The Town and Country Planning (Environmental Impact Assessment) Regulations 2017). It may be appropriate to consider, as part of any proposed mitigation strategy, how operational measures, siting and design of new taxiways, apron and runways, and ground-level noise attenuation measures could reduce noise impacts of expansion or increased utilisation to a minimum.”

3.3 Aviation Strategy: Noise Forecast and Analyses, CAP 1731

3.3.1 The Government commissioned the Civil Aviation Authority (CAA) to prepare *CAP 1731: Aviation Strategy: Noise Forecast and Analyses* which was published in December 2018 and subsequently updated in February 2019. The objective of the report was to undertake an assessment of the feasibility of implementing noise limits nationally and locally in the UK. One aspect included a review of noise metrics and limits to help devise targets or limits in order to control aircraft noise emissions, noise exposure and their associated health impacts. This led to a proposed limit scheme which in summary consists of:

- 1) *“A nationally set absolute Quota Count (QC) limit or noise contour area limit at a particular noise level both day and night, aggregated across all major airports;*
- 2) *A locally set absolute QC or noise contour area limit at a particular noise level for both day and night for each airport;*
- 3) *Local monitoring of the number of highly annoyed and highly sleep-disturbed people; and reporting requirements.”*

3.4 Survey of Noise Attitudes 2014 (SoNA) Second Edition

3.4.1 The CAA *Survey of Noise Attitudes 2014 (SoNA) Second Edition 2017* CAP 1506 [CD 13.09] includes the results of a survey of noise attitudes to civil aircraft. SoNA largely replaces *Attitudes to noise from aviation sources in England* (ANASE), the last large scale survey on attitudes to aircraft noise published in 2007.

3.4.2 SoNA compared reported mean annoyance scores against average summer-day noise exposure defined using $L_{Aeq,16h}$, L_{den} , N70 and N65. Mean annoyance score correlated well with average summer day noise

exposure, $L_{Aeq,16h}$. No evidence was found to suggest any of the other indicators correlated better with annoyance than $L_{Aeq,16h}$.

- 3.4.3 The survey resulted in the 54 dB $L_{Aeq,16h}$ becoming the threshold of community annoyance rather than 57 dB $L_{Aeq,16h}$ which was based on the *UK Aircraft Noise Index Study* (or ANIS) from 1985.

3.5 WHO Environmental Noise Guidelines for the European Region 2018

- 3.5.1 The WHO Environmental Noise Guidelines for the European Region (ENG18) [CD 13.42] contain the following recommendations:

"For average noise exposure, the GDG (Guideline Development Group) strongly recommends reducing noise levels produced by aircraft below 45 dB L_{den} , as aircraft noise above this level is associated with adverse health effects."

"For night noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night-time below 40 dB L_{night} , as night-time aircraft noise above this level is associated with adverse effects on sleep."

- 3.5.2 These guidelines have not been adopted as UK policy, and there is no current indication that they will be. In December 2018, the UK Government published the consultation document *Aviation 2050*, which included the following (para 3.106) regarding the WHO Guidelines:

"There is also evidence that the public is becoming more sensitive to aircraft noise, to a greater extent than noise from other transport sources, and that there are health costs associated from exposure to this noise. The government is considering the recent new environmental noise guidelines for the European region published by the World Health Organization (WHO). It agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these effects, including the total cost of an action and recent UK specific evidence which the WHO report did not assess."

- 3.5.3 At the recent Stansted Inquiry it was concluded that these guidelines should be given limited weight, with the Appeal Decision stating (para 37):

"The World Health Organisation's (WHO) Environmental Noise Guidelines 2018 (ENG) recommend lower noise levels than those used in response to SoNA. The Government has stated in Aviation 2050 that it agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these"

effects, including the total cost of action and recent UK specific evidence which the WHO did not assess. These factors limit the weight that can be given to the lower noise levels recommended in the ENG.”

3.6 WHO Night Noise Guidelines for Europe 2009

- 3.6.1 Guidance on absolute noise levels at night were given in the WHO *Night Noise Guidelines* (NNG) [CD 13.43]. The report presents findings concerning night noise from transportation sources and its effects on health and sleep. The 2009 WHO Guidelines acknowledge that the effect of noise on people at night depends not just on the magnitude of noise of a single event but also the number of events. It considers that in the long term, over a year, these effects can be described using the $L_{\text{night, outside}}$ index. This is essentially equivalent to the $L_{\text{Aeq, 8h}}$ index commonly used in the UK, but instead of being based on aircraft activities during the average summer night, is based on the average annual night and will therefore typically be lower than the $L_{\text{Aeq, 8h}}$.
- 3.6.2 The following night noise guideline values were recommended by the working group for the protection of public health from night noise:
- Night noise guideline (NNG): $L_{\text{night, outside}}$ equal to 40 dB
 - Interim target (IT): $L_{\text{night, outside}}$ equal to 55 dB
- 3.6.3 The relationship between night noise exposure and health effects as defined by WHO can be summarised as shown in the following Table.

Table 1 WHO Night Noise Guidance

L_{night,outside}	Relationship between night noise exposure and health effects
<30	No effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise
30 – 40	There is no sufficient evidence that the biological effects observed at the level below 40 dB L _{night,outside} are harmful to health
40 – 55 ^[1]	Adverse health effects are observed at the level above 40 dB L _{night,outside} , such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives
>55	Cardiovascular effects become the major public health concern, which are likely to be less dependent on the nature of the noise

- 3.6.4 The 2009 WHO Guidelines have not been superseded by the latest (2018) WHO Guidelines [CD 13.42] which state:

"Furthermore, the current guidelines complement the NNG from 2009."

3.7 WHO Guidelines for Community Noise (1999)

- 3.7.1 WHO Guidelines *for Community Noise* provides a range of aspirational noise targets aimed at protecting the health and well-being of the community. They therefore set out noise targets which represent goals for minimising the adverse effects of noise on health as opposed to setting absolute noise limits for planning purposes.
- 3.7.2 For dwellings, the 1999 WHO Guidelines state that to protect against moderate annoyance, a daytime indoor value of 35 dB L_{Aeq} should not be exceeded. The equivalent value to protect against sleep disturbance at night is 30 dB L_{Aeq}. It is also stated that:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night".

- 3.7.3 These indoor noise level guidelines remain the current WHO guidance, as more recent guidance deals only with outdoor noise levels. The latest (2018) WHO Guidelines [CD13.42] stated the following on this topic:

"The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid."

3.8 Themes Emerging from a Review of Noise Policy and other guidance

- 3.8.1 Government policy as it relates to noise from airport development is spread across several documents stretching back several years. The fundamental policy statement in the Noise Policy Statement for England is supported by the concept of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) but leaves the assignment of numerical values to LOAEL and SOAEL to be determined outside the policy statement itself. Some statements of numerical values and their relevance have appeared in the documents reviewed above, and it has been possible to piece together a numerical framework for the purpose of applying Government Noise Policy.
- 3.8.2 For LOAEL, the statement in the Air Navigation Guidance 2017 provides a reasonable basis for setting LOAEL at 51 dB $L_{Aeq\ 16h}$ and 45 dB $L_{Aeq\ 8h}$ for the day and nighttime respectively. The APF's reference to 57 dB $L_{Aeq\ 16h}$ cannot be interpreted as SOAEL since Government Policy is to avoid SOAEL, and there is no government policy to avoid exposure to 57 dB $L_{Aeq\ 16h}$. It has been established, however, that the government regards mitigation at the receptor as a way of avoiding SOAEL (See, for example, paragraphs 69 to 72 of the Thames Tideway decision and paragraphs 152, 154 and 155 of the in Manston Airport decision Appendix C below) and therefore it is logical to align SOAEL with recommended noise insulation thresholds, which leads to a numerical value of 63 dB $L_{Aeq\ 16h}$ for SOAEL. The ES selects 55 dB $L_{Aeq\ 6h}$ for night time SOAEL based on the Night Noise Guidelines for Europe Interim Target.
- 3.8.3 These values assigned to LOAEL and SOAEL, which have not been challenged by LBC, are the same as those used in the Bristol Airport Public Inquiry and the Inspectors did not recommend any change. For reasons which are unclear, the Stansted Airport ES adopted the figure of 54 dB $L_{Aeq,6h}$ as night time SOAEL (1 dB lower than in the other schemes), but otherwise chose the same set of numerical values as Bristol and Luton.
- 3.8.4 It follows that at LOAEL and above, noise should be mitigated and minimised and at or above SOAEL, avoidance can be achieved by the provision of mitigation in the form of sound insulation at the receptor.

4. The Regulatory Framework at the Airport

4.1 Regulatory Framework

- 4.1.1 The regulatory framework of aircraft noise in the UK is considered within Luton Airport's Noise Action Plan for 2019-2023 [CD 13.11] which was approved by the Secretary of State of Environment, Food and Rural Affairs in 2019.

International and European Regulation

Restrictions on Aircraft Noise Emissions

- 4.1.2 At International level, the International Civil Aviation Organization (ICAO) sets standards relating to noise emissions from civil aircraft. These standards, referred to as Chapters, have over time become progressively tighter. Since 2002, unless in specific circumstances, aircraft certificated to Chapter 2 of the 1st edition of Annex 16 to the Convention on International Civil Aviation have been banned from operating in the EU. The vast majority of aircraft now operating fall within Chapter 3 (1978) and Chapter 4 (2006) of the ICAO standards. The latest ICAO standard, Chapter 14 was introduced in 2014. From December 2017 all new aircraft must comply with this standard.

National Regulation

- 4.1.3 Within England, aircraft noise is subject to a number of legislative controls and regulations. Much of this legislation reciprocates the requirements of International and European legislation.
- 4.1.4 The DfT and Defra are responsible for regulating certain environmental aspects of aviation, including aircraft noise. The CAA also has powers as a regulator and certifying authority. It also provides specialist aviation advice to the Government including noise.
- 4.1.5 The key legislation relating to the aircraft noise at non-designated airports¹ within England includes:
- ▶ The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003;
 - ▶ The Environmental Noise (England) Regulations 2006 transpose the requirements of Directive 2002/49/EC into English law. Under these Regulations, major airports with more than 50,000 movements per year are required to produce strategic noise maps and associated noise action plans every 5 years.

¹ The designated airports are Heathrow, Gatwick and Stansted

► The Airports (Noise-related Operating Restrictions) (England and Wales) Regulations 2018

These Regulations, which apply to airports in England and Wales which have more than 50,000 civil aircraft movements per calendar year, implement the requirement to designate competent authorities for the purposes of Regulation No 598/2014 in the context of establishing rules and procedures with regard to noise-related operating restrictions at airports. To this end the Regulations serve only to identify the authority that will execute the processes and procedures defined by EU Regulation No 598/2014 in England and Wales depending upon the statutory scheme under which a proposal is made to impose, modify or discharge a noise-related operating restriction. The local planning authority is the competent authority under Regulation No. 598/2014 for any proposal which is brought forward under the Town and Country Planning Act 1990 relating to the imposition, modification or discharge of an operating restriction.

