

TOWN AND COUNTRY PLANNING ACT 1990, SECTION 73
TOWN AND COUNTRY PLANNING (INQUIRIES PROCEDURE) (ENGLAND) RULES 2000
APPLICATION BY LONDON CITY AIRPORT LIMITED
to vary Conditions 2, 8,
12, 17, 23, 25, 26, 35, 42, 43 and 50
attached to planning permission
13/01228/FUL allowed on appeal APP/G5750/W/15/3035673 dated 26th
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Proof of Evidence – Noise

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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 59 years. I have been the head of the Rupert Taylor Ltd consultancy practice, and an independent consultant in these areas for the past 55 years.
- 1.1.3 I have provided consultancy advice and expert evidence with respect to London City Airport since its earliest stage when it was an idea considered by the then planning authority, The London Docklands Development Corporation (LDDC) in 1982. 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, 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).

2. The Planning History and Environmental Information

- 2.1.1 A short summary of the Airport's planning history and environmental information relevant to this s73 Application is as follows:
- 2.1.2 The airport was originally proposed as a short take-off and landing facility known as a STOLport, from which operations would be primarily by the de Havilland Dash 7 (DHC-7), a quiet four-engined Turbo-Prop with the capability of steep approaches and departures requiring only a short runway. Some operations by the Twin Otter (DHC-6) were also envisaged.

The 1983 Public Inquiry

- 2.1.3 In January 1983 I prepared a report for the London Docklands Development Corporation (LDDC) into a proposal for an aerodrome for use by short take-off and landing aircraft known as a STOLport. The proposed operation was based on operations by the de Havilland Dash 7 (DHC-7) or aircraft which have noise characteristics comparable with or better than the Dash 7, with up to 100 movements per day between 06:30 and 23:00. The report considered the likely impact of noise on the surrounding population and on the desirability of imposing limitations and control, such as might be achieved by the use of a Section 52¹ agreement. The conclusion of the report was that the impact of noise from aircraft in flight would be confined to a small area to the south west of the runway. In this area about 700 people would suffer annoyance that was moderate, or greater. The report found that the highest impact would be from ground-based activities. It was recommended that a Section 52 Agreement should be used to limit the types of aircraft which may be operated from the STOLport according to their noise characteristics and to limit the number of permissible movements and hours of operation. A public inquiry was held, in which I was expert witness for the LDDC. My evidence was that overall, the L_{Aeq} _{16h} due to airborne, taking off and landing aircraft would vary from 53 to 68 across the residential area and the ground noise would not exceed 60. In the residential area to the south-west of the site the previous level of about 55

¹ of the Town and Country Planning Act 1971

would be increased to about 60 to 63 dB $L_{Aeq\ 16h}$. A draft Section 52 Agreement was agreed with the applicants. In a letter of 14 August 1984 it was indicated that the Secretary of State for the Environment was disposed to adopt the Inspector's suggestion that there should be a more direct simple and easily understood method of controlling noise than the noise contour level on which the draft Section 52 Agreement was based.

- 2.1.4 The inspector, in his report, had expressed the view that "the STOLport operations should be controlled to ensure that the surrounding noise climate is no worse than that resulting from 100 Dash 7 movements in a day. This could be achieved by identifying 2 categories of acceptable aircraft types. In simple terms, category 1 would include STOL aircraft of equal or less noise than the Dash 7 and category 2 would include those STOL aircraft noisier than the Dash 7 but no noisier than the Twin Otter. The total weekday ATMs would be linked to 100 category I aircraft movements or a mixture of categories 1 and 2 according to a sliding scale table."
- 2.1.5 Following a period of consultation, a control regime was implemented in which there were two classes of aircraft. The first class was designed to accommodate the Dash 7, and the second class would accommodate the Twin Otter. Because the latter was noisier than the first, it was to count as 3.63 aircraft for every movement it made in order to offset the increase in the noise contour value caused by its additional noise. This came to be referred to as a "noise factor". The noise contours on which this was based was the Noise and Number Index, NNI, the predecessor to $L_{Aeq\ 16h}$ used for the description of airport noise. The Section 52 Agreement was designed to limit the size of the 35 NNI contour and houses within the 35 NNI contour were to be offered noise insulation.
- 2.1.6 Following the publication of the Aircraft Noise Index Study by the CAA in 1985, which found that L_{Aeq} was a better index than NNI, NNI was replaced by L_{Aeq} for all cases of airport noise evaluation, and the mathematical derivation of noise factors was adjusted accordingly.

The 1989 Planning Application

- 2.1.7 On 12 September 1989 London City Airport submitted two planning applications, one for the extension of the runway from 1030m (actually two overlapping 762m runways) to 1199m with two starter strips, and to amend the then existing noise control regime to allow the operation of BAe 146 aircraft and additional 2-engined turboprops. The applicants also sought an extension of the operating day from 2200 to 2300 and an increase in the number of movements from 120 per day (40 at weekends) to 130 per day and from 30,160 per annum to 36,500.

- 2.1.8 This application led to the conclusion of a supplemental Section 52 Agreement which contained an extended Aircraft Noise Categorisation system, that instead of the previous two categories of aircraft now had five, with the highest category having a noise factor of 1.26, and lower categories reducing the noise level by 3 dB and the noise factor by half. This is the original of the ACR system currently applicable to London City Airport. As part of the ACR regime, the airport was required to submit an annual categorisation report for the purpose of assigning noise categories to each type of aircraft in operation at the airport.
- 2.1.9 The ACR system sought to control noise to a new set of NNI contours in which the 42NNI contour lay approximately over the previous 35 NNI contour.
- 2.1.10 The inspector, in his report on the public inquiry in 1990-1, concluded that "The expansion of the airport would be of benefit to the economy of east London and the City. It would assist in the regeneration of Docklands and in redressing the imbalance between west and east London. To that extent the proposals accord with policies and place for the area. There are however disadvantages, most notably the increase in noise levels and the effect on the design of ELRC [the East London River Crossing then proposed but subsequently abandoned]. The increase in noise would be most significant in residential areas in the vicinity of the airport but would be unlikely to deter the redevelopment of sites in the Royal Docks or the implementation of proposals in Thamesmead to the east." He concluded that if the airport continued to cater mainly for the business sector and its operations were strictly controlled, the disadvantages of the proposed expansion would be outweighed by the benefits. The Secretary of State, in his decision letter, said he had carefully considered the disadvantages of the proposals, the most notable of which in his opinion was the increase in noise levels and the effect on the Thames Bridge design. On the question of noise, the Secretary of State agreed with the inspector that the noise management scheme to be agreed under the section 106 agreement [actually a Supplemental Section 52 Agreement] in conjunction with the conditions suggested by the Inspector would ensure that the effects of the additional noise resulting from the proposals will not be excessive.
- 2.1.11 Planning permission was granted by the Secretary of State in September 1991. The Supplemental Section 52 Agreement varied the previous Section 52 Agreement so as, among other things, to introduce a requirement that the aircraft categorization scheme, which remains current prior to the proposed revisions in 2016, would not exceed 36,500 – the same number as the limit on air transport movements.

