Appendix 9-8 Draft Operational Noise Management Plan

London Luton Airport Ltd
A Luton Council company

Future LuToN: Making best use of our runway

Preliminary Environmental Information Report
Volume 3: Appendices
Appendix 9-8 Draft Operational Noise Management Plan

8 October 2019

LLADCO-3B-AEC-00-00-RP-YE-0002 | Issue 1

Contents

Tables

Figures

1 INTRODUCTION

1.1 Background

1.1.1 London Luton Airport Limited (LLAL) is proposing to expand London Luton Airport (LTN) by submitting a Development Consent Order (DCO) application for works that will allow LTN to grow to accommodate 32 million passengers per annum (mppa). A current planning permission for works at LTN, called Project Curium (LBC ref: 12/01400/FUL), limits passenger throughput to 18mppa.

1.1.2 London Luton Airport Operations Ltd (LLAOL) have direct control over the operation of the airport under a concession agreement with LLAL. This agreement is currently in place until 2031. Therefore, the management of noise associated with operating the airport is under the direct control of LLAOL.

1.1.3 This document is the draft Operational Noise Management Plan (ONMP) and is provided as part of a suite of documents which make up Preliminary Environmental Information Report (PEIR) for consultation. It sets out the long-term goals for noise management during the lifespan of the Proposed Development.

2 LUTON AIRPORT NOISE ACTION PLAN

2.1.1 LLAOL provide a Noise Action Plan (NAP), which is updated every five years in line with requirements set out in Directive 2002/49/EC[1]. The NAP responds to paragraph 2.69 of the Consultation Response on UK Airspace Policy, which states an objective is to:

"…limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise".

2.1.2 The current NAP applies to the period from 2019 to 2023[2] and sets out five main work areas to manage aircraft noise associated with LTN, as reproduced in Table 1.

[1] European Union (2002), *Directive 2002/49/EC Of the European Parliament and of the Council.* Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN

[2] London Luton Airport (2014), *Noise Action Plan 2019-2023*. Available at: https://www.london-luton.co.uk/corporate/community/noise/noise-action-plan

Table 1: LTN NAP Main Work Areas

Approach	Description
Operational Procedures	We will constantly review our operating procedures to ensure the most environmentally friendly procedures are in place, as part of this we will challenge best practice to provide continuous improvement. If more fundamental changes to airspace are required, we will proactively engage with stakeholders, in line with CAP 1616, to effectively manage aircraft noise impacts.
Quieter Aircraft	Modern aircraft of today are less noisy than previous generations, however as traffic continues to grow where demand for air travel increases, this reduction can often be counteracted by the number of aircraft overflying an area. At LLA we are encouraging operators to use the quietest aircraft practicable to the Luton operation, particularly during early morning and night time periods.
Land-use Planning and Mitigation	Through communication with local planning authorities we will continue to discourage developments near the airport which would give rise to the number of people significantly affected by noise. Furthermore, we will proactively review the Noise Insulation Scheme to ensure that it remains an effective means of noise mitigation.
Operational Restrictions	Restrictions should not be the first option when it comes to noise management however, we have a range of operating restrictions including movement limits and noise quota limits. Where restrictions are in place, we are focused on ensuring that they are adhered to fully.
Working with the local community & industry partners	In order to reduce the impact of noise we recognise the importance of working with our communities and industry partners to understand any concerns and take action where possible, keeping communities up to date.

3 NOISE MANAGEMENT MEASURES

3.1 ICAO Balanced Approach

3.1.1 Aircraft noise management is subject to the concept of a 'Balanced Approach' (ICAO Resolution A33/7[3]). This is given legal effect in the UK through EU Regulation 598/2014[4]. The Balanced Approach explores various measures to control noise at airports through consideration of four principal elements:

- Reduction of noise at source;

[3] International Civil Aviation Organization (2001), *Assembly Resolutions in Force*. Available at: https://www.icao.int/environmental-protection/Documents/STATEMENTS/A33-7.pdf

[4] European Parliament and Council of the European Union (2014), *Regulation (EU) No 598/2014.* Available at: http://www.legislation.gov.uk/uksi/2018/785/made?_sm_au_=iVVJ3J3PHrjF10Z5

- Land use planning and noise management;
- Noise abatement and operational procedures; and
- Operating restrictions.