► The Aviation Noise (Amendment) (EU Exit) Regulations 2019

As part of the UK's Exit from the EU, The Aviation Noise (Amendment) (EU Exit) Regulations 2019 amends the Airports (Noise-related Operating Restrictions) (England and Wales) Regulations 2018 and Regulation (EU) No 598/2014 in order to direct these Regulations to national legislation. It does not change the procedures described within Regulation (EU) No 598/2014 but instead refers to national legislation.

► The Environmental Noise (England) Regulations 2006,

The Environmental Noise (England) Regulations 2006 (as amended) transpose the Environmental Noise Directive into domestic law for England. These Regulations apply to environmental noise, mainly from transport. The regulations require regular noise mapping and action planning for road, rail and aviation noise and noise in large urban areas (agglomerations).

They also require the production of Noise Action Plans based on the maps for road and rail noise and noise in agglomerations. The Action Plans identify Important Areas (areas exposed to the highest levels of noise) and suggests ways the relevant authorities can reduce these. Major airports and those which affect agglomerations are also required to produce and publish their own Noise Action Plans separately

Local Planning Conditions

- 4.1.6 The noise impact of Luton Airport is currently limited by conditions and the Section 106 legal agreement associated with the 2015 planning application (ref:15/00950/VARCON). This includes the Noise Control Scheme (condition 9), operation in accordance with the Noise Report (condition 10), the Noise Control Monitoring Scheme (condition 11) and the Ground Noise Control Scheme (condition 12). In addition to these

measures the Section 106 legal agreement included the comprehensive Noise Management Plan, which incorporated the conditioned schemes, the Airport's Noise Action Plan and the Noise Insulation Scheme (covering residential and non-residential properties).

Quota Count

- 4.1.7 In line with other UK airports, LLAOL operates a Quota Count (QC) system during the night time period (23:30hrs – 06:00hrs). Aircraft operating at night are given a QC rating determined from the aircraft manufacturer's noise certification test results. Quieter aircraft have a lower QC value, with some particularly quiet aircraft being exempt. The table below shows QC noise classification.
- 4.1.8 Since 2010 aircraft movements with a QC value of greater than 2 have been excluded during the night-time period. In October 2015 a QC limit was put in place and the Airport is currently subject to a 3,500 night noise QC point limit, the QC value therefore indicating points per corresponding aircraft movement (e.g. 1,750 QC2 movements, or 3,500 QC 1 movements, or 7,000 QC0.5 movements). As part of the 2015 planning conditions the 3,500 night noise QC limit is to be reduced until it does not exceed 2,800 by 2028
- 4.1.9 No change in the quota count is required as a result of this application, and the mix of aircraft forecast will not result in the allowable QC limit being exceeded.

5. Existing Mitigation Measures at the Airport

5.1 Mitigation measures have already been put in place by the Airport

- 5.1.1 The Airport's existing Noise Insulation Scheme covers both residential and non-residential properties in Bedfordshire and Hertfordshire subject to monetary limits. Depending on any existing insulation in the property, double glazing, secondary glazing, ventilation units and loft insulation is provided to eligible properties. Rooms eligible for insulation include living rooms, dining rooms, kitchen-diners and bedrooms. Noise contours determine the eligible properties each year.
- 5.1.2 The Noise Insulation Scheme is operated by the Airport, together with an independent noise analyst and the London Luton Airport Consultative Committee (LLACC) Noise Insulation Sub-Committee, to offer noise insulation to eligible properties.
- 5.1.3 In accordance with the Noise Action Plan for the airport, noise insulation is provided to residential 'receptors' exposed to noise above Significant Observed Adverse Effect Level (SOAEL) (i.e. the noise level above which significant adverse effects on health and quality of life occur). I deal further with the benefits of the development proposal in enhancing the Noise Insulation Scheme below.

Residential Noise Insulation Scheme

- 5.1.4 The existing scheme provides for noise insulation works to residential buildings that meet the residential eligibility criteria and which have not previously been treated by the Airport subject to monetary limits (See Table 2.2).

Table 2 Summary of Current Noise Insulation Scheme

Noise Source	Residential Eligibility Criteria
Airborne Aircraft Noise	<ul style="list-style-type: none"> Any habitable rooms at dwellings within the 63 dB L_{Aeq,16h} average mode summer daytime (07.00-23.00) airborne noise contour¹. Any habitable rooms which are used as bedrooms at dwellings within the 55 dB L_{Aeq,8h} average mode summer night-time (23.00-07.00) airborne noise contour¹. Any habitable rooms which are used as bedrooms at dwellings where the airborne noise level in excess of 90 dB SEL occurs at an annual average frequency of once or greater during the night-time (23.00 to 07.00).

Ground Noise	<ul style="list-style-type: none"> Any habitable rooms at dwellings which are exposed to a free field noise level in excess of 55 dB $L_{Aeq,i6h}$ daytime (07.00-23.00) based on actual aircraft movements at the Airport during the summer period (16th June to 15th September) in the immediately preceding calendar year. Any habitable rooms which are used as bedrooms at dwellings which are exposed to a free field noise level in excess of 45 dB $L_{Aeq,8h}$ night-time (23.00-07.00)¹.
Traffic Noise	<ul style="list-style-type: none"> (i) Any habitable rooms at dwellings with a facade incident noise level in excess of 66 dB $L_{Aeq,i6h}$ daytime (07.00 to 23.00); and (ii) Which are subject to the predicted Road Traffic Noise Increase of not less than 1 dB as a result of the Development which for the avoidance of doubt has been identified in Plan 2 of the settled Section 106 Agreement.

5.1.5 The existing noise insulation scheme is capped to a total of £100,000 per annum. The grant per household is restricted up to £3,000 Index Linked per property based on providing noise insulation to up to five habitable rooms². The only rooms excluded are bathrooms and kitchens, although kitchen dining rooms are considered as habitable rooms. In exceptional circumstances, as deemed by the Airport, higher grants maybe available.

5.1.6 The grant is based on noise levels at the time of application and can be used for works that will improve the internal noise climate within the residential property through either the installation of secondary glazing to provide an additional layer of glass inside the existing external windows or installation of double-glazed replacement windows. Where glazing works are undertaken there is also a requirement to install sound attenuated ventilation units to provide background ventilation.

Non-residential Noise Insulation Scheme

5.1.7 This part of the scheme provides noise insulation works to non-residential buildings (i.e. education, healthcare, religious, community and children's day care uses) that meet the non-residential eligibility criteria. The non-residential eligibility criteria are listed below in Table 2.3:

² See paragraph 8.14.8 and Table 8.29 of ESA2 (CD1.08, 1.09 & CD1.10) which also indicates a total fund of £1.3 million between 2016-2028 (up to £100,000 per annum).

Table 3 Non Residential Noise Insulation

Noise Source	Non-residential Eligibility Criteria
Airborne Aircraft Noise	<ul style="list-style-type: none"> Any noise sensitive rooms within non-residential buildings within the 63 dB L_{Aeq,i6h} average mode summer daytime (07.00-23.00) airborne noise contour¹. Any noise sensitive rooms which are used at night within non-residential buildings within the 55 dB L_{Aeq8h} average mode summer night-time (23.00-07.00) airborne noise contour based on actual aircraft movements at the Airport during the summer period (16th June to 15th September) in the immediately preceding calendar year.

- 5.1.8 The scheme provides a grant as appropriate in order that noise insulation can be provided through either the installation of secondary glazing or double-glazed replacement windows, as well as sound attenuated ventilation units. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures will be considered.

Slot allocations

- 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

Working with Local Communities and Industry Stakeholders

Community Airspace Modernisation Working Group (CAMWG)

- 5.1.9 London Luton Airport has set up a Community Airspace Modernisation Working Group (CAMWG) formed of individuals from local communities with knowledge and experience of airspace changes and noise impacts. CAMWG will provide additional insights during the design of airspace change proposals, including consultation material. There will still be extensive engagement with the wider community as part of the CAA's CAP1616 Airspace Change Guidance through the Airport's community focus groups, as well as with airlines and general aviation stakeholders.
- 5.1.10 In direct response to the APF, which promotes the theme of working closely in partnership with noise-stakeholders, Luton Airport has been active in developing a number of tools and forums where noise issues can be discussed and considered. The following information is set out in the Noise Action Plan.

Complaints Handling

- 5.1.11 London Luton Airport investigates, logs and responds to all concerns relating to aircraft activity in line with the complaints policy.
- 5.1.12 General information is available on the London Luton Airport website and complaints can be submitted by telephone, email, or through the online Flight Tracking system (TraVis).
- 5.1.13 Complaint statistics are reported quarterly and annually to LLACC and trends are identified. The noise complaints handling system is kept under continual review to ensure the local community receives timely feedback in relation to concerns raised.

London Luton Airport Consultative Committee (LLACC)

- 5.1.14 LLACC is the formal mechanism for the Airport to interact and exchange information with communities.
- 5.1.15 Its membership includes representatives from local authorities, community groups, airport users and other interested parties. The Committee meets quarterly and is supported by the Noise and Track Sub Committee and Passenger Services Sub Committee. Both the Consultative Committee and sub-committees are well attended.
- 5.1.16 The LLACC and its membership have assisted in the development of the Noise Action Plan and play a full role in monitoring the implementation and effectiveness of the actions.

Flight Operations Committee (FLOPC)

- 5.1.17 The FLOPC is made up of operators at the Airport. The committee discusses noise infringements, track keeping statistics, data from any ongoing trials and CDA compliance. The committee is focussed on improving operations at the Airport, whilst ensuring this minimises the noise to the local community.

Public Surgeries

- 5.1.18 The Airport holds Public Surgeries each year which provides an opportunity for local residents and councillors to meet with the Flight Operations team to personally answer any queries on airspace and aircraft noise. In addition to this, local parish councils are invited to visit the Flight Operations team at the Airport.

Community Updates - Inform

- 5.1.19 *Inform* is the Airport's Flight Operations team quarterly newsletter to keep stakeholders and members of the local community up to date with the latest information, this is directly sent to all interested parties.

Community Trust Fund

- 5.1.20 All Noise and Off-track fines are added to the Community Trust Fund.
- 5.1.21 The Community Trust Fund allows communities to apply for grants between £250 to £10,000, to help fund or support projects and charities within the local area.

Sustainable Aviation

- 5.1.22 Sustainable Aviation is a UK aviation industry group, made up of UK airlines, manufacturers, airports and air-traffic control. The Airport is part of the Noise Working Group and actively engages with this committee to limit and where possible reduce the impact of aviation noise.