The 1997 Planning Application

- 2.1.12 In 1997 London City Airport made an application to vary Condition 13 to increase the limit on the permitted number of air transport movements from 36,500 per year to 73,000 per year with an increase in the maximum number of daily movements from 130 to 240 (weekdays) and from 40 to 120 (weekends). A previous planning application had sought to increase the limit on movements at weekends and bank holidays on a temporary basis. The numbers of movements which were not ATMs were minimal.
- 2.1.13 The accompanying Environmental Statement found that if the proposed variation in planning condition 13 were approved, and if full usage of the increased aircraft movements were implemented, an increase of 2-3 dB(A) in airborne noise in the area would occur over that for which planning permission was approved in 1991.
- 2.1.14 The LDDC officers' report concluded that "following submission of the application and the carrying out of extensive public consultation thereon, it became clear that there was concern notably from residents in the locality over the noise consequences of the proposed expansion, particularly over weekend, holiday and early morning flights and the identification of areas affected by noise." Following negotiations with the LDDC and Newham during which the Airport were reported to have responded positively to these concerns, amendments to the proposals submitted were agreed and these were considered by both the LDDC and LB Newham as both statutory authorities and signatories to the Agreement to strike what was considered to be an appropriate balance between the needs of the Airport to be able to expand, within the defined parameters, whilst protecting the amenities of existing and incoming residents and businesses.
- 2.1.15 The LDDC's planning powers for the Royal Docks were transferred to the London Borough of Newham in 1998. The application was granted by LBN in 1998 with the addition of Condition 11(c) – From April 1999 the Airport shall not be used for the taking off or landing of aircraft on Saturdays at any time other than between 06:30 and 12:30 hours except (a) in the event of an emergency, (b) for the taking off or landing between 12:30 and 13:00 hours on Saturdays of an aircraft that was scheduled to take off or land before 12:30 hours but has suffered unavoidable operational delays and where that taking off or landing would not result in there being more than 400 air transport movements at the Airport per calendar year between 12.30 and 13.00 hours or more than 150 such movements in any consecutive three months, (c) the taking off or landing of aircraft between 12.30 hours and 18.00 hours on one Saturday per calendar year for the Airport's charity open day. Condition 15 was added that between 06.30 and 06.59 hours on Monday to Saturdays (excluding Bank Holidays and Public Holidays when the

airport will be closed between these times) the number of air transport movements shall not exceed 6 on any day.

- 2.1.16 The previous Section 52 Agreement was replaced by a new Section 106² Agreement. The Section 106 agreement provided that the number of noise factored movements, calculated according to the aircraft categorization scheme would not exceed 73,000 – the same number as the limit on air transport movements.

The 2007 Planning Permission

- 2.1.17 The daily limits were varied by a planning permission granted in 2007 for a three year temporary period which expired on 11 July 2010. This allowed 360 daily movements with fewer movements at weekends and bank holidays, while retaining the overall limit of 73,000 noise factored movements.

The 2009 Planning Application

- 2.1.18 Planning permission was granted for variation of conditions 13 and 15 of the outline planning permission no. N/82/104 dated 23 May 1985, as previously varied by the Secretary of State on the 26th September 1991 and by the London Borough of Newham on the 21st July 1998 and 11th July 2007, to allow up to 120,000 total aircraft movements per annum (number of total movements in 2006 was 79,616) with related modifications to other limits including noise factored movements.
- 2.1.19 The number of noise factored movements was increased from 73,000 to 120,000. The officers' report found that there would be an increase in noise level from road transport serving the airport operations on the ground at the airport and planes taking off and landing. There would be a doubling of the number of properties within the 57 dB L_{Aeq} contour and a tripling if new developments were included. The contours also encompassed outdoor amenity areas and schools. The conclusion was that if planning permission were to be granted a series of mitigation measures to limit the noise impacts should be used.

The 2016 Appeal Decision (CADP1)

- 2.1.20 The 'CADP1' planning permission includes works to demolish existing buildings and structures and provide additional infrastructure and passenger facilities at the Airport without changes to the number of permitted flights or opening hours previously permitted pursuant to planning permission 07/01510/VAR.

² of the Town and Country Planning Act 1990

- 2.1.21 The Condition 33 of the CADP1 planning permission sets a limit on the area of the 57 dB LAeq,16h contour of 9.1 km² and LCY is required to produce a Noise Contour Strategy that seeks to reduce the area of the noise contour by 2030 and every 5 years thereafter. As with the ANCS it would be possible to take into account the forecasts of reduced contour areas in future years, namely 8.5 km² (2025), 6.5 km² (2027) and 7.2 km² (2031) and to incorporate a reduced area or areas in a revised Condition 33 as part of any grant of permission for this application. Although Condition 33 is not included in the list of conditions with respect to which variation is applied for, the cover letter includes reference to variations in the contour areas in stages, under the heading "Reference Updates to other CADP1 Planning Conditions", viz:

Up to the passenger throughput at London City Airport exceeding 6,5 million passengers in any 12-month period (to be taken from 1 January to 31 December unless a different 12-month start and end date is agreed), the area enclosed by the 57dB daytime noise contour shall not exceed 9.1 km² or any lower figure as agreed pursuant to the Noise Contour Strategy approved on [x].