3.1.2 The mitigation measures set up in this ONMP have been defined with reference to the ICAO Balanced Approach.

3.2 Reduction of Noise at Source

3.2.1 Reduction of aircraft noise at source relates to improvements in aircraft technology to reduce aircraft noise. Noise emissions from aircraft have been controlled since the 1970s through aircraft noise limits out in Annex 16 of the Convention on International Civil Aviation. The first noise certification standard was set out in Chapter 2 of Annex 16, Volume 1 and was introduced in 1972. Noise limits were defined as a direct function of Maximum Take-off Mass in order to recognise that heavier aeroplanes produce more noise than lighter aeroplane types.

3.2.2 Following the introduction of Chapter 2, higher bypass ratio jet engines were introduced into service that resulted in reductions in aircraft noise. Consequently, the Chapter 2 aircraft standard was added to through the introduction of Chapter 3 in 1978, which reduced noise certification limits set out in Chapter 2.

3.2.3 In 2006, the ICAO Chapter 4 noise certification standards were introduced, which ensured that the latest available technology is incorporated into new aircraft designs. The Chapter 4 standard has since been superseded by the new Chapter 14 noise standard for jet and propeller-driven aeroplanes. It is applicable to new aeroplane types submitted for certification on or after 31 December 2017, and on or after 31 December 2020 for aircraft less than 55 tonnes in mass.

3.2.4 In 2002, Chapter 2 aircraft were outlawed from the EU, so only Chapter 3, Chapter 4 and Chapter 14 aircraft are currently operational.

3.2.5 Introducing new aircraft types into service is a cyclical process that can be fraught with delays, as has been seen recently with the introduction of both Airbus and Boeing's new models. A standard fleet life lasts between 10 and 25 years, with low-cost airlines operating at LTN typically replacing their aircraft after approximately 14 to 15 years. Consequently, the switch from older types to the latest aircraft can be expected throughout the lifespan of the Proposed Development.

3.2.6 The objectives for fleet modernisation at LTN are as follows:

- 100% of aircraft will be Chapter 4 or equivalent by 2022; and

- At least 95% aircraft will be Chapter 14 or equivalent by 2035.

3.3 Land use Planning and Noise Management

Noise Metrics

3.3.1 The $L_{Aeq,16h}$ noise metric was adopted by the UK Government in 1990 and is used in the UK to describe the average daytime noise levels of aircraft. The metric was adopted as the UK Aircraft Noise Index Study[5] found it correlated well with community annoyance.

3.3.2 The assessment criteria for aviation noise was expanded on during the appraisal for increasing UK airport capacity in the Appraisal Framework Consultation[6] document. The document recommends the use of both the $L_{Aeq,16h}$ and L_{night} for assessing aircraft noise impacts. In the Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace (October 2017)[7], the L_{night} is recommended to be written as $L_{Aeq,8h}$ so it is consistent with the daytime noise metric.

3.3.3 In 2002 the European Commission published Directive 2002/49/EC, which established the L_{den} as a common environmental noise indicator for the European Union. The L_{den} is the logarithmic average of the day, evening and night sound levels, weighted for the sensitivity of the different time periods.

3.3.4 The $L_{Aeq,16h}$, $L_{Aeq,8h}$ (both for summer average movements) and L_{den} (for annual average movements) noise metrics are used to illustrate aircraft noise at LTN in LLAOL's Annual Monitoring Reports. As these noise metrics represent the average continuous noise level over defined periods, they are not consistent with people's perception of aircraft noise as a number of discrete, noticeable events.