Airspace modernisation

- 5.1.23 As part of a National airspace change programme, as detailed in the Civil Aviation Authority's (CAA) Airspace Modernisation Strategies, London Luton Airport is required to update all of its arrival and departure procedures in a move towards satellite based technology.
- 5.1.24 The CAA has published a formal process called CAP1616. This process must be followed by the Airport when making an airspace change. CAP1616 sets out a number of detailed steps that must be followed, with the CAA's approval required at the end of each stage in order to progress.
- 5.1.25 The Airport is using this opportunity to identify the most environmentally efficient way of managing its airspace with the main focus being on reducing the noise impact associated with aircraft operations.
- 5.1.26 The Airport is therefore working on Future Airspace Strategy Implementation as set out in "London Luton Airport Departures and Arrivals (FASI-S)"

- 5.1.27 All of the airspace design options are currently in performance-based navigation (PBN), either RNAV1³ or RNP1. These are systems for limiting the dispersion of flight paths either side of the notional standard-instrument departure routes. There are also some respite options, i.e. two routes in different directions which would be used at different times of the day. This can be known to increase the size of the contours in these areas, also use of the PBN may increase the noise. There are not currently any options which are vectoring and therefore creating dispersal.
- 5.1.28 In March 2022 the Airport received approval from the CAA to pass into Stage 3, consultation stage, of the FASIS-S process, but will be not doing any noise modelling on these routes until next year after the discussion with other airports, as changes may be required to remove interactions. Whilst the Airport expects to be able to reduce the size of the noise contours through airspace modernisation, this is not guaranteed. The hope is that interactions with other airports can be resolved to allow more continuous climb between 4,000-7,000ft, which is outside of the contour area. The main aim outlined in the Airport's airspace statement of need was continuous climb which was approved by the CAA in Stage 1.
- 5.1.29 The Airport is continuing to push with the Airspace Change Organising Group (ACOG)⁴ and the CAA for an early deployment to make airspace change earlier, as the Airport has always maintained that these must benefit the size of the noise contours.

³ RNAV is short for aRea NAVigation. A type of aircraft navigation, known as Performance Based Navigation (PBN). RNP followed by a number denotes the maximum allowed error in nautical miles from the aircraft's current (estimated) position..

⁴ ACOG was formed in 2019 as a fully independent organisation within NATS under the direction of the UK Government Department for Transport and Civil Aviation Authority, who are the co-sponsors of the Airspace Modernisation Strategy.

6. The Application Proposals

6.1 Introduction

- 6.1.1 This section describes the components of the application proposals particularly relevant to consideration of the noise topic.

6.2 Outline of the proposals

- 6.2.1 As set out in detail in paragraph 1.2 above, the application seeks permission for an increase in the permitted number of annual passenger numbers from 18mppa to 19mppa, and temporary increases in the area limit for the 57 dB L_{Aeq} (0700-2300) from 19.4 sq km to 21.6 sq km and 48 dB L_{Aeq} (2300-0700) from 37.2 sq km to 42.9 sq km. These are followed by decreases post 2030 to 15.1 sq km and 31.6 sq km respectively.
- 6.2.2 Implementation of the application proposals only affects air noise (noise from aircraft between start-of-roll on departure and the end of the ground run on landing). Noise during taxiing and on aprons is the subject of a separate planning condition (12), in respect of which if which no change is being sought.

6.3 Physical features of the proposals that affect noise

- 6.3.1 The proposals only relate to changes in operations and do not involve any changes to physical features of the Airport. The only indirect physical changes would be a consequence of the scheme for the provision of sound insulation of dwellings.

6.4 Operational features of the proposals that affect noise

- 6.4.1 The proposals involve an increase in the permitted number of passengers per annum, and a temporary increase in the allowable noise contour area, followed by a reduction in the allowable noise contour area. The potential changes that would result from the proposals would be to aircraft fleet mix and numbers. In particular, the increase in the limit on passenger numbers means that airlines can introduce the quieter "neo" and "max" quieter versions of the A300 series and Boeing 737 series of aircraft, which have a large seating capacity without breaching the limit on passenger numbers, or having to remove seats from the aircraft (or leave seats unfilled).

6.5 Effects of Re-fleeting

- 6.5.1 For more than ten years the aviation industry has been expecting the introduction of aircraft powered by a new design of engines, principally the CFM Leap engine and the Pratt & Whitney PW1000G, which among other things were expected to result in lower noise levels. In due course the engines were introduced in re-engined designs of the pre-existing Airbus A320 family and the Boeing 737, known respectively as A320 neo (for new engine option) and 737 max.
- 6.5.2 Although the airframes were based on the long-established predecessor aircraft, the fitting of the new engines resulted in significant changes to the performance characteristics of the aircraft. As is well known, following fatal accidents in 2018 and 2019 the Boeing 737 max was grounded while design issues were addressed.
- 6.5.3 The airline industry was of course severely affected by the Covid-19 pandemic, as a result of which re-fleeting did not proceed at the rate forecast before the pandemic.
- 6.5.4 The promised extent of lower noise levels associated with the neo and max aircraft types was not completely fulfilled. The ICAO/EASA certificated noise levels are about 5dB better for the Leap-engined A320neo and the A320ceo (conventional engine option), but their profiles, flap and thrust settings are not the same when flown in service at airports compared with the conditions applicable to the certification test. Despite this, the noise output of the “neo” versions is still lower than that of the “ceo” versions.
- 6.5.5 Consequently, when forecast noise contours prepared in the last decade are compared with actual contours, the actual contours are larger because of a combination of a smaller amount of re-fleeting than foreseen and a smaller actual noise reduction from those new aircraft that did enter service.
- 6.5.6 The process of producing noise contours for the Airport, both for the purposes of routine compliance monitoring and also of informing the environmental assessment involves calibration of the noise contour model by reference to actual measured noise levels resulting from specific aircraft operations. Thus both the numbers of re-fleeted aircraft, and their actual in-service noise performance are taken into account in the generation of the contours.
- 6.5.7 A table presenting the numbers of each aircraft type forecast in each assessment scenario between 2023 and 2031 is included as 8B.1 in ESA4. A version of it is included in Appendix D to this proof of evidence, with additional annotation for ease of reference. This shows how the proportion of “neo” and “max” aircraft relative to the “ceo” and conventional 737 types increases, and beyond 2025 they predominate, completely replacing the “ceo” and conventional 737 types by 2031.

6.6 The principles of the proposed mitigation

Noise Insulation and Compensation

- 6.6.1 The Airport's proposed noise insulation scheme for these proposals is compliant with and exceeds Government requirements as set out within the APF. It represents a significant enhancement of the noise insulation scheme which is currently provided for in the terms of the current s106 legal agreement.
- 6.6.2 The current noise mitigation scheme is described in paragraphs 5.1.2 to 5.1.4 above. The noise mitigation associated with the current proposed scheme represents a significant enhancement of the current scheme,
- 6.6.3 It is proposed that the eligibility criteria for noise insulation will be based on the worst year, in ESA4 predicted as 2023, and fixed for a period of six years, i.e. any properties that fell within the 55dB $L_{Aeq\ 8hr}$ or 63dB $L_{Aeq\ 16hr}$ contour in the worst year would be entitled to noise insulation for a period of six years after that date, despite the fact that they may no longer be within the SOAEL contour as it decreases up to 2028 and 2031.
- 6.6.4 In ESA1 (prior to the noise chapter being updated following the Regulation 25 request) the fund available for the noise insulation scheme rose considerably from its then current £100,000 annual level, to £400,000 in 2021, £900,000 in 2022, £700,000 in 2023, before dropping back to the £100,000 level for each successive year. However it was considered that the total cap in the scheme as it was then proposed would mean that not all properties significantly adversely affected would have been able to receive insulation. Consequently, it is now proposed that the total cap be removed so that all properties within the SOAEL in the worst case year would be eligible for noise insulation.
- 6.6.5 ESA1 also referred to continuation of a limit on the amount available for noise insulation of £3,000 per dwelling, as is the case with the requirement associated within the current Section 106 legal agreement. In its current proposals for the deed of variation to the Section 106 legal agreement, it is proposed that this sum will be increased.
- 6.6.6 The noise insulation scheme covers dwellings that fall within the area covered by both the daytime SOAEL and the night-time SOAEL.
- 6.6.7 In relation to the daytime SOAEL windows to any habitable room are included, whilst for properties that only fall within the night-time SOAEL it is replacement of bedroom windows that is undertaken.
- 6.6.8 Unlike some other airport schemes, the noise insulation scheme at London Luton Airport will continue to offer property owners like for like replacement (in terms of window frames) to ensure that a uniform look for the property is maintained.

- 6.6.9 At the time of writing, and under the existing mitigation scheme, LLAOL has completed noise insulation of 142 properties. A further 125 have accepted the offer of noise insulation. This total of 267 acceptances is 30% of the number of offers made.

7. Assessment Methodology

7.1 Introduction

- 7.1.1 The noise assessment for these proposals is contained within ESA3 and ESA4. ESA3 revised the noise chapter of ESA2. ESA4 was prepared to update ESA3 as a result of the time which had passed since its preparation.
- 7.1.2 These documents consider the effect of the application proposals: firstly in terms of the change in noise index values resulting from comparing scenarios with and without the proposals; and secondly by evaluating the change in the number of dwellings and non-residential properties that lie within relevant contours of absolute noise index levels, particularly the contours of SOAEL with regard to dwellings.

7.2 Assessment Metrics and Significance

- 7.2.1 ESA2, ESA3 and ESA4 considered a number of assessment metrics and effects and associated significance to changes in these. This section outlines the approach taken.
- 7.2.2 In accordance with Government policy, the ES and its addenda include an assessment of the noise with and without the proposals in terms of the $L_{Aeq, 16h}$ metric.
- 7.2.3 The Environmental Statement, and specifically the 2022 Addendum (ESA4) which presents the updated noise assessment before this inquiry, adopted an approach to significance with regard to both the absolute level of noise and the change in noise level. In order to consider the absolute level LOAEL and SOAEL thresholds were adopted, whilst to consider change in noise levels, thresholds of significance were adopted.
- 7.2.4 Increases of 3dB above the LOAEL were considered significant (conventionally accepted as the minimal perceived increase and the level at which the APF identifies that acoustic insulation should be provided) whilst a lower trigger of 1dB above the SOAEL was chosen to reflect the evidence that people are more sensitive to increase in noise at higher absolute levels.
- 7.2.5 The ES and addenda present the location, area, number of households and associated populations exposed to various levels of $L_{Aeq, 16hr}$ and change therein. Noise exposure changes were considered in 1 dB bands. The total number of changes in $L_{Aeq, 16hr}$ of at least 1 dB were presented.
- 7.2.6 In table 6.3 to 6.14 of the 2022 ES Addendum (ESA4) it is shown that all the noise changes lie in the range 0 to 0.9 dB, and there are no noise changes of 1 dB or more.