Upon the passenger throughput at London City Airport exceeding 8 million passengers in any 12-month period (to be taken from 1 January to 31 December unless a different 12-month start and end date is agreed), the area enclosed by the 57dB daytime noise contour shall not exceed x km². The area enclosed by the 57dB daytime noise contour shall not exceed x km² from when passenger throughput at London City Airport reaches 9 mppa in any 12-month period.

Forecast aircraft movements and consequential forecast and actual noise contours for the forthcoming year shall be reported to the Local Planning Authority annually within the Annual Operations Monitoring Report.

- 2.1.22 The values of "x" would need to be entered before grant of the S73 application.

2.2 Issues in the decision of the planning authority

The Planning Committee Decision

- 2.2.1 The decision of the Strategic Planning Committee of LBN was made on the basis of two issues, noise from additional movements in the morning half hour before 07:00 and from newly introduced movements on Saturday afternoons:

"The proposal, by reason of the additional morning and Saturday flights, and reduction of the existing Saturday curfew would result in a new material noise impact which would result in significant harm to the residential amenity of nearby residential properties. This would be contrary to policies D13 and T8 of The London Plan (2021) and policies SP2 and SP8 of the Newham Local Plan (2018)"

The Statement of Common Ground

- 2.2.2 The Statement of Common Ground identifies the issues which are not agreed between the appellants and LBN, and with regard to noise and health, there may be summarised as follows. The ES addresses noise and health in separate chapters, LBN notes that government's noise policy vision is "Promote good health and a good quality of life

through the effective management of noise within the context of Government policy on sustainable development” and that all three noise policy aims relate to impacts on health.

- LBN does not consider the Appellant’s separate assessment of weekend noise to be appropriate.
- LBN contend that there is no assessment methodology currently available for assessing the effects of removing the Saturday afternoon curfew at London City.
- LBN considers that the loss of Saturday afternoon curfew is not mitigated by noise insulation.
- LBN considers the loss of Saturday afternoon curfew is significant.
- LBN consider that normal approaches to the assessment of airport noise in the context of the Noise Policy Statement for England (and other policies based on it), including established observed effect levels in terms of 92-day noise indicators, are insensitive to the presence, absence or removal of curfew periods. Notwithstanding this, with regard to the 92-day noise indicators, including the effect of additional aircraft movements in the $L_{Aeq, 8h}$ period 2300-0700, LBN considers that significant effects from noise may need to be identified where there is a 1 dB change or more above the relevant SOAEL threshold in the light of with the criteria used in the ES accompanying the recent Luton Airport S73 application. Since completion of the SoCG the Secretary of State’s decision on the Luton Airport S73 called-in Inquiry has been issued. The SoS agreed with the inspectors who changed the word “significant” to “notable” in quoting from the applicants’ ES with regard to residential receptors receiving a 1dB or more increase above SOAEL (leaving the word unchanged with regard to non-residential receptors).

2.3 Scope of Evidence

2.3.1 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 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.

2.3.2 I will concentrate in this evidence on matters where there is a disagreement between the Council and the Airport and will not repeat matters presented in other documents.

3. Policy Context

3.1 Introduction

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

3.2 The Newham Local Plan 2018

- 3.2.1 The parts of policy SP2 with direct noise implications are:

1. Strategic Principles and Spatial Strategy:

iii. The need to improve employment levels and reduce poverty, whilst attending to the environmental impacts of economic development including community/public safety, noise, vibrations and odour and the legacy of contaminated land as per SP8 and SC1;

2. Design and technical criteria:

- 3.2.2 *a. The requirement for major development proposals to be accompanied by a health impact assessment detailing how they respond to the above contributors to health and well-being, including details of ongoing management or mitigation of issues where necessary*

- 3.2.3 The parts of policy SP8 with direct noise implications are:

1. Strategic principles and Spatial Strategy

a. All development is expected to achieve good neighbourliness and fairness from the outset by avoiding negative and maximising positive social, environmental and design impacts for neighbours on and off the site;

2. Design, Management and Technical Criteria

a. Compliance with the standards and due regard to the importance of the technical guidance in Table 4 where they are relevant to development proposals, will be expected to promote neighbourliness in addressing the need to:

xi. Avoid unacceptable exposure to light (including light spillage), odour, dust, noise, disturbance, vibration, radiation and other amenity or health impacting pollutants in accordance with policy SP2;

3.3 The London Plan 2021

- 3.3.1 The relevant parts of Policy T8 Aviation are

B The environmental and health impacts of aviation must be fully acknowledged and aviation-related development proposals should include mitigation measures that fully meet their external and environmental costs, particularly in respect of noise, air quality and climate change. Any airport expansion scheme must be appropriately assessed and if required demonstrate that there is an overriding public interest or no suitable alternative solution with fewer environmental impacts.

E Development proposals that would lead to changes in airport operations or air traffic movements must take full account of their environmental impacts and the views of

affected communities. Any changes to London's airspace must treat London's major airports equitably when airspace is allocated.

F Development proposals should make better use of existing airport capacity, underpinned by upgraded passenger and freight facilities and improved surface access links, in particular rail.

- 3.3.2 Policy D13 of the London Plan is primarily about the Agent of Change principle, but paragraph C is more general:

C New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.

3.4 National Policy and Guidance

Overarching aviation noise policy

- 3.4.1 In advance of the Noise Policy Paper to be published later in 2023, to frame the night-time noise abatement objective consultation and to provide clarity for airports and their stakeholders preparing or responding to noise action plan consultations, on 27th March 2023 the DfT published the government's revised overarching aviation noise policy statement:

"The government's overall policy on aviation noise is to balance the economic and consumer benefits of aviation against their social and health implications in line with the International Civil Aviation Organisation's Balanced Approach to Aircraft Noise Management. This should take into account the local and national context of both passenger and freight operations, and recognise the additional health impacts of night flights.

The impact of aviation noise must be mitigated as much as is practicable and realistic to do so, limiting, and where possible reducing, the total adverse impacts on health and quality of life from aviation noise."