3.3.5 Air Navigation Guidance[8] identifies the Number Above noise metric to provide greater context to air noise contours through providing information on the number of events exceeding a defined noise level. The N65 (for daytime) and the N60 (for night-

[5] Civil Aviation authority. DR Report 8402: *United Kingdom Aircraft Noise Study: Main Report*. Available at: https://publicapps.caa.co.uk/docs/33/ERCD%208402.PDF
[6] Airports Commission (2014); Appraisal Framework.
[7] Department for Transport (2017), *Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf
[8] Department for Transport (2017), *Air Navigation Guidance*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/653978/air-navigation-guidance-2017.pdf

time) describe the number of aircraft generating noise above 65 dB L_{ASmax} and 60 dB L_{ASmax}.

3.3.6 From 2022, LLAOL will report on Number Above noise contours to provide information on the frequency of noise events as follows:

- Summer 16-hour day N65, at levels 20, 50, 100, 200 and 500 events; and
- Summer 8-hour night N60, at levels 10, 20, 50 and 100 events.

3.3.7 The Future Airspace Strategy and Sustainable Aviation have sponsored the Civil Aviation Authority (CAA) who will be supported by the National Air Traffic Services (NATS) to develop a new Low Noise Arrival Metric. LLAOL will monitor any published results and explore the possibility of adopting the Low Noise Arrival Metric to better define aircraft arrival noise.

Land Use Planning

3.3.8 The relationship between land use around an airport and airport noise is a significant factor in the development of land around an airport. Development of residential housing and community facilities such as schools, hospitals and places of worship should only be undertaken with due consideration of the potential for aircraft noise impacts.

3.3.9 The objective of compatible land-use planning is to ensure that noise sensitive developments mentioned above are located away from the airport and to encourage non-noise sensitive development (such as industrial and commercial use) to locate around the airport.

3.3.10 Guidance on land use planning is contained in ICAO Doc 9184[9]. The manual provides guidance on the use of various tools for the minimisation, control or prevention of the impact of aircraft noise in the vicinity of airports and describes the practices adopted for land-use planning and management. The document recommends that a minimum of two zones, presented in Table 2, are established for the purpose of land-use planning with regard to aircraft noise in the vicinity of the airport. Outside the noise zones, restrictions to development are not generally required.

Table 2: Land Use Planning Zones

Zone	Noise exposure level	Restrictions
A	High	Noise sensitive land uses should be restricted, and most developments are not permitted

[9] International Civil Aviation Organisation (2002); Airport Planning Manual, Part 2 — Land Use and Environmental Control.

Zone	Noise exposure level	Restrictions
B	Moderate	There may be some need to restrict land uses and developments

3.3.11 LLAL will enter discussion with relevant Local Authorities to explore the possibility of introducing land use planning zones into their Local Plans by 2022. Land use planning zones will be updated annually by LLAOL to restrict new noise sensitive development in areas of High and Moderate noise exposure.

Noise Related Landing Charges

3.3.12 LLAOL currently operate landing fees for aircraft. The charges per tonne, based on the authorised maximum take-off weight (MTOW) for Chapter 3 aircraft and above are:

- Base Charge £141.80 per landing plus £2.11 per tonne.
- Minimum £291.70 per landing.

3.3.13 Aircraft below Chapter 3 are subject to a 200% surcharge.

3.3.14 Aircraft operating at night are charged per landing or departure based on aircraft MTOW as follows:

- Base £114.08 per movement plus £2.11 per tonne.
- Minimum £263.99 per movement.

3.3.15 Landing charges are set to be updated in 2020 to encourage the use of quieter aircraft. Landing charges will be reviewed biennially.

Noise Fining System

3.3.16 Noise-related fines are put into the Community Trust Fund, which provides grants to community groups and charities in Bedfordshire, Hertfordshire and Buckinghamshire.

Noise Violation Limits

3.3.17 A system of fines is in place to penalise aircraft operators that do not adhere to noise abatement procedures and/or noise limits set by the airport operator. Noise levels of departing aircraft are monitored at 6.5 km from start-of-roll point, which is the departure noise certification location defined by the ICAO, at three permanent noise monitoring locations covering easterly and westerly departures. Any aircraft departure exceeding the noise violation limits (NVL) at these monitors will be charged based on the charges set out in Table 3.