- 7.2.7 For the reason explained in 8.1 below, noise changes of less than 1 dB do have an effect on noise contour area, as a result of which more receptors are drawn into the envelope of the LOAEL and SOAEL contours.
- 7.2.8 Tables 6.15 and 6.16 of the 2022 ES Addendum (ESA4) show that in the case of non-residential receptors, in no case is there an increase of 1 dB or more.

7.3 Alternative Metrics considered in the assessment

- 7.3.1 As outlined above, the APF expects airport operators not to rely solely on average noise contours when seeking to explain how locations under flight paths are affected by aircraft noise. To assist in communicating the effects of introducing runway alternation, the ES presents information in terms of N metrics.

N Metrics

- 7.3.2 Discussion around the use of these metrics within the UK was brought to light in the former Airports Commission in their July 2013 discussion paper "*Discussion Paper 05: Aviation Noise*".
- 7.3.3 The Commission explained that it believed this noise metric was useful for describing aircraft flyover frequency citing its origin and use in Australia at Sydney Airport. It concluded by recommending the use of the N70 and N60 metrics i.e. the number of noise events above 70 dB and 60 dB L_{Amax} respectively but cautions that the metric does not consider event duration or time-above that level.
- 7.3.4 There are no social survey relationships developed against the N70 or any other 'number-above' metrics. To this end, the general consensus is that metrics of this nature provide a means of developing an understanding of the impact rather than a conclusion regarding the effects.
- 7.3.5 The Airports Commission state in Paragraph 3.29 of "Discussion Paper 05: Aviation Noise":
"In Australia, N70 metrics do not replace the Australian ANEF (their version of L_{Aeq}) system, which remains the metric for use in Australian policy making. The Australian position is that N70 contours are a supplementary method to L_{Aeq} ; this is also the position of the CAA in the UK"
- 7.3.6 The Airports Commission made use of the "number above" indicators N70 (for day) and N60 (for night) in their assessment of expansion options at Heathrow and Gatwick. This indicator is a simple count of the average number of aircraft noise events above L_{Amax} levels of 70 dB and 60 dB respectively. In considering the N70, the Airports Commission used average conditions.

- 7.3.7 The Appendices to the 2022 ES Addendum (ESA3) presents N65 contours for a range of scenarios. The contours change little as a result of the proposals.

8. Assessment of Effects

8.1 Introduction

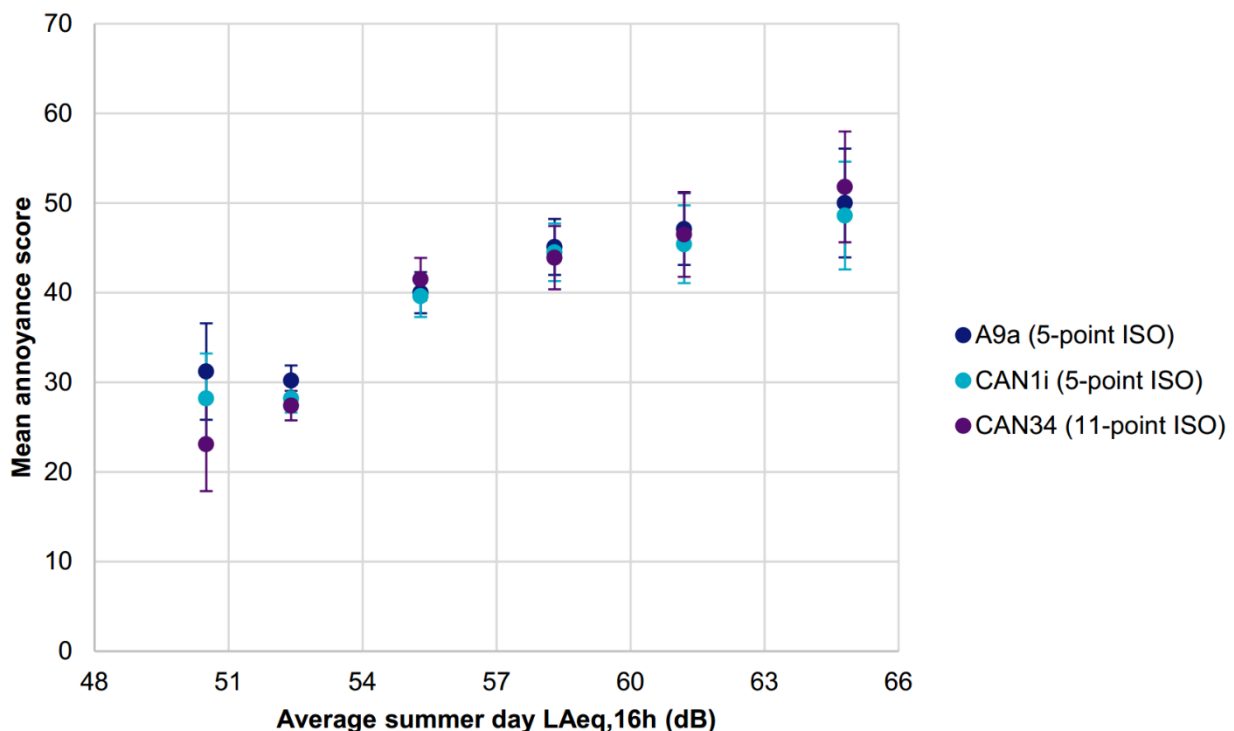
- 8.1.1 This section sets out the effects of the proposals, as assessed and reported in ESA3 and ESA4.
- 8.1.2 It is unusual among airport-relating planning applications for expansion proposals to involve as small a change in aircraft movement numbers as is the present case. The increases in noise contour area before the end of 2027 are primarily due to a change in the aircraft mix, increasing the proportion of aircraft with larger seat capacities, as opposed to simply 'adding more aircraft'.
- 8.1.3 The resulting noise increases themselves are very small-generally less than 1dB, but because noise contour areas are highly sensitive to small changes in L_{Aeq} levels, these small changes in levels result in what appear to be material increases in contour area. The effect is analogous to an incoming tide on a shallow, slightly sloping beach where the water area increases greatly with only a small rise in water level.
- 8.1.4 The relationship between contour area and numbers of dwellings or population is similarly sensitive to small changes in noise level, as well as to the distribution of centres of population around the Airport.
- 8.1.5 When a change in L_{Aeq} level is primarily due to increases in aircraft noise levels more than to increases in number of movements, general dicta⁵ about the relationship between noise level in decibels and human perception become valid.
- 8.1.6 These rules-of-thumb include the principle that a 1 dB change is only noticeable if there is an instantaneous change in a continuing noise, and it takes a 3 dB change to be noticeable if there is an interval between to quieter and the noisier noise.
- 8.1.7 At any location, if an aircraft overflies at a noise level "X", and sometime later a similar aircraft overflies but at a noise level $X + \Delta dB$, most people would not perceive a difference unless Δ was at least 3 dB. This is in contrast to the case where L_{Aeq} increases are due not to noisier aircraft but to an increase in the number of aircraft, and a 1 dB increase is due to a 26% increase in numbers and a 3dB increase is due to a 100% increase in numbers. In table 8B.1 of ESA4 it can be seen that the likely maximum increase in the number of aircraft movements is less than 19%.
- 8.1.8 In general, where aircraft noise changes are due to either noisier aircraft or increased numbers, there are relationships between global parameters

⁵ Glossary to withdrawn PPG24 Planning and Noise

such as the percentage of the population that is highly annoyed and L_{Aeq} -based indices.

- 8.1.9 The following Figure 1 from Sona2014 shows the change in mean annoyance score with change in $L_{Aeq, 16h}$, and it is evident that a change in $L_{Aeq, 16h}$ of 3 dB causes a change in annoyance score on a 100-point scale of fewer than 5 points in the middle of the range and a change of 1dB changes the annoyance score by one or two points on a 100 point scale.
- 8.1.10 An argument often advanced when a small increase in the value of a noise contour is proposed at an airport is that while the increase itself may not be material, it may be the “thin end of the wedge”, or “salami-slicing”, masking a more significant potential future overall increase. In this case that does not arise because the revised condition 10 requires a reduction in contour area after the end of 2027 and subsequently after the end of 2030.

Figure 1: Plot of mean annoyance scores in SoNA 2014 survey as a function of average summer day $L_{Aeq,16h}$ noise exposure



- 8.1.11 There is, however, an artificial “cliff-edge” effect in the assessment reporting when the L_{Aeq} levels chosen to represent LOAEL and SOAEL are exceeded, and a one decibel increase can of course numerically move numbers of dwellings/population into the LOAEL or SOAEL zones, so triggering policy requirements to mitigate and minimise the noise above LOAEL and to avoid SOAEL. However, the reality is that when noise rises by less than 1dB to move a location into LOAEL or into SOAEL, a listener on the ground would notice no difference as will be the case here.

8.2 Significance

Day

- 8.2.1 Table 6.3 of ESA4 presents the principal assessment of significance for daytime using the $L_{Aeq, 16hr}$ metric.
- 8.2.2 The assessment concludes that the effect of the proposed scheme during daytime in 2023, the year when the change in $L_{Aeq, 16h}$ is greatest, is less than 1 dB and would not be significant.

Night

- 8.2.3 Table 6.4 of ESA4 presents the principal assessment of significance for night time using the $L_{Aeq, 8hr}$ metric. Table 6.6 of ESA4 presents the population with various magnitudes of change in noise exposure above dB $L_{Aeq, 2300-0700}$.
- 8.2.4 The assessment concludes that the effect of the proposed scheme during night time in 2023, the year when the change in $L_{Aeq, 8h}$ is greatest, is less than 1 dB and would not be significant.

8.3 Exceedance of SOAEL

Day

- 8.3.1 Table 6.5 of ESA4 presents the population with various magnitudes of change in noise exposure above daytime LOAEL of 51 dB $L_{Aeq 0700-2300}$ in 2024.
- 8.3.2 Table 6.20 of ESA4 shows that 105 new properties would fall within SOAEL of 63 dB $L_{Aeq 0700-2300}$ in 2023, the year when the change in $L_{Aeq, 16h}$ is greatest. As explained above the perceived change in noise for residents of those properties is marginal.

Night

- 8.3.3 Table 6.6 of ESA4 presents the population with various magnitudes of change in noise exposure above the night time LOAEL of 45in dB $L_{Aeq, 2300-0700}$ in 2024.
- 8.3.4 Table 6.20 of ESA4 shows that 322 new properties would fall within SOAEL of 55 dB $L_{Aeq 2300-0700}$ in 2023, the year when the change in $L_{Aeq, 16h}$ is greatest. This figure includes the 105 new properties that fall within the daytime SOAEL. Again, the perceived change in noise for residents of those properties is marginal.
- 8.3.5 There is no equivalent table to 6.5 and 6.6 for the year 2031 in the body of ESA4, but table 8E2.2 in Volume 3 Figures and Appendices of ESA4 shows that in 2031 the number of dwellings within the daytime SOAEL, at 282, is fewer than the figure of 359 for 2028 with the existing Condition

10 noise limit. For night-time there is a total of 968 dwellings within SOAEL compared with 1057 for 2028 with the existing Condition 10 noise limit.