Jet Zero Strategy

- 3.4.2 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

- 3.4.3 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.
- 3.4.4 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

- 3.4.5 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

- 3.4.6 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 2023.
- 3.4.7 The NPPF paragraph 174(e) 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".*
- 3.4.8 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

- 3.4.9 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"

- 3.4.10 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."*

- 3.4.11 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.

- 3.4.12 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.

- 3.4.13 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.

- 3.4.14 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

- 3.4.15 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"

- 3.4.16 The policy states (Paragraph 3.13) that this is consistent with the Government's Noise Policy as set out in the NPSE.

- 3.4.17 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.

- 3.4.18 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.

- 3.4.19 With regard to the assessment of 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."

- 3.4.20 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."

- 3.4.21 Footnote 96 states:

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

Noise Insulation Schemes

3.4.22 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.

3.4.23 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."

3.4.24 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."

3.4.25 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

3.4.26 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."

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

UK Airspace Policy

3.4.28 In 2017 the Department for Transport 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”.

3.4.29 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).

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

3.4.31 The Department for Transport 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.

3.4.32 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.

3.5 Aviation 2050

3.5.1 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".*

3.5.2 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 $L_{Aeq,16h}$ contour to 60 dB $L_{Aeq,16h}$ ";*
- *"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 L_{Aeq} , which leaves a household in the 54 dB $L_{Aeq,16h}$ contour or above as a new eligibility criterion for assistance with noise insulation"*

4. Other Material Guidance, Strategies and Surveys

4.1 Air Navigation Guidance 2017

- 4.1.1 Although this guidance 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."

4.2 Planning Practice Guidance

- 4.2.1 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.
- 4.2.2 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').
- 4.2.3 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.”

4.3 Aviation Strategy: Noise Forecast and Analyses, CAP 1731

4.3.1 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."*

4.4 Aircraft Noise and Health Effects – a six monthly update, CAP 2398

4.4.1 The topic of respite is considered in the update as follows:

“2.36 Respite as an effective intervention: predictable respite is effective as an intervention – it is (genuinely) valued by residents, when they are informed of it and they do not wish for it to be removed. There were indications that the overall value of predictable respite to the communities around Heathrow Airport could be maximised by increasing individual awareness through public engagement.”

4.5 Respite from aircraft noise: high-level overview of journey on building our knowledge, Porter et al, Proceedings Internoise 2022 Glasgow.

4.5.1 The following extracts are informative

“What do we mean by respite?”

Respite is ‘A break from or a reduction in aircraft noise’. Predictable Respite is ‘Scheduled respite from aircraft noise for a period of time’. Respite noise change is the difference in noise level between different operational modes, most commonly measured as $L_{Aeq,T}$ for each mode of operation. These changes can be classified into 3 bands; dB changes of greater than 9 dB, 4-9 dB, and less than 4 dB.

How is respite subjectively perceived?

Predictable respite is generally viewed as of benefit and considered helpful as a mitigation measure to reduce the impacts of noise. It might be concluded that managed respite is effective – it is (genuinely) valued by residents, when they are informed of it – and they certainly don’t want it removed. The degree of its effectiveness is dependent on both acoustic and non-acoustic factors. However, many residents are not aware of the current respite provision, and research has suggested that non-acoustic factors such as effectiveness of public engagement, trust and understanding could be at least as important as the respite noise level differences in terms of their appreciation of a noise respite intervention.”

- 4.5.2 The “current respite provision” referred to is the system of runway alternation at Heathrow, through which at a fixed time of day the runways used for arrivals and departures are switched so that residents in the areas around the runway ends cease to be overflown. While the facility to operate runway alternation is restricted to airports with more than runway, the general principle of predictable periods when there is no (or much reduced) aircraft noise is applicable to weekends at LCY.

4.6 Survey of Noise Attitudes 2014 (SoNA) Second Edition

- 4.6.1 The Civil Aviation Authority *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.
- 4.6.2 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 $L_{Aeq,16h}$.
- 4.6.3 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.

4.7 WHO Environmental Noise Guidelines for the European Region 2018

- 4.7.1 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."

- 4.7.2 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."

- 4.7.3 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."

4.8 WHO Night Noise Guidelines for Europe 2009

- 4.8.1 Guidance on absolute noise levels at night were given in the WHO *Night Noise Guidelines* (NNG). 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 $L_{night,outside}$ index. This is essentially equivalent to the $L_{Aeq,8h}$ 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 $L_{Aeq,8h}$.

4.8.2 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): $L_{night,outside}$ equal to 40 dB
- Interim target (IT): $L_{night,outside}$ equal to 55 dB

4.8.3 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

- 4.8.4 The 2009 WHO Guidelines have not been superseded by the latest (2018) WHO Guidelines which state:

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

4.9 WHO Guidelines for Community Noise (1999)

- 4.9.1 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.

- 4.9.2 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".

- 4.9.3 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 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."

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

- 4.10.1 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.
- 4.10.2 The Statement of Common Ground includes the statement "The NPSE SOAEL / LOAEL thresholds are appropriate to consider effects on health and quality of life. LBN does not agree that they address the loss of the Saturday afternoon curfew." And "In accordance with policy the ES uses the lowest observed adverse effect level (LOAEL), and the significant observed adverse effect level (SOAEL) in the assessment. These have been assigned values based on Government guidance and established practice. For daytime noise the LOAEL is 51 dB $L_{Aeq,16h}$ and the SOAEL 63 dB $L_{Aeq,16h}$. For nighttime noise the LOAEL is 45 dB $L_{Aeq,8h}$ and the SOAEL 55 dB $L_{Aeq,8h}$. LBN consider that these are insensitive to the presence, absence or removal of curfew periods and are not therefore agreed (Section 17e)."
- 4.10.3 The derivation of these numerical values is as follows. 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) 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 figure of 55 dB $L_{Aeq,8h}$ for night time SOAEL accords with the Night Noise Guidelines for Europe Interim Target.
- 4.10.4 These values assigned to LOAEL and SOAEL 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.