Table 3: Noise Limit Violation Fines

Excess over Noise	Frequency	Fine per Event
For day flights the NVL will be set at 82 dB L_{ASmax} 07:00 – 22:59 local time		
Any event		£1,000
For night flights the NVL will be set at 80 dB L_{ASmax} 23:00 – 06:59 local time		
Any event		£2,000

3.3.18 Reductions to the noise violation limits are planned for 2020 with the daytime limit reducing to 80 dB(A) and the night-time limit reducing to 79 dB(A). Noise violation limits and fines will be reviewed biennially.

Noise Preferential Routes

3.3.19 Aircraft taking off normally generate more noise than landing, as such aircraft are required to follow specific paths called Noise Preferential Routes (NPRs) (see Section 3.4 for more details) unless otherwise directed by air traffic control. Aircraft flying outside the NPR below the release altitude may be subject to a penalty. Penalties for track violations are presented in Table 4. NPR violation penalties will be reviewed biennially.

Table 4: Track Violation Fines

Occurrence Rate	Daytime 07:00 to 22:59	Night-time 23:00 to 06:59
Any event	£1,000	£2,000

Noise Complaint System

3.3.20 LLAOL investigates, logs and responds to all concerns relating to aircraft activity. General information is available on the London Luton Airport website and complaints can be submitted by telephone, email, or through the online Flight Tracking system (TraVis)[10].

3.3.21 Details of the complaints response procedure are set out in LLOAL's Aircraft Noise Enquiries and Complaints Procedure[11]. The noise complaints handling system is kept under continual review to ensure the local community receives timely feedback in relation to concerns raised.

Noise Monitoring Plan

3.3.22 LLAOL has a noise monitoring scheme currently in place which is covered by three permanent noise monitors and seven

[10] https://travisltn.topsonic.aero/
[11] https://www.london-luton.co.uk/LondonLuton/files/4e/4e34d520-025e-464d-af5f-f48f37778e8b.pdf

temporary noise monitors that are moved around periodically according to a yearly schedule. The results of temporary noise monitoring are presented as community reports[12] and the results from permanent noise monitoring stations are presented in the Annual Noise Monitoring Report, the most recent of which is for 2018[13].

3.3.23 Data collected from noise monitoring stations allows:

- Identification of noise infringements and to subsequently impose penalties where relevant;
- Monitoring of track-keeping and work with operators to improve performance;
- Monitoring of noise in all local communities; and
- Investigation of complaints of disturbance and enquiries.

3.3.24 The CAA document CAP 1691[14] recommends that additional permanent noise monitors on departure routes located beyond 6.5 km from start-of-roll could be adopted. These monitors would help to provide a clearer picture of aircraft departure noise levels and could help to further incentivise airline performance, improve transparency and enhance community engagement.

3.3.25 LLAOL will explore the possibility of providing additional permanent noise monitoring stations along departure routes. LLAOL will decide whether the monitors should be subject to supplementary NVLs, advisory noise levels or whether monitors will be for informative purposes only.

Compensation Scheme

3.3.26 The current noise insulation scheme offered by LTN covers properties within the 63 dB $L_{Aeq,16h}$ and 55 dB $L_{Aeq,8h}$ noise contours. Consequently, all properties identified as experiencing a likely significant noise effect due to the Proposed Development will be eligible for noise insulation and provision of noise insulation can help avoid significant effects. This demonstrates compliance with Paragraph 5.68 of the ANPS to avoid significant impacts on health and quality of life.

3.3.27 As part of the expansion proposals, the noise insulation scheme will be updated. The updated noise insulation scheme improves on the current scheme by adopting government proposals set out

[12] https://www.london-luton.co.uk/corporate/community/noise/community-noise-reports
[13] https://www.london-luton.co.uk/LondonLuton/files/35/357f2cfa-ae0c-4312-b4fc-1e7d5d677194.pdf
[14] Civil Aviation Authority (2018), CAP 1691 *Departure Noise Mitigation: Main Report*. Available at: http://publicapps.caa.co.uk/docs/33/CAP1691%20Departure%20Noise%20Mitigation%20Main%20Report.pdf

in Aviation 2050 that the noise insulation policy threshold extends from the 63 dB $L_{Aeq,16h}$ contour to 60 dB $L_{Aeq,16h}$. Details on the proposed noise insulation scheme and a new discretionary property compensation scheme are presented in the Compensation Proposals document published for statutory consultation.