- 8.3.6 It can be seen by comparing figures 6.1 and 6.17 that the daytime contours for 2031 19mppa are smaller than the contour for 2023 with the existing Condition 10 limit. Likewise, by comparing figures 6.2 and 6.18 it can be seen that the night-time contours for 2031 19mppa are smaller than the contour for 2023 with the existing Condition 10 limit.

8.4 Non-residential receptors

- 8.4.1 Section 6.6 and table 6.16 of ESA4 shows that for non-residential receptors increases are all less than 1dB and not significant.

8.5 Health effects of the proposed scheme due to noise.

- 8.5.1 The direct effects of noise on health have been the subject of a number of scientific studies. Many of these were reviewed by the Guideline Development Group in the production of the Environmental Noise Guidelines for the European Region (a process in which I was a member of the External Review Group). Although the UK Government has not implemented the recommendation of the ENG, the findings about health effects are factual. Health effects considered were Incidence of Ischaemic Heart Disease (IHD), Incidence of hypertension, Prevalence of Highly Annoyed Population, Sleep Disturbance, Permanent Hearing Impairment, Reading skills and Oral Comprehension in Children. Of these, prevalence of highly annoyed population is not a direct health effect and I have addressed the topic in this section above. Noise levels for residents around London Luton Airport are well below risk thresholds for hearing impairment.
- 8.5.2 However, research into the health effects of noise generally considers long-term permanent noise exposure. The health effects of increased aircraft noise exposure which endures for only a limited period have not been studied.
- 8.5.3 The WHO ENG use L_{den} as their metric, a composite of the annual L_{Aeq} indices for day, evening and night, in which the evening L_{Aeq} is enhanced by 5dB and the night L_{Aeq} is enhanced by 10dB. In the case of London Luton Airport L_{den} is approximately equal to L_{Aeq16h} plus 2dB.
- 8.5.4 The GDG rated many of the studies they considered as of low or very low quality. For IHD they reported a relative risk (RR) of 1.09 with confidence limits of 1.04-1.15 per 10 dB increase above 47 dB L_{den} approximately equivalent to the 45 dB $L_{Aeq 16h}$ contour at London Luton Airport. This means that in a population with long term exposure to aircraft noise at 57 L_{den} , there is a 4% to 15% greater risk of IHD than in a population identical in all respects except that their noise exposure is 47 dB L_{den} . To

get the approximate percentages for a 1 dB increase these percentages can be divided by 10, meaning that the risk of hypertension in a population with long-term exposure to 48 dB L_{den} is approximately 0.4% to 1.5% greater than the otherwise equivalent population exposed to no more than 47 dB L_{den} .

- 8.5.5 For incidence of hypertension the RR was 1.00 with confidence limits of 0.77-1.30 per 10 dB increase. This means that different studies may show a reduction in hypertension or an increase in hypertension. For cognitive impairment (reading and oral comprehension) the finding was a 2 month delay per 5 dB increase.
- 8.5.6 The RR values all relate to long-term noise exposure, whereas the noise increases around London Luton Airport associated with the scheme proposals will last only for a limited period.
- 8.5.7 Furthermore, in the social surveys on which the studies reported are based, no account is taken of the presence of noise insulation. The surveys therefore do not address the extent to which the health effects of aircraft noise are mitigated by the installation of noise insulation. At an airport where an increase in noise is accompanied by an improvement in the noise insulation scheme, as is the case at London Luton Airport, this could explain why the confidence limits for RR of hypertension cover the possibility of a reduction in RR with a 10 dB increase in the noise index.
- 8.5.8 In the present case, no part of the population will experience a change as high as 1 dB, so taking the top of the confidence limits ranges, the RR is not greater than 1.015 for IHD and 1.03 for hypertension for a 1dB change. This means that in a population with long-term noise exposure of a certain level of noise the risk of suffering hypertension is 3% more than in an identical population with noise exposure 1dB less. The equivalent percentage for IHD is 1.5%. The cognitive reading and oral comprehension delay cannot be evaluated for less than a 1 dB change.
- 8.5.9 With regard to sleep disturbance, the percentages highly sleep-disturbed presented in the WHO ENG are

L_{night}	%HSD	95% CI
40	11.3	4.72–17.81
45	15.0	6.95–23.08
50	19.7	9.87–29.60
55	25.5	13.57–37.41
60	32.3	18.15–46.36
65	40.0	23.65–56.05

- 8.5.10 Broadly speaking, an increase of 1dB results in an extra 1% of the population being Highly Sleep Disturbed. Population figures down to 40

L_{night} are not available, but within the 45 dB $L_{Aeq, 2300-0700}$ contour there are about 25000 dwellings, and the total within the 40 dB $L_{Aeq, (2300-0700)}$ contour may be approximately double that figure, which leads to the conclusion that residents in a further 500 dwellings would be highly sleep disturbed in 2023 as a result of the scheme proposals. For 2031, there are dwellings in both the -0.9-0.0 and 0.0-0.9 columns, with a net fall in the number within the 45 $L_{Aeq, (2300-07)}$ contours of approximately 3800, i.e. about 7,600 within the 40 dB $L_{Aeq, (2300-0700)}$ contour, taking residents in a net number of dwellings of approximately 76 out of the total highly sleep disturbed.

- 8.5.11 These population totals do not have much meaning, because, for any particular resident of the dwellings concerned there will only be a negligible difference in the loudness or frequency of occurrence of aircraft noise events when the change in L_{Aeq} level is less than 1dB which will not be noticeable.
- 8.5.12 With regard to annoyance, the best data with direct relevance to UK airports and populations are in Sona2014, namely

Percentage highly annoyed as a function average summer day noise exposure, $L_{Aeq, 16h}$ summer day noise exposure	
Average summer day noise exposure, $L_{Aeq, 16h}$ (dB)	% highly annoyed
51	7%
54	9%
57	13%
60	17%
63	23%
66	31%
69	39%

- 8.5.13 Broadly speaking, a rise of 1 dB results in a little over a 1% increase in the population highly annoyed. There are approximately 16000 dwellings with noise exposure above 51 dB $L_{Aeq, 0700-2300}$ likely to experience a 1 dB increase in 2023 due to the scheme proposals, so that in theory residents in about 160 additional dwellings are likely to be highly annoyed (again before one considers the benefits of the enhanced noise insulation scheme I deal with below).
- 8.5.14 By 2031, however, the greater part of the dwellings experiencing a 1dB noise change experience a fall in noise level, a net total of approximately 8500 so that by 2032 residents in about 85 dwellings will be taken out of the total highly annoyed.

- 8.5.15 Again, these population totals do not have much meaning, because, for any particular resident of the dwellings concerned there will only be a negligible difference in the loudness or frequency of occurrence of aircraft noise events when the change in L_{Aeq} level is less than 1dB which will not be noticeable.

9. Proposed Mitigation

9.1 Noise insulation mitigation

- 9.1.1 The noise insulation mitigation has been described above. As has been explained, all properties exposed to noise above SOAEL in the worst-case year will be eligible for mitigation.
- 9.1.2 Eligible properties are assessed in accordance with the Noise Insulation Scheme Policy v4. 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
- 9.1.3 322 additional properties would be exposed to noise above nighttime SOAEL and of these 105 new properties would be exposed to noise above daytime SOAEL in the 2023 Proposed Scheme scenario.
- 9.1.4 There will be an offer of noise insulation for the 322 additional dwellings that would be predicted to experience noise levels above SOAEL as a result of the Proposed Scheme.
- 9.1.5 As 2023 is forecast to be the worst-case year in terms of noise insulation provision, the 2023 noise insulation eligibility contour would be fixed for 5 years. Therefore, the scheme would not change each year, but would always be based on 2023 data, allowing everyone affected by the worst-case year to be eligible for insulation in future years.
- 9.1.6 As part of the S73 Application, enhanced sound insulation is proposed as a response to any potential adverse effects.
- 9.1.7 As already noted, the existing Noise Insulation Scheme has an annual capped fund of £100,000 per year (index-linked) with a per property fund of £3,000 (index-linked).
- 9.1.8 As set out in the Statement of Common Ground (SoCG) (Table 9.4), this means that under the current permission noise insulation for all affected eligible properties (approximately 1,100) would take 33 years to complete with a fund of approximately £3.5M and with the current uptake of the scheme and (approximately 50%) at best deployment could take 16 years.
- 9.1.9 Under the new scheme a fund of £4,500 (index-linked) per property is proposed with an uncapped annual fund. In relation to daytime SOAEL, windows to any habitable room are included, whilst for properties that fall within the night-time SOAEL only, replacement bedroom windrows would be provided. The Applicant intends to allocate £8.5M to the noise insulation

- 9.1.10 Further details of the enhanced mitigation measures in the S106 are provided in appendix 3 of the SoCG which, in addition to noise alleviation measures., includes provision of passenger and staff travel plans, a review of the Surface Access Strategy, updates to the employment, skills and training programme, provision of a carbon reduction strategy and annual monitoring.

10. Compliance with policy requirements

10.1 The Luton Local Plan

- 10.1.1 The extent to which the application proposals comply with airport noise related aspects of policies in the Luton Local Plan is as follows:

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;

- 10.1.2 The proposals comply ESA4 contains a full assessment of the impacts and identifies appropriate forms of mitigation.

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;

- 10.1.3 Further noise reduction is achieved after the end of 2027. Meanwhile the increase in noise is not material. The overall effect of the proposals is a reduction in noise from 2031.

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;

- 10.1.4 The proposals comply in that the existing noise control, monitoring and management scheme will remain in place

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;

- 10.1.5 The proposals comply. and temporary increases in the area limit for the 57 dB L_{Aeq} (0700-2300) from 19.4 sq km to 21.6 sq km and 48 dB L_{Aeq} (2300-0700) from 37.2 sq km to 42.9 sq km are followed by decreases post 2030 to 15.1 sq km and 31.6 sq km respectively. There is significant betterment in the noise insulation scheme, so that the temporary increase in contour areas triggers an improved noise insulation scheme.

10.2 National Noise Policy

- 10.2.1 The requirements of the NPSE (which underpin wider aviation noise policy set out in section 2 above), to mitigate and minimise noise above LOAEL,

and to avoid noise above SOAEL are met through the mitigation measures set out in sections 6 and 9 above.

11. Response to Issues raised by Rule 6 parties

11.1.1 Two Rule 6 parties have raised issues which fall within the scope of my evidence, as follows.

11.2 Luton And District Association for the Control of Aircraft Noise (LADACAN)

11.2.1 LADACAN's Statement of Case can be summarized as containing the allegations which are set out below. The allegations made by LADACAN are general and very little detail is given. Therefore, I respond to the allegations as far as is possible at the present time.