- 4.10.5 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.
- 4.10.6 The essential issue that arises from a review of policy and guidance on aviation noise is that there is no formal method of assessing, on a scientific basis, the effect of ending a curfew at an airport. It is noted in 17.1 (d) of the Statement of common ground that "It is agreed that SoNA 2014 survey data includes Heathrow where a night flight voluntary curfew is in place (to 0430 for arrivals and 0600 for departures) as well as predictable periods of daytime respite east of the airport provided by alternation of arrival runways when the airport is in 'westerly' mode of operation. LBN contend that there is no assessment methodology currently available for assessing the effects of removing the Saturday afternoon curfew at London City." What is not available is a set of data equivalent to the SoNA 2014 survey for Heathrow without a night flight voluntary curfew in order to compare the two and enable an evaluation of the effect of that voluntary curfew on community response. Even if there were, the effect of a voluntary curfew in hours when most people wish to sleep would not be the same as for Saturday afternoon.
- 4.10.7 However, the absence of an established and accepted "formula" for assessing the effect of removing a respite period does not mean that an informed judgement cannot be made in the decision-making process.

5. The Regulatory Framework at the Airport

5.1 Regulatory Framework

- 5.1.1 The regulatory framework of aircraft noise in the UK is considered within London City Airport's Noise Action Plan for 2018-2023 which was approved by the Secretary of State of Environment, Food and Rural Affairs on 23rd November 2018. The Draft Noise Action Plan 2024-2028 was published in 2023.

International and European Regulation

Restrictions on Aircraft Noise Emissions

- 5.1.2 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

- 5.1.3 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.
- 5.1.4 The Department for Transport (DfT) and the Department for Environment, Food and Rural Affairs (Defra) are responsible for regulating certain environmental aspects of aviation, including aircraft noise. The Civil Aviation Authority (CAA) also has powers as a regulator and certifying authority. It also provides specialist aviation advice to the Government including noise.
- 5.1.5 The key legislation relating to the aircraft noise at non-designated airports³ 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

³ The designated airports are Heathrow, Gatwick and Stansted

more than 50,000 movements per year are required to produce strategic noise maps and associated noise action plans every 5 years.

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

5.1.6 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

5.1.7 The CADP1 planning permission is accompanied by a set of planning conditions which control the airport's operations. These include limits on the number of aircraft movements (and permitted movements under the noise quota count system), including during specific times of day and specific days such as public holidays; the size of the 57 dB $L_{Aeq, 16hr}$ noise contour; aircraft take-off and landing times; passenger terminal opening times; the number and position of aircraft stands and runway length; the types of aircraft permitted; and noise monitoring systems and management strategy

The 2016 Section 106 Agreement

- 5.1.8 A Section 106 Agreement was agreed between LCY and LBN in April 2016 and sets out key planning obligations to be implemented by the airport in order to minimise and offset adverse effects associated with CADP1.
- 5.1.9 LCY operates a noise Quota Count system, in accordance with Condition 18 (Aircraft Noise Categorisation Scheme) of the CADP1 planning permission. Under the ANCS, each aircraft type is assigned a separate quota count (QC) for arrivals and for departures, based on their certification noise levels and categorised into 1 dB bands. The QC system is similar to that operated at many UK airports at night. The ANCS QC system has an annual limit of 22,000 per calendar year, with a maximum of 742.5 in any single week. These limits are reviewed regularly.

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 Features of the proposals that affect noise

- 6.2.1 The proposals that directly affect noise emission associated with the airport are (1) to increase the number of passengers per annum from 6.6mppa to 9mppa; (2) to increase the number of aircraft movements between 06:30 and 06:59 and (3) to extend operational hours on Saturday afternoons, thus introducing aircraft movements between 12:30 and 18:30 (19:30 during British Summer Time).
- 6.2.2 The applicants' assessment is made on the basis that these changes will incentivise airlines to re-fleet with "neo" (new engine option) aircraft that have lower certificated noise levels, and a consequence of implementing the proposals would be a reduction in fleet noise levels, partially offsetting the increase in aircraft numbers and the period within which they would operate.

6.3 Effects of Re-fleeting

- 6.3.1 The introduction of aircraft powered by a new design of engines, principally the CFM Leap engine and the Pratt & Whitney PW1000G, was, among other things expected to result in lower noise levels. 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.
- 6.3.2 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.
- 6.3.3 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.
- 6.3.4 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.

- 6.3.5 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.
- 6.3.6 The ES Chapter 8 illustrates this effect by comparing future types with the Embraer E190, the most common type currently operating at the airport, showing that on departure the new types are of the order of 5 dBA quieter and on arrival they are about 3 dB quieter. This has been challenged by some responding to the consultation process, and was also challenged at the Luton S73 inquiry with evidence from measurements at locations some distance from the airport that the differences in the field are much smaller.
- 6.3.7 Close to the airport, figures produced by the appellants’ consultants are not likely to be materially inaccurate, but further away where aircraft thrust settings are low and airframe aerodynamic noise predominates the difference between the two groups of aircraft will be smaller. However, the formal way of assessing airport noise effects does place weight on noise closer to the airport, and a smaller effect from the introduction of quieter aircraft at a distance from the airport does not come through the conventional assessment methodology. Although aircraft noise associated with LCY results in representations from residents in locations many miles from the airport, the noise index values are not computed at such distances and significant effects in the context of formal environmental assessment do not arise.

6.4 The principles of the proposed mitigation

Noise Insulation and Compensation

- 6.4.1 The Statement of Common Ground indicates the S106 obligations or conditions, that are agreed as appropriate and necessary. Those which involve noise are:
- Commitment to only allowing new generation aircraft operating in any newly extended hours on a Saturday as well as the three additional flights in the first half hour of the day (0630-0659).
 - An enhanced residential Sound Insulation Scheme lowering the noise threshold for eligibility in one of the categories of the Scheme so that more residents

affected by noise receive a higher specification of treatment in their homes and is intended to enhance take up.

- An enhancement to the Airport's Community Fund.

7. Assessment Methodology

7.1 Introduction

- 7.1.1 The noise assessment for these proposals addresses three effects. The first effect is the result of changes in aircraft movements as a result of forecast changes in the mix of aircraft likely to operate from the airport should the changes applied for be approved. The second effect is the consequence of permitting more aircraft movements between 06:30 and 06:59 and the third effect is the consequence of introducing aircraft movements into the period 12:30 to 18:30 (19:30 during BST) on Saturday.
- 7.1.2 The reasons for refusal refer to the second and third effects.