3.4 Noise Abatement and Operational Procedures

3.4.1 LTN operates in either an easterly or westerly direction depending on the wind direction, as aircraft are required to take off and land into the wind for safety reasons. During westerly operations, aircraft will depart towards the west, most of the time Luton's wind comes from the west so this happens, on average, for 70% of the time. Easterly operations, when aircraft depart to the east, occur on average for 30% of the time.

3.4.2 The Flight Operations Committee (FLOPC) is made up of airline operators at LTN and discusses noise infringements, track keeping statistics, data from any ongoing trials and continuous descent approach compliance. The committee is focussed on improving operations at LLA, whilst ensuring this minimises noise at local communities.

Departure Procedures

Noise Preferential Routes

3.4.3 Aircraft taking off are required to follow NPRs, unless directed otherwise by air traffic control. The NPRs are the routes that departing aircraft are required to follow to join with the main UK airspace. Aircraft flying inside these corridors are considered to be flying on-track. The NPRs at Luton are designed to avoid the overflight of built-up areas where practicable. NPRs are presented in Figure 1 for westerly departures and Figure 2 for easterly departures.

3.4.4 Each NPR is contained in a corridor extending 1.5 km either side of the NPR centre line. Departing aircraft must remain within the NPR until reaching a release altitude of 3,000 ft during the day or 4,000 ft at night. The exception to this is on the Area Navigation (RNAV) departure route (26 Match/Detling) where the corridor extends 1 km either side of the centreline and the release altitude is 4,000 ft for both day and night.

3.4.5 Once an aircraft reaches the NPR release altitude, a controller can vector it onto a more direct heading to its destination, which may take the aircraft outside the NPR corridor. There may be occasions where it is necessary for safety reasons (e.g. to avoid severe weather conditions) to vector aircraft off NPRs below the release altitude. This is standard air traffic management

procedure followed by all airports in this country and other member states of ICAO.

Noise Abatement Departure Procedures

3.4.6 Noise Abatement Departure Procedures (NADP) defined in PANS-OPS, Volume 1[15] covers two NADPs (NADP1 and NADP2) to mitigate noise. NADPs cover the area where an aircraft increases altitude from 800 ft to 3,000 ft. NADP1 is designed to mitigate noise close to the airport whereas NADP2 is designed to mitigate noise further from the airport.

3.4.7 For NADP1, the aim is to get aircraft as high as possible as quickly as possible so aircraft will climb at a steep departure angle between 800 and 3,000 ft. Whilst increasing take-off power increases the amount of noise being emitted by the engines, communities will benefit from aircraft getting as high as possible as quickly as possible.

3.4.8 For NADP2, the aim is to operate the aircraft as quietly as possible through operating at reduced thrust and climb rate. This procedure aims to be quieter overall over a longer distance. This procedure also has the benefit of being more fuel efficient.

3.4.9 There are no clear benefits from adopting either NADP1 or NADP2 as each procedure redistributes noise from one location to another. Consequently, the potential noise benefit on departure routes due to adoption of either/ or NADP1 or NADP2 will be explored by LLAOL.

Continuous Climb Operations

3.4.10 A continuous climb to cruise altitude has always been the default practice for airlines and air traffic for aircraft departures. However, there are occasion when stepped climbs i.e. climbs with periods of level flight, are required to maintain safe separation between aircraft where there are crossing flows of air traffic. Continuous climb operations will be used whenever practicable to minimise thrust-generated noise from aircraft departures.