The Environmental Statement (ES) is defective because the 'baseline' is incorrect;

11.2.2 The basis of the assumptions used for the forecasts relating to both the with and without development scenario is included in the Appendix to the evidence of Mr Andrew Hunt.

the metrics used are inappropriate;

11.2.3 The range of metrics used conform to the guidance issued by the Government and the CAA, and represent best practice, and in fact all available metrics with relevance to aircraft noise assessment have been considered. The ES and its addenda consider $L_{Aeq\ 16h}$, $L_{Aeq\ 8h}$, N-Contours and L_{Amax} values. There are derivatives of L_{Aeq} indices, namely L_{day} , $L_{evening}$ and L_{night} , which are the constituents of L_{den} as I explain in 8.5 above, but they are less sensitive descriptors than those which have primarily been used in this case. At some airports, contours of SEL are used in the way L_{Amax} has been used at London Luton Airport. In other countries, and historically in the UK, other indices which combine number of events, noise levels and duration exist, but they provide no better assessment than do the indices which have been used for London Luton Airport.

noise predictions in the ES differ significantly from the Appellant's noise measurements;

11.2.4 There is no indication that this assertion is correct. LADACAN has not cited any evidence for its assertion.

the noise model is not fully calibrated;

11.2.5 In the noise model source terms for each aircraft type have been aligned with data measured at the Airport.

the fleet projections are inconsistent;

- 11.2.6 The basis for the fleet projections are included in the Appendix to the evidence of Mr Andrew Hunt.

the ES does not meet policy requirements for mitigation.

- 11.2.7 Where LOAEL is exceeded there is mitigation and minimisation as required by the NPSE and where SOAEL is exceeded noise insulation is provided in accordance with Government policy. In fact, the scheme which is presented exceeds the requirements of Government policy as has been made clear above.

11.3 Campaign to Protect Rural England (CPRE)

“The Increase in flights proposed will also result in aircraft flying over communities that have previously enjoyed relative tranquillity.”

- 11.3.1 There will be no change to aircraft approach or departure routes.

“Promises on the replacement of current aircraft fleets with less-noisy modern variants have not been kept”

As explained in section 6.5 above the airline industry was severely affected by the Covid-19 pandemic, as a result of which re-fleeting did not proceed at the rate forecast before the pandemic, and there were also delays in the production of the new aircraft types due, for example, to the fatal accidents of the Boeing 737 max. The promised extent of lower noise levels associated with the neo and max aircraft types was not completely fulfilled. Nevertheless, in the last three years the level of modernised aircraft using the Airport has increased threefold.

“Luton's relatively short runway inevitably involves, for larger and heavier aircraft, deployment of high levels of landing flap, and higher engine power settings to slow the aircraft for the final stage of landing”

- 11.3.2 These effects are fully taken into account in the noise assessment, because the source terms for aircraft operating at this specific airport as measured at the Airport are used to align the noise model input data with actual local noise levels. The short runway length also restricts the use of larger, heavier aircraft such as transatlantic traffic which is considerably noisier than the current fleet.

“Noise contour areas should be left unchanged and regular reports made of the scale of infringement so that remedial action may be taken”

- 11.3.3 The proposals will result in a reduction in daytime noise contour areas. If the noise contour area limitation were to be left unchanged this beneficial effect would not happen.

12. Conclusions

- 12.1 The application seeks permission for an increase in the permitted number of annual passenger numbers from 18mppa to 19mppa, and temporary increases in the area limit for the 57 dB L_{Aeq} (0700-2300) from 19.4 sq km to 21.6 sq km and 48 dB L_{Aeq} (2300-0700) from 37.2 sq km to 42.9 sq km. These are followed by decreases post 2030 to 15.1 sq km and 31.6 sq km respectively. The application involves no new infrastructure nor any other physical development.
- 12.2 The fundamental statement of Government Policy on noise is the Noise Policy Statement for England which includes the concept of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL).
- 12.3 For LOAEL, the statement in the Air Navigation Guidance 2017 provides a reasonable basis for setting LOAEL at 51 dB L_{Aeq} 16h and 45 dB L_{Aeq} 6h. SOAEL of 63 dB L_{Aeq} 16h is aligned with recommended noise insulation thresholds. 55 dB L_{Aeq} 8h for night time SOAEL is based on the Night Noise Guidelines for Europe Interim Target.
- 12.4 It follows that at LOAEL and above, noise should be mitigated and minimised and at or above SOAEL, avoidance can be achieved by the provision of mitigation in the form of sound insulation at the receptor.
- 12.5 LLAOL's proposed noise insulation scheme for these proposals is compliant with and exceeds Government requirements as set out within the APF.
- 12.6 It is proposed that the eligibility criteria for noise insulation will be based on the worst year, in ESA4 predicted as 2023, and fixed for a period of six years, i.e. any properties that fell within the 55dB L_{Aeq} 8hr or 63dB L_{Aeq} 16hr contour in the worst year would be entitled to noise insulation for a period of six years after that date, despite the fact that they may no longer be within the SOAEL contour as it decreases up to 2028 and 2031.
- 12.7 The ES considers the effect of the application proposals firstly in terms of the change in noise index values resulting from comparing scenarios with and without the proposals, and secondly by evaluating the change in the number of dwellings and non-residential properties that lie within relevant contours of absolute noise index levels, particularly the contours of SOAEL with regard to dwellings
- 12.8 The assessment concludes that the effect of the proposed scheme during both the day time and the night time in 2023, the year when the change in L_{Aeq} 16h is greatest, is less than 1 dB and would not be significant.

- 12.9 ESA4 shows that 105 new properties would fall within the daytime SOAEL in 2023, the year when the change in $L_{Aeq, 16h}$ is greatest. The perceived change in noise for residents of those properties is marginal and would not be noticeable.
- 12.10 A total of 322 new properties would fall within the night-time SOAEL in 2023. This figure includes the 105 new properties that fall within the daytime SOAEL. Again, the perceived change in noise for residents of those properties is marginal and would not be noticeable.
- 12.11 The daytime noise contours for 2031 19mppa are smaller than the contour for 2023 with the existing Condition 10 limit.
- 12.12 The proposals comply with Government and local policy including the Luton Local Plan.
- 12.13 In summary, implementation of the proposals which are the subject of the planning application would have a noise effect which varies according to the year of assessment. In 2023 there is predicted to be an increase in noise with an associated increase in noise contour area, but the magnitude of the increase is not significant. There is a slight increase in the number of dwellings coming within the SOAEL contour. However, there will be a considerable enhancement of the noise insulation scheme. After 2023 there is predicted to be a fall in noise level and associated noise contour area, and the revised planning condition which would have been attached to a permission granted by LBC requires a smaller daytime noise contour in the future than in the current planning condition.
- 12.14 The overall effect of the proposals is therefore to reduce the noise impact of the operation of the Airport and to improve mitigation for surrounding residents.

Appendix A – Glossary of Terms

Term	Definition
The Airport	London Luton Airport
APF	Aviation Policy Framework
Aviation 2050	The UK Government consultation, <i>"Aviation 2050 – the future of UK aviation"</i> , which ran from 17 December 2017 to 20 June 2019
CAA	Civil Aviation Authority
CAMWG	Community Airspace Modernisation Working Group
CDA	Continuous Decent Approach
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
ES	Environmental Statement
ESA1	July 2015 ES Addendum in relation to section 73 application dated 25 June 2015 with ref. 15/00950/VARCON
ESA2	January 2021 ES Addendum in relation to section 73 application 21 January 2021 with ref. 21/00031/VARCON
ESA3	May 2021 ES Addendum in response to a Regulation 25 request for clarifications on the noise assessment
ESA4	July 2022 ES Addendum to update the ES in relation to some changes to the description of the proposed wording of Condition 10 and also due to the passage of time since the original application

Term	Definition
GDG	Guideline Development Group
ICAO	International Civil Aviation Organisation
IHD	Ischaemic Heart Disease
LADACAN	Luton and District Association for the Control of Airport Noise
LBC	Luton Borough Council
LLACC	London Luton Airport Consultative Committee
LLAOL	London Luton Airport Operations Limited
LOAEL	Lowest Observed Adverse Effect Level
Local Plan	The Luton Local Plan 2011 – 2031
LPA	Local Planning Authority
MPPA	Million passengers per annum
NATS	National Air Traffic Service
NNG	WHO Night Noise Guidelines
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England (2010)
PBN	performance-based navigation
PINS	The Planning Inspectorate
QC	Quota Count
RR	relative risk
S73 Application	The application dated 8 January 2021 under s.73 Town and County Planning Act 1990 by London Luton Airport Operations Limited to vary Conditions 8

Term	Definition
	(Passenger Throughput Cap), 10 (Noise Contours), 22 (Car Parking Management), 24 (Travel Plan) and 28 (Approved Plans and Specifications) to planning permission 15/00950/VARCON granted by LBC on 13 October 2017
SOAEL	Significant Observed Adverse Effect Level
SoCG	Statement of Common Ground
SoNA	Survey of Noise Attitudes 2014 Second Edition 2017 CAP 1506
Stansted Inquiry	An inquiry held by PINS between 12 January 2021 and 12 March 2021 in respect of an appeal against a refusal by Uttlesford District Council to grant planning permission to Stansted Airport Limited
WHO	World Health Organisation

Appendix B – Calculation And Assessment Of Noise

1. CALCULATION AND ASSESSMENT OF NOISE

1.1 Noise measurement

Today environmental and occupational noise is almost exclusively measured and assessed using indices based on the A-weighted decibel or dB(A) scale. The A-weighting is a frequency weighting intended to allow for the fact that human hearing is relatively insensitive to low frequency and very high frequency noise. Noise levels in dB(A), like the basic decibel scale, measure proportions so that a 10 dB(A) increase is approximately a doubling of loudness and a 10 dB(A) decrease is approximately a halving of loudness. As a further guide, one may say that a sound level of less than 20 dB(A) is virtual silence, 30 dB(A) is very quiet. 50 dB(A) is a moderate level of noise, 70 dB(A) is quite noisy and in a noise level of 90 dB(A) one has to shout to be understood. If the sound is predominantly of low frequency, a doubling of loudness may be perceived with an increase of less than 10 dB(A).

Indices

The basic dB(A) scale can only measure the instantaneous level of sound, and where the level of sound fluctuates up and down, as it normally does in the environment, the dB(A) level also fluctuates. When it is necessary to measure a fluctuating noise environment by means of single number, an index known as equivalent continuous sound level, or L_{Aeq} , is employed. L_{Aeq} (which in some documents is referred to as L_{eq} in units of dB(A) rather than L_{Aeq} in units of dB—the two terms have the same meaning) is a long term average of the amount of energy in the fluctuating sound, expressed in A-weighted decibels. The L_{Aeq} index takes numbers and duration of noise events into account such that a doubling of the number of identical noise events in a fixed time period causes an increase in the value of the L_{Aeq} index of 3dB and a tenfold rise in the number of identical events causes an increase in the value of the L_{Aeq} index of 10 dB.