7.2 Assessment Metrics and Significance

- 7.2.1 The numerical quantification of aircraft noise in general is well established, and the methodology used in the ES is conventional with regard to noise occurring within the conventionally adopted time periods, particularly the noise contour period of mid-June to mid-September separately assessed for night and day.
- 7.2.2 The unusual feature of this application is that there are potential effects that are very specific to local circumstances, namely the increase on early morning aircraft movements and the loss of respite on Saturday afternoons.
- 7.2.3 Noise indices of any kind are only of use if they are linked to the results of noise and social surveys or incidence of health effects which permit the establishment of a correlation between numerical noise index values (and changes in those values) and observed effects in a population. There are very limited data in the literature to enable noise indices, and changes in their values, to be used to assess the significance of the effect of increase the number of aircraft movements in the half hour between 0630 and 0700. There is only information relating to the full night period 2300-0700. There is some information about the role played by respite periods for populations around airports, particularly in the case of airports with more than one runway where runway mode segregation or alternation is possible.
- 7.2.4 The ES in this case departs from established convention by including some night movements in the daytime noise contours. For daytime air noise, the standard 16 hour period assessed in the UK is 07:00-23:00. At LCY daytime noise contours have generally been produced based on the airport's operational hours 06:30-22:30, thus including all flights that occur at the airport.

- 7.2.5 The 8 hour night period contours have been based on the standard UK night period 23:00-07:00. There is thus some overlap between the aircraft whose noise is accounted for in the daytime noise contours and those covered by the night noise contours, in that aircraft movements between 06:30 and 07:00 are include in both. This departure from convention has a negligible effect on the conclusions of the assessment.
- 7.2.6 A further unconventional approach has been introduced specifically for the issue of Saturday afternoons:
- 7.2.7 In addition to these primary metrics, due to the proposed changes in Saturday operational hours, a specific assessment of weekend noise has been undertaken. Air noise predictions have been undertaken in terms of the standard daytime $L_{Aeq,16h}$ metric, but the predictions are based on only the aircraft movements at the weekend. This is not a standard assessment metric. This has not been done before, and the method of drawing conclusions from the outcome is not an established procedure with the result that the conclusions need to be regarded with caution.
- 7.2.8 A key feature of the noise assessment in the ES is that a change in outdoor noise level in the range 0-1.9 dB $L_{Aeq,16h}$ or $L_{Aeq,8h}$ is treated as negligible. Chapter 8 8.3.98 points out that "A semantic scale of this type, based on the IEMA noise impact guidelines, has been widely accepted in the assessment of other UK airport development projects such as the recent Bristol Airport application and the Luton Airport Development Consent Order (DCO) application." It does not note that for the 2022 Luton Section 73 application called-in inquiry the ES regards a 1 dB increase as significant where the noise exposure was above SOAEL. However, in his decision, the SoS agreed with the inspectors who changed the word "significant" to "notable" in quoting from the applicants' ES with regard to residential receptors receiving a 1dB or more increase above SOAEL (leaving the word unchanged with regard to non-residential receptors).

Separation of effects into "noise" and "health".

- 7.2.9 The ES considers noise in two chapters, Chapter 8 Noise and Vibration and Chapter 12 "Health and well-being". Noise effects on health and well-being are not separate from other effects that potentially arise in the present context. While Chapter 12 cross-refers to Chapter 8 from which it draws information, there is no cross reference to Chapter 12 in Chapter 8.

Night movements

- 7.2.10 The proposed increase in the number of movements between 06:30 and 06:59 is a change in the number of movements in the formal night time assessment period 23:00-

0700. It is, however, likely that the community response to night noise at an airport which has no aircraft movements in the night until 06:30 will be different, for the same noise index value (and the same change in noise index value), from the case of an airport which has movements during other hours in the night.

- 7.2.11 The ES assesses the change in movement numbers during this period in terms of the $L_{Aeq, 8h}$ index.

Sleep disturbance

- 7.2.12 With regard to sleep disturbance, the percentages highly sleep-disturbed presented in the World Health Organization Environmental Noise Guidelines for the European Region 2018 (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

- 7.2.13 Broadly speaking, an increase of 1dB results in an extra 1% of the population being Highly Sleep Disturbed. The ES finds that in several locations there are increases of up to 2 dB in summer $L_{Aeq, 8h}$ which, if there is no major seasonal variation is equivalent to L_{night} , but the additional population likely to be highly sleep disturbed is not reported. The research which led to these figures did not take into account whether or not the residents studied had sound insulation installed in their homes. If that were taken into account, the %HSD could be less than reported in the WHO ENG. This may partly explain the very large overlap of the 95% confidence limits.

The weekend curfew

- 7.2.14 The change in the weekend curfew period from the current 12:30 Saturday until 12:30 Sunday by the introduction of aircraft movements between 12:30 and 18:30 (19:30 during BST) on Saturdays is a noise effect unique to London City Airport and there is therefore no established noise index for quantifying or assessing the effect. The schedule absence of aircraft movements is referred to as respite, and studies that have been carried out into the benefits of respite have not yielded a deterministic method of assessment.