Approach Procedures

Approach Routes

3.4.11 While there are defined flight paths for departing aircraft, there are none for arriving until aircraft are established on the final approach. This is because there is less operational flexibility in landing a plane than there is in taking off as aircraft are required to line up with the runway from several miles away in order to

[15] International Civil Aviation Organization (2006), Procedures for Air Navigation Services Volume 1: Flight Procedures.

carry out a stable approach on a predefined glide slope. This procedure ensures that aircraft safety is not jeopardised.

Late Deployment of Landing Gear

3.4.12 Deployment of the landing gear significantly increases aircraft drag and airframe noise. Additionally, besides aerodynamic noise, the extra drag must be compensated by increasing the engine thrust so there is a corresponding increase in engine noise.

3.4.13 Deployment of landing gear will normally be initiated at around 2,000 ft; however, it is possible to delay this procedure until around 1,500 ft or (approximately 5 nautical miles from the runway threshold) to ensure aircraft are fully stabilised by 1,000 ft in preparation for landing. Late deployment is affected by weather conditions with high wind conditions requiring an earlier landing gear deployment to provide more time for aircraft to safely stabilise prior to 1,000 ft.

3.4.14 Implementation of late landing gear deployment has demonstrated noise benefits of between 2.7 dB and 3.4 dB for Stevenage, Dagnall and Whipsnade. LLAOL encourage airline operators to delay deployment of the landing gear if safety requirements allow to minimise noise generated on aircraft approaches.

3.4.15 As it is not possible for airports to monitor when aircraft drop their landing gear, this measure cannot be enforced through implementation of a fining system. However, late deployment of landing gear does not just benefit reduced noise levels, but there are benefits to the airline operator through reduced levels of fuel burn due to additional thrust requirements when the landing gear is deployed.

3.4.16 Airplane operators will be encouraged to delay landing gear deployment as late as safety restrictions permit. LLAOL will annually provide airline operators with information detailing the benefits of late deployment of landing gear.

Continuous Descent Approaches

3.4.17 Conventional stepped aircraft approaches are typically adopted at airports with aircraft descending for periods before levelling off and waiting for permission from air traffic control to begin descending again. Application of increased engine thrust is required to level out the aircraft during descent. This use of increased levels of thrust while descending results in increase engine noise.

3.4.18 The optimum approach altitude profile takes the form of a continuously descending path, with level flight segments kept to a minimum and only used when it is strictly necessary. The

continuous descent allows engine thrust levels to be kept at a low level with the benefit of reduced levels of engine noise and reduced fuel burn. To ensure that aircraft approach noise affecting receptors is minimised, continuous descent approaches will be used where practicable to minimise thrust-generated noise.

3.4.19 LLAOL encourage all operators to use a continuous descent approach and currently have a target of 90% compliance. This target will be increased so, where possible, 95% of aircraft will be compliant by 2022.

Steeper Approach Angle

3.4.20 The international standard altitude approach profile has aircraft descending on a 3° glide slope. Major international airports such as Frankfurt and Heathrow Airports have successfully trialled a 3.2° glide slope. An increased glide slope reduces aircraft noise at the ground in two ways:

- The height of aircraft over the ground is increased meaning noise has further to travel and is reduced at the ground; and
- The aircrafts rate of descent is increased, which reduces the engine power required.

3.4.21 An increased glide slope may not be practicable at LTN due to the comparatively short runway length. Aircraft speed is likely to require increased flap setting to control the aircraft speed on approach thus, increasing aerodynamic noise. Additionally, the increased aircraft speed on approach would likely require increased levels of reverse thrust to safely stop aircraft. Consequently, an increased glide slope may not be possible to implement due to safety concerns and there may be no net noise benefit to increased flap settings and use of reverse thrust.

3.4.22 An alternative concept that would allow an increased approach glide slope is the two-segment approach. This approach incorporates an intermediate approach phase flown at a steeper angle, before transitioning to the standard glide slope on final approach. Adoption of segmented approach could potentially provide noise benefits further out during the approach phase, without affecting the final approach phase.

3.4.23 Although the runway length at LTN may prohibit the safe implementation of steeper approach slopes, an assessment will be undertaken on measures to increase the glide slope of approaching aircraft that can be adopted. Recommendations will be implemented by 2025.