The L_{Aeq} scale is effectively a composite measure of sound level, duration and number of occurrences where there are discrete noise events. It is important to understand that it is an index, and just as the Retail Prices Index does not tell you what is the price of a loaf of bread, so noise indices such as L_{Aeq} do not tell you what you hear in any particular next hour. It is necessary to use a composite index because physical sound levels on their own have no meaning.

Only by scientific study of the relationship between community response measured in a social survey and noise exposure using a composite index is it possible to give any meaning to measured, calculated or predicted sound levels.

What a listener in the environment hears at any specific time may be no aircraft noise at all, or, for a limited duration the noise of an overflying aircraft, which may be repeated (not necessarily with identical characteristics) after an interval. How that person responds to the noise depends on (a) how loud it is, (b) how long it lasts, (c) what its character is and (d) how often it recurs. At night the critical question is (e) does the noise cause a shift in sleep level and (f) does the noise cause awakening or (g) does the noise cause a delay in, or prevent, falling asleep. The listener's attitude to the noise and the maker of the noise also affects their response. Of these variables, the character of the noise is the most difficult to measure, and frequency-weighting curves specific to aircraft noise have been developed over the years with the objective of achieving the best correlation between a single-figure measure and human response.

In addition to the A-weighting curve explained above, the only other weighting system to survive is the Effective Perceived Noise Decibel, or EPNdB, which is used primarily for aircraft noise certification. It is not generally used for aircraft noise assessment other than certification, and conversions are made between EPNdB and dB(A) for environmental noise assessment purposes. The noise levels determined in the certification process form the basis of the Quota Count system employed to limit night noise at a number of airports. Quota Count (QC) values are readily available and provide a convenient means of comparing the noise levels of different aircraft types, at least under the controlled test conditions used for certification.

All the above variables can be measured or calculated with an uncertainty capable of estimation, and the physical variables are mathematically capable of being combined into one or more indices. Likewise, the results obtained from field studies of community response, and from somnometric studies can be reduced to exposure response functions, as can secondary effects such as incidence of morbidity, for example Ischaemic Heart Disease, Hypertension and other health outcomes. The associated uncertainty can be expressed in terms of confidence limits, such as 95% confidence levels.

While there is a large number of indices that have been developed for expressing noise effects, the uncertainties associated with them are such that no individual index is outstandingly better than the others, and they are correlated with each other. For this reason the L_{Aeq} index is now widely used, with additional information sometimes provided in the form of measures such as the number of aircraft exceeding a set noise threshold in a day, or the sound exposure level of the noisiest aircraft to

fly at least once per night. The Index N70, for example, expresses the number of noise events involving maximum noise levels of 70 dB(A) or more as measured at a location. N60 and N65 do the same for noise maxima of 60 dB(A) and 65 dB(A). These index values can be plotted in the same way as L_{Aeq} contours. Their main advantage is that their meaning is simple. What they do not show is by how big a margin the noise events exceed the stated thresholds.

In the UK, the L_{Aeq} index is normally computed for the period 0700-2300 to include average daily aircraft movements between mid-June and mid-September. Contours are also produced for the night period 2300-0700 for the same period.

The making of the Environmental Noise Directive, the "END", (2002/49/EC) brought with it a variant of the L_{Aeq} index intended to address the increased annoyance/disturbance value of noise at night, and to a lesser extent in the evening. The day-evening-night level denoted L_{den} is L_{Aeq} computed over 24 hours, but with noise between 2300 and 0700 increase by the additional of 10 dB and noise between 1900 and 2300 increase by the addition of 5 dB. This index is used for the preparation of the statutory noise maps required by the END. Unlike $L_{Aeq\ 16h}$, L_{den} is computed for the annual average daily aircraft movements, as is L_{night} for the hours 2300-0700. While, in the contribution of L_{night} to the overall L_{den} , the L_{night} level is weighted by the addition of 10 dB, the L_{night} index itself is computed and plotted without the addition of any penalty.

When consideration is given to the size of L_{Aeq} or L_{den} contours and the area enclosed, the area within a noise contour, a 3 dB change has a very marked effect on population and area. A doubling of movement numbers tends to cause an increase in contour area very much greater than twofold. Small changes in the numerical value of the L_{Aeq} index can result in quite large changes in populations within contours, and when comparing two sets of contours, a large difference in area may be associated with a change of a few dB.

It should be noted that a prospective property purchaser does not experience noise in terms of $L_{Aeq\ 16h}$, $L_{Aeq\ 2300-0700}$ or L_{den} , as they are normally present on site for a time which may not be representative of the summer-day or night averages, or the annual average. It is possible they will only be present during use of the runway in one direction and may experience only overflights or only departures. If they visit during the day they will not experience night noise, or noise at the start and end of the day. Equally if they visited during a busy period of the day the noise perceived may be greater than an annual index may suggest.

It is often said by the layman that the L_{Aeq} scale does not represent what people hear. That is true in that a single-figure index cannot

convey all the information that goes into its calculation. If the L_{Aeq} value is high, it may mean either that there is a small number of noisy aircraft or that there is a large number of less noisy aircraft, or somewhere in between. The thesis behind L_{Aeq} is that noisiness and numbers have a trade-off between them in the manner described above, but as aircraft have become significantly quieter over the years and numbers have increased, the fact that the increase in annoyance measured in the population for a given value of L_{Aeq} has gone up suggests that people may be more annoyed by numbers of events than the L_{Aeq} index suggests.

Over the past 50 years, aircraft noise levels have fallen, weight-for-weight, by 0.3 dB per year, leading to a 15 dB reduction. International regulatory authorities have responded by progressively lowering allowable noise limits in the certification of aircraft. By contrast, aircraft movement numbers have increased at most airports, but the trade-off between numbers and noise levels inherent in the L_{Aeq} index means that despite major growth in movement numbers, airport noise contours, and populations living within them, have contracted significantly.

Meta-analyses of noise and social surveys have found that levels of annoyance are higher at airports undergoing a high rate-of-change in infrastructure or capacity than at airports which are in relatively static in this respect. As explained by Gjestland in his paper published in the International Journal of Environmental Research and Public Health⁶ "A Systematic Review of the Basis for WHO's New Recommendation for Limiting Aircraft Noise Annoyance"

"Most airports experience an increase in traffic. This increase usually occurs gradually over many years. Other airports are characterized by large abrupt changes such as the opening of a new runway, introduction of new flight paths, an abrupt increase in number of aircraft movements, etc.

Janssen and Guski [19] call airports low-rate change airports if there is no indication of a sustained abrupt change of aircraft movements, or the published intention of the airport to change the number of movements within three years before and after the annoyance study. They offer the following definition: An abrupt change is defined here as a significant deviation in the trend of aircraft movements from the trend typical for the airport. If the typical trend is disrupted significantly and permanent, we call this a 'high-rate change airport'. We also classify this airport in the latter category if there has been public discussion about operational plans within (three) years before and after the study. Low-rate change is the default characterization.

Gelderblom et al. [20] have applied this "high-rate/low-rate" classification to 62 aircraft noise annoyance studies conducted over the

⁶ Int. J. Environ. Res. Public Health 2018, 15, 2717; doi:10.3390/ijerph15122717

past half century. They show that there is a difference in the annoyance response between the two types amounting to about 9 dB. To express a certain degree of annoyance people at a high-rate change (HRC) airport on average “tolerate” 9 dB less noise than people at a low-rate change (LRC) airport. Guski et al. [2] report a similar but somewhat smaller, 6 dB, difference.”

Appendix C – Secretary of State Decision Letters regarding avoidance of SOAEL.

Thames Tideway Tunnel

Manston Airport

reflects that certain types of rooms (for example those solely used as a utility or bath room) have traditionally been regarded as much less noise-sensitive environments. The Secretaries of State have therefore added additional wording to requirement PW17 in the Order to clarify the definition of habitable rooms accordingly.

67. The Secretaries of State agree with the additional wording included by the ExA in requirement PW17 to reflect the Applicant's revised off-site mitigation policy (Application document APP 210.01) which states that houseboats located by Putney Embankment Foreshore, Kirtling Street/Heathwall pumping station and Chambers Wharf will be treated differently with respect to trigger values for off-site mitigation eligibility. The Secretaries of State have added to this to ensure that trigger values for temporary rehousing where noise insulation cannot reasonably be installed in houseboats, shall be the same as the trigger values for noise insulation, mirroring the approach taken with other residential properties.
68. With the amendments to the Order made by the ExA and the further changes made by the Secretaries of State as outlined above, the Secretaries of State are satisfied that the mitigation is acceptable in accordance with paragraph 4.9.11 of the NPS.
69. With regard to the NPS aims in paragraph 4.9.9 relating to noise, the Secretaries of State disagree with the ExA's assessment (ER 12.357) that the proposal has not met the first NPS aim of avoiding significant adverse impacts on health and quality of life from noise. The Secretaries of State recognise how the ExA came to their view that there was not compliance with the first aim given their opinion (set out in ER 12.329-12.334 and 12.348) on the way in which the requirements of the NPS should be considered by decision-makers, but the Secretaries of State disagree with that view.
70. The Secretaries of State consider that the three NPS aims at paragraph 4.9.9 should be considered only after the full impact of the proposed development, including any on-site and off-site mitigation, has been taken into account. From the context of paragraph 4.9.13 it is clear that off-site mitigation is part of the means available to an Applicant to manage the noise impacts including cases where noise impacts are of such a magnitude that they necessitate compulsory purchase in order to gain consent for what might otherwise be unacceptable development.
71. In relation to whether the proposed development therefore meets the first of the NPS aims at paragraph 4.9.9. (i.e. avoid significant adverse impacts on health and quality of life), the Secretaries of State note the Applicant's commitment to develop Trigger Action Plans for premises which would be expected to experience significant adverse impacts and the commitment to offer noise insulation and/or temporary re-housing if trigger levels are exceeded. They further note the commitment for lower trigger values for temporary rehousing in certain special cases such as for night-shift workers, vulnerable persons and relating to certain community facilities. Where noise insulation is not feasible the trigger value for temporary rehousing will be set at the same level as for noise insulation. The Secretaries of State are content that the trigger levels as specified in requirement PW17 of the Order as revised are appropriate.