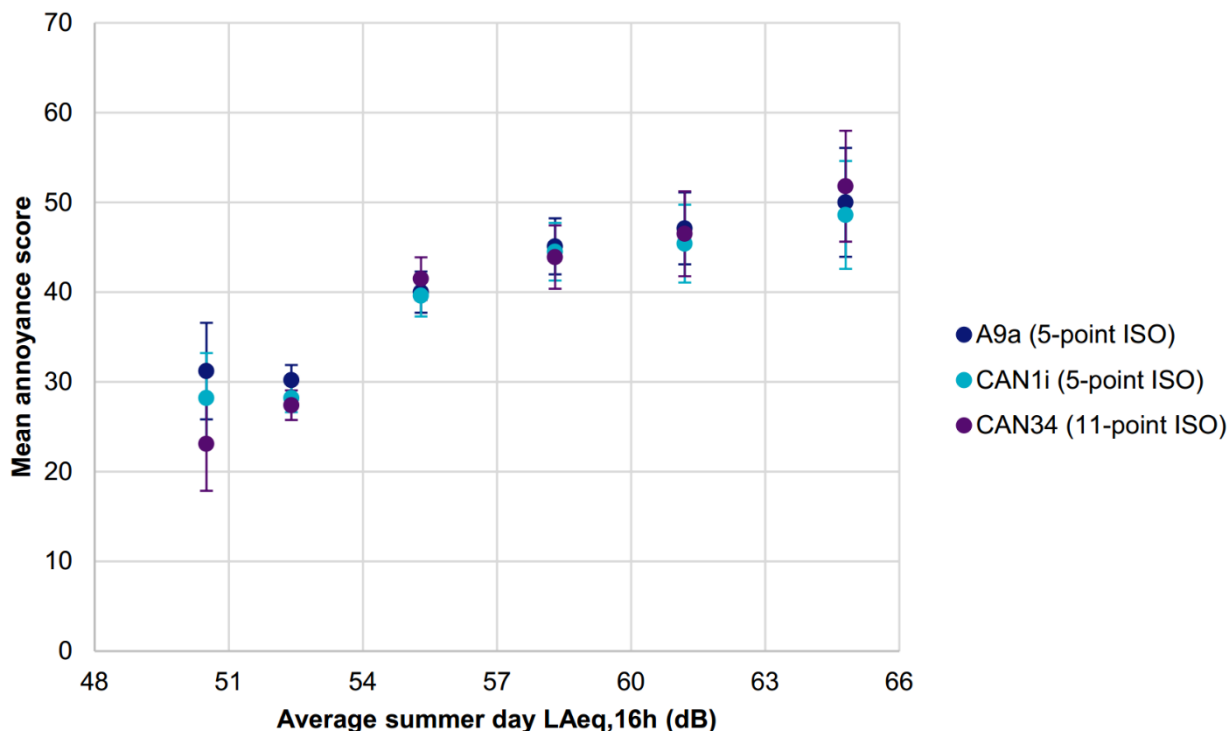
8. Assessment of Effects

8.1 Introduction

- 8.1.1 The relationship between contour area and numbers of dwellings or population is sensitive to small changes in noise level, as well as to the distribution of centres of population around the airport.
- 8.1.2 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 dicta⁴ about the relationship between noise level in decibels and human perception become valid.
- 8.1.3 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 the quieter and the noisier noise.
- 8.1.4 At any location, if an aircraft overflies at a noise level "X", and some time 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.
- 8.1.5 In general, where aircraft noise changes are due to either noisier aircraft or increased numbers, there are relationships between global parameters such as the percentage of the population that is highly annoyed and L_{Aeq} -based indices.
- 8.1.6 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.

⁴ Glossary to withdrawn PPG24 Planning and Noise

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



8.1.7 With regard to percentage highly annoyed, the data in Sona2014 are

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%

8.2 Health effects of the proposals due to noise.

8.2.1 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 City Airport are well below risk thresholds for hearing impairment.

- 8.2.2 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.
- 8.2.3 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. L_{den} is approximately equal to L_{Aeq16h} plus 2dB.
- 8.2.4 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} .
- 8.2.5 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.
- 8.2.6 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, 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.

9. The noise effects of the proposals

9.1 Basic changes

9.1.1 Having considered all the relevant and applicable guidance the need is to establish an approach whereby the effect of the changes brought about by the application can be assessed in a way that reflects the impacts they will have on the local area and the people living and working there

9.1.2 If the proposed changes were to take immediate effect, there would be immediate changes in the noise environment of the airport as follows assuming that the previously permitted allowable number of aircraft movements were fully utilised just prior to the change.

Night

9.1.3 The permitted number of aircraft movements in the night period 23:00-07:00 would be increased from 6 per night (Monday to Saturday) to 9 per night, an increase of 50%. For the same aircraft fleet this is an increase of 1.76 dB on the $L_{Aeq\ 8h}$ index. The appellants' forecast fleet mixes for the DM and DC cases, the change in the $L_{Aeq\ 8h}$ index is predicted in the ES as up to 2.5 dB for 2025 as the base figure is less than 6.

Day

9.1.4 The number of aircraft movements on Saturday afternoons between 12:30 and 22:30 would be increased from zero to 130. There is no accepted index for quantifying the effect of removing a respite period noise exposure on Saturday afternoons. If there were, this would be an increase of an infinite number of decibels in noise from aircraft operating at LCY; however, there is some aircraft noise in the area due to aircraft arriving at or departing from other airports including Heathrow, so the increase in aircraft noise or any origin would be finite, but large. The appellants have created a unique weekend $L_{Aeq\ 16h}$ index. The limit on the number of aircraft movements on any consecutive Saturday and Sunday would be increased from 280 to 400. For the same aircraft fleet this is an increase of 1.55 dB in weekend $L_{Aeq\ 16h}$ index. Taking into account the effects of refueling and the appellants' forecast fleet mixes for the DM and DC cases, the change in the weekend $L_{Aeq\ 16h}$ index is predicted in the ES as less than this. However, there are no social survey data which enable a correlation between values of the weekend noise index and community response to be computed. The nearest thing to a social survey that exists on this topic is the response to consultation on the current application.

10. Conclusions

- 10.1.1 The main issue before this inquiry as far as noise is concerned is whether, in the first reason for refusal, the words “significant harm” are true, i.e. whether “the proposal, by reason of the additional morning and Saturday flights, and reduction of the existing Saturday curfew would result in a new material noise impact which would result in significant harm to the residential amenity of nearby residential properties.”
- 10.1.2 Additional issues are whether, if there would be significant harm, this would be contrary to policies D13 and T8 of The London Plan (2021) and policies SP2 and SP8 of the Newham Local Plan (2018), and whether that would be (a) sufficiently mitigated or (b) outweighed by other advantages of the appeal proposals. Point (b) depends on matters such as forecasting which are outside the scope of my evidence.