72. The Secretaries of State therefore consider the Applicant's proposals have succeeded in avoiding significant adverse impacts on health or quality of life as a result of the proposed development.
73. In reaching this view the Secretaries of State have considered wider Government policy on noise. The National Planning Policy Framework, the National Planning Practice Guidance on noise and the Noise Policy Statement for England are all clear that noise management should be determined in the context of sustainable development including the environmental, economic and social benefits of the proposal.
74. Therefore, notwithstanding their concerns about the incompleteness of the noise and disturbance assessment noted in paragraph 59, the Secretaries of State:
- Disagree with the ExA's views and consider that the proposed development meets the first NPS aim of avoiding significant adverse impacts on health and quality of life (ER 12.357);
 - Agree with the ExA's assessment (ER 12.357) that the proposed development meets the second NPS aim of mitigating and minimising adverse impacts on health and quality of life (NPS paragraph 4.9.9);
 - Agree with the ExA's assessment (ER 12.357) that the proposal meets the third NPS aim of contributing to improvements to health and quality of life through effective management and control of noise where possible (NPS paragraph 4.9.9);
 - Agree with the ExA's finding that, even with the wide range of mitigation secured the proposed development would result in noise and vibration impacts at many work sites during the construction phase (affecting mainly residential premises but also non-residential premises, public open space and amenities (ER 12.178)), which are undesirable. These impacts are a matter that weighs against consenting to the development and the Secretaries of State have taken this into account in their overall consideration of the Application in paragraphs 145-151.
75. Despite the difference of approach between the Secretaries of State and the ExA the two approaches both lead to the same conclusion that the Order should be made. On the basis of what is secured in the Order and otherwise proposed by the Applicant and the information available to them, the Secretaries of State's view is that the residual adverse impacts will not be significant. The ExA's view is that although the impacts are significant, the Order can be made notwithstanding non-compliance with the first bullet point of NPS paragraph 4.9.9, because the off-site mitigation does much to mitigate these and the matters weighing in favour of making the Order outweigh the matters weighing against.
76. The Secretaries of State consider the effect of residual noise impacts on the ability to satisfy the NPS aim on socio-economic factors at paragraph 79 of this letter.

that should be afforded moderate weight against the Development in the planning balance, and considers that it should instead be given neutral weight at the most.

150. For the reasons set out in the paragraphs above, the Secretary of State is content that climate change is a matter that should be afforded neutral weight in the planning balance.

NOISE AND VIBRATION

151. The Secretary of State notes that a significant proportion of the relevant representations received by the Examining Authority raised aviation noise as a concern and the examination therefore primarily focused on operational noise effects [ER 6.8.5]. The Secretary of State also notes that the Examining Authority examined a wider scope of potential noise affects including noise and vibration impacts from construction and operational activities in order to take into account impacts on a range of potential human and ecological receptors [ER 6.8.3].

152. The Examining Authority concluded that with the controls and measures included in the DCO during the examination, noise from the Development would be sufficiently mitigated. The controls and measures within the DCO covering operational noise mitigation, airport operation and monitoring include:

- a ban on night flights – restricting scheduled flights between 23:00 and 06:00 (requirement 21) and a restriction on noisier aircraft between 06:00 to 07:00 (requirement 9) [ER 8.2.124];
- noise Quota Counts (“QCs”) to control noise impacts (requirement 9) – setting a QC for aircraft in the 06:00 to 07:00 period and restricting noisier aircraft with QC 4, 8 or 16 to mitigate noise in the late part of the night-time quota period [ER 8.2.125];
- contour to limit annual noise emissions – the contour area and relevant noise contours are secured in the DCO (requirement 9) and the contour area cap is considered a reasonable approach to mitigate and minimise the population exposed to aircraft noise above the day and night-time Lowest Observed Adverse Effect Level (“LOAEL” – the level above which adverse effects on health and quality of life can be detected) [ER 8.2.126];
- residential properties –with habitable rooms within the 60dB LAeq (16 hour) day time contour will be eligible for noise insulation and ventilation detailed in the noise mitigation plan (Requirement 9) [ER 6.8.247];
- schools – the restrictions on passenger air transport departures during the period 09:00 to 12:00 is, with the funding commitments for insulation and ventilation in the UU in favour of Kent County Council, considered adequate to avoid significant adverse noise effects [ER 8.2.136]; and caps on the annual air traffic movements for cargo, passenger and general aviation (requirement 21) to the worst-case assessment in the Environmental Statement [ER 8.2.123].

153. The Examining Authority concluded that the financial contribution for insulation and ventilation for schools in the Unilateral Undertaking (“UU”) in favour of Kent County Council together with requirement 21 covering Airport Operations would adequately mitigate the impacts of noise and vibration effects of the Development on schools. The

Examining Authority was also satisfied that a financial contribution for Noise Monitoring Stations and independent noise monitoring assessment of their data in the UU in favour of Thanet District Council will ensure that the provisions of the Noise Mitigation Plan and DCO are complied with [ER 8.2.148].

154. The Secretary of State notes that the Examining Authority's overall assessment of the Developments compliance with the Noise Policy Statement England 2010 ("NPSE"). The NPSE, which is mirrored in the ANPS, states at paragraph 1.7 that a proposal should meet the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the content of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.* [6.8.489]

155. The Examining Authority concluded that with the inclusion of its recommended measures and controls to mitigate impacts from noise, it is able to conclude that on balance, the Development meets the first and second aim of the NPSE. As the third aim is to be achieve "where possible", the Examining Authority considered that the Applicant has demonstrated that it has addressed the third aim and notes the annual financial contributions for monitoring and for school insulation and ventilation mitigation [ER 8.2.491 – 8.2.492].

156. The Examining Authority also concluded that with the inclusion of its amendments to the DCO related to the control of noise and appropriate mitigation, and given the evidence presented, the Development generally accords with the relevant national and local policies and guidance in respect of noise [ER 6.8.489 – 6.8.493 and ER 8.2.145 – 8.2.149].

157. However, given the uncertainty regarding the efficacy of noise insulation and ventilation schemes for caravans, there remained a potential that the mitigation of noise impacts may not be possible for up to 40 residential caravans at Smugglers Leap caravan park, and there remained the possibility of SOAEL being exceeded at this receptor [ER 6.8.366]. The Secretary of State notes that the should it prove impossible to achieve an appropriate level of acoustic performance as defined by BS 3632:2015, then the Applicant will consider relocation in line with the provisions in section 5 of the Noise Mitigation Plan [ER 6.8.364]. The Examining Authority considers relocation is likely to result in significant effects on health and quality of life and therefore fails to satisfy the first aim of the NPSE [ER 8.2.147] and that this weighed against the Development [ER 8.2.150].

158. The Examining Authority also considered that while the inclusion of requirement 21(2) in the recommended DCO mitigates against potential impacts from night flights, the impacts for night noise flights from emergency flights and flights for humanitarian purposes could not be entirely excluded [ER 8.2.124].

159. On implication of noise impacts from a Human Rights perspective, the Examining Authority concluded that because the Applicant has been unable to demonstrate sufficient need for the Development and because the socio-economic benefits of the Development are overstated, the proposed interference with the Human

Appendix D – Table 8B.1 from ESA4

Table 8B.1 Forecast flows for 92 summer day period

	2023 18mppawith scheme		2023 with scheme meeting Current Condition 10 contour Limit		2024 18mppawith scheme		2024 with scheme meeting Current Condition 10 contour Limit		2025 19mppawith scheme		2025 with scheme meeting Current Condition 10 contour Limit		2028 19mppawith scheme		2028 with scheme meeting Current Condition 10 Limit		2031 19mppawith scheme	
	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytime	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time
A300	225	146	203	123	225	146	212	123	226	146	226n/a	133	226	146	220	125	218	146
A318ceo	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
A318 neo	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
A319ceo	2560	360	2304	304	1760	289	1654	245	2010	347	2010n/a	316	49	n/a<1 0	48	<10	0	0
A319 neo	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
A320ceo	7440	1296	6696	1092	6807	1290	6398	1093	6542	1292	6542n/a	1178	1888	438	1839	376	0	0
A320 neo	4473	742	4025	626	5914	819	5559	694	6203	829	6203n/a	756	14088	2040	13722	1752	16100	2354
A321ceo	4415	499	3974	421	4019	451	3778	382	3661	303	3661n/a	276	0	0	0	0	0	0
A321 neo	3225	793	2903	669	3616	842	3399	713	3733	926	3733n/a	845	5638	1210	5492	1039	5699	1150
A330	11	0	10	0	11	0	11	0	11	0	11n/a	0	11	0	11	0	11	0
B737- Max	1033	254	930	214	1787	277	1680	234	3804	675	3804n/a	615	4108	758	4001	651	4954	805

	2023 18mppawith scheme		2023 with scheme meeting Current Condition 10 contour Limit		2024 18mppawith scheme		2024 with scheme meeting Current Condition 10 contour Limit		2025 19mppawith scheme		2025 with scheme meeting Current Condition 10 contour Limit		2028 19mppawith scheme		2028 with scheme meeting Current Condition 10 Limit		2031 19mppawith scheme	
	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytime	Night- time	Daytim e	Night- time	Daytim e	Night- -time	Daytim e	Night- -time
B737-300 / 73C	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10n/a	<10	<10	0	0
B737-400	12	103	11	87	12	103	12	87	13	103	13n/a	94	13	103	12	88	0	103
B737-500	20	0	18	0	20	0	19	0	21	0	21n/a	0	21	0	21	0	0	0
B737-600	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
B737-700	36	0	32	0	37	0	35	0	39	0	39n/a	0	39	0	38	0	0	0
B737-800 / 73H	3588	551	3229	465	2835	529	2665	448	824	132	824n/a	121	541	49	527	42	0	0
B737-900	189	40	170	34	189	40	178	34	190	40	190n/a	36	190	40	185	34	0	0
B757	<10n/a	128	<10n/a	108	<10n/a	128	<10n/a	109	<10n/a	129	<10n/a	117	<10n/a	129	<10	111	0	129
B767-200	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
B767-300	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
B787-800 / 900	17	0	15	0	17	0	16	0	17	0	17n/a	0	29	0	28	0	29	0

	2023 18mppawith scheme		2023 with scheme meeting Current Condition 10 contour Limit		2024 18mppawith scheme		2024 with scheme meeting Current Condition 10 contour Limit		2025 19mppawith scheme		2025 with scheme meeting Current Condition 10 contour Limit		2028 19mppawith scheme		2028 with scheme meeting Current Condition 10 Limit		2031 19mppawith scheme	
	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytime	Night- time	Daytim e	Night- time	Daytim e	Night- time	Daytim e	Night- time
Dash 8	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
DO328	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
E135/145	340	0	306	0	353	0	332	0	366	0	366n/a	0	366	0	357	0	366	0
E175/195	<10n/a	<10n/a	<10n/a	<10n/a	10	<10n/a	10	<10n/a	11	<10n/a	11n/a	<10n/a	11	<10n/a	10	<10	11	0
F10062	0	0	0	0	0	0	0	0	0	0	0n/a	0	0	0	0	0	0	0
OTHER	7120	81	6408	68	7389	84	6945	71	7660	87	7660n/a	79	7631	90	7433	77	7600	78
Total	34706	4994	31235	4210	35003	4997	32903	4232	35331	5007	35331n/a	4566	34849	5002	33943	4297	34987	4765