Significant harm

- 10.1.3 The Appellants’ Environmental Statement concludes that (8.8.6) “Nobody is forecast to experience a significant increase in night-time air noise levels between the Do Minimum scenario and the Development Case scenario, with the vast majority of people forecast to experience a negligible increase of less than 2 dB.” Given that some of those experiencing the increase are exposed to noise at levels above SOAEL, this conclusion is at odds with the decision of the Secretary of State in the Luton S73 application who found that an increase of “1 dB” above SOAEL was notable (and the applicants found it to be significant). There are people (ES Table 8.25) who may not be in the “vast majority” but are forecast to experience an increase in the night noise index which by the appellants’ own criteria is not negligible. I explain why in 7.2.13 above. Considering only “vast majorities” is not an acceptable method of assessment.
- 10.1.4 With regard to Saturday afternoons, the ES finds “8.8.7 The number of people exposed to air noise during the weekend in 2031 will remain similar to 2019, as the greater use of quieter new generation aircraft by 2031 will offset the increase in weekend movements. The number of people exposed to air noise during the weekend will be more for the Development Case scenario compared to the Do Minimum scenario. This is due to the proposed extension to the airport’s operating hours on Saturdays into the early evening and the resulting increase in weekend movements. Comparing the Development Case and Do Minimum scenarios all changes in weekend air noise are forecast be Negligible (less than 2 dB).” This conclusion regarding negligibility is based on the application of a weekend noise index that has no technical support, and cannot be used to measure community response to removal of the Saturday afternoon curfew.

This conclusion is at odds with the views of surrounding residents received following the publication of the application details.

- 10.1.5 There is no validated technical test for assessing the changes that will occur during the Saturday afternoon period. Those changes will be very obvious and will undoubtedly be experienced by those living and working within the local area. It is therefore necessary to make a value-judgement and compare the factual positions, namely, the current case with no flights operating from the airport to be replaced by an increasing number of flights within a six hour period during Saturday afternoons.

Policy contravention

- 10.1.6 The evidence of Mr Liam McFadden shows that if there would be significant harm the proposals would be contrary to the noise requirements of the policies cited in the first reason for refusal.

Mitigation

- 10.1.7 It is essential to note that the loss of the Saturday afternoon curfew and the additional flights between 06:30 and 07:00 will have an immediate effect, the day that any new permission is implemented. Even if those noise indices which are valid for the assessment of airport noise effects were to show noise reductions over time due to the effects of re-fleeting, they would have no benefit in mitigating the effect of introducing the proposals for a long time. Because there is no valid measure of the noise impact of removing the Saturday afternoon respite period, even after enough time has passed for the effects of any refleeting to happen it is still not possible to measure objectively the two effects, negative and positive, in the decision-making balance, and a value judgement is unavoidable. Enhanced noise insulation could be put in place before implementation of the new proposals, but it is not known what effect that would have on community reaction to the loss of a complete absence of noise from flights serving London City Airport on Saturday afternoons, both indoors and outdoors.

11. Statement of truth

- 11.1.1 The evidence which I have prepared and provide for this planning appeal in this proof of evidence is true and has been prepared and is given in accordance with the guidance of my professional institution and I confirm that the opinions expressed are my true and professional opinions.

A handwritten signature in black ink, appearing to read 'Rupert Thornely-Taylor', with a long horizontal flourish extending to the right.

Rupert Thornely-Taylor F.I.O.A.

6 November 2023

Appendix A – Glossary of Terms

Term	Definition
ACA	Airport Carbon Accreditation
AIP	Aeronautical Information Publication
The Airport	London City Airport
ANPS	Airports National Policy Statement
APF	Aviation Policy Framework
ATMs	Air Transport Movements
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
CDA	Continuous Decent Approach
CMC	Case Management Conference
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
Curfew	A fixed period during which aircraft movements are not allowed.
Current S106 Agreement	The legal agreement dated 9 October 2017 and currently in force between London Luton Airport Operations Limited, London Luton Airport Limited, Royal Bank of Scotland plc and LBC under section 106 of the Town and Country Planning Act 1990
Defra	Department for Environment, Food and Rural Affairs
DfES	Department for Education and Skills
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
EEA	European Economic Area
EIA	Environmental Impact Assessment

Term	Definition
ES	Environmental Statement
EU ETS	European Union Emissions Trading System
FTTF	The UK Government strategy, <i>"Flightpath to the future: a strategic framework for the aviation sector"</i> , published 26 May 2022
GDP	Gross domestic product (£)
GHG	Greenhouse gases
GVA	Gross value added (£)
ICAO	International Civil Aviation Organisation
Jet Zero Consultation	The government consultation <i>"Jet zero: our strategy for net zero aviation"</i> , which ran from 14 July 2021 to 8 September 2021 (with a further short, technical consultation running from 21 March 2022 to 25 April 2022)
LADACAN	Luton and District Association for the Control of Airport Noise
LBC	Luton Borough Council
LDF	Local Development Framework
LEP	Local Environmental Plan
Local Plan	The Newham Local Plan 2018
LPA	Local Planning Authority
MBU	The UK Government strategy, <i>"Beyond the horizon: The future of UK aviation: Making best use of existing runways"</i> , published 5 June 2018
MPPA	Million passengers per annum
NATS	National Air Traffic Service
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PINS	The Planning Inspectorate
PoE	Proof of evidence
Respite	A scheduled relief from aircraft noise for a period of time

Term	Definition
S73 Application	The application dated 8 January 2021 under s.73 Town and County Planning Act 1990 by London to vary Conditions 2, 8, 12, 17, 23, 25, 26, 35, 42, 43 and 50 attached to planning permission 13/01228/FUL allowed on appeal APP/G5750W/15/3035673 dated 26th July 2016 LPA REFERENCE NUMBER 23/00059/REF PINS REFERENCE NUMBER: APP/G5750/W/23/3326646
SAF	Sustainable aviation fuels
SID	Standard Instrument Departure Route
SoCG	Statement of Common Ground
SoS	Secretary of State
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
TCFD	Task Force on Climate-Related Financial Disclosures
UDP	Unitary Development Plan
UK ETS	UK Emissions Trading Scheme

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 Health⁵ "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 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

⁵ Int. J. Environ. Res. Public Health 2018, 15, 2717; doi:10.3390/ijerph15122717

(LRC) airport. Guski et al. [2] report a similar but somewhat smaller, 6 dB, difference."