Displaced Thresholds

3.4.24 Aircraft noise can be mitigated through displacement of airport runway thresholds to a location further down the runway. Displaced runway thresholds have most commonly been employed to increase the clearance between approaching aircraft and obstacles but can be applied to reduce aircraft noise at the ground. Displacing runway thresholds allow aircraft to fly at higher altitudes as they pass over communities located near the airport. The benefit of this is the distance between aircraft and ground is increased thus lowering aircraft noise at sensitive receptors.

3.4.25 A displaced threshold will provide noise benefits to sensitive receptors affected by aircraft noise; however, there may be potential impacts on capacity and operational resilience. Consequently, use of displaced thresholds is likely to be most effective at night when there is less demand for runway use.

3.4.26 Due to the length of the LTN runway, displaced thresholds are only likely to be practicable for small aircraft. Consequently, the possibility of adopting displaced thresholds for executive jet arrivals at night will be explored within the safety constraints of the runway length.

3.5 Operating Restrictions

Night-time Operating Restrictions

3.5.1 A limit on aircraft movements during the night quota period from 23:30 to 06:00 is operated at LTN. The total number of permitted aircraft movements during the night quota period over a continuous rolling 12-month period is 9,650. This limit will be continued in future to control aircraft noise at night.

Noise Envelope

3.5.1 The Noise Envelope is a legally binding framework of limits and controls to manage aircraft noise. It is the responsibility of LLAL to put forward the Noise Envelope proposals as part of the DCO application. Consequently, a Noise Envelope Design Group (NEDG) has been established to assist LLAL in meeting the requirements set out in paragraph 5.60 of the ANPS.

3.5.2 The Noise Envelope will be designed to protect communities whilst enabling the airport to operate efficiently and allow it to grow in accordance with the limits defined by the Noise Envelope consented through the DCO. The Noise Envelope will provide certainty to the industry and communities about how noise will be managed to comply with government policy, balancing growth and noise reduction for the long-term.

3.5.3 The NEDG will have joint responsibility with LLAL for ensuring that the Noise Envelope proposals submitted as part of the DCO application:

- include the principles and priorities on which the Noise Envelope is based;
- include the enforceable limits or thresholds;
- have a method for evaluating noise control measures;
- have a mechanism for sharing the benefits of technological improvements between the community and other stakeholders; and
- have a review mechanism.

3.5.4 The expansion of LTN is being promoted at the same time as the wider airspace change process is being progressed. The airspace changes are unlikely to be finalised before DCO consent is obtained. Therefore, the NEDG will also need to assure that the development of the Noise Envelope and the review process, provide certainty that the noise impact (once the airspace changes have been agreed) will be no greater than that relied on in granting the DCO.

3.5.5 The NEDG membership comprises of representation from LLAL, LLAOL, NATs, local authorities, airline operators and local interest groups. Where considered appropriate, subject matter experts and other specialist advisers/consultees will be seconded to assist. Also, where necessary, independent facilitators will be used to assist the NEDG's deliberations.

3.5.6 The NEDG has met initially to discuss the aims and objectives of the Noise Envelope and to finalise membership. The NEDG will continue to meet throughout the lifespan of the DCO application to agree the limits and controls to manage aircraft noise that will be part of the DCO application.

4 AIRSPACE MODERNISATION

4.1.1 This section covers potential noise improvements that may occur due to the redesign of UK airspace, which is taking place in parallel with the DCO application. Further details on airspace modernisation process are presented in the Explanatory Note on Airspace Modernisation document that accompanies the Guide to Consultation.

4.1.2 Airspace redesign for LTN is part of a much larger process requiring substantial coordination across all airports and with NATS. At present, the specific implications for LTN and surrounding areas of the wider airspace change process are unclear and so cannot be expressly factored into the

assessments being carried out for the Development Consent Order (DCO) process. As is the case with the DCO process for a third runway at Heathrow and for other airport expansion proposals, the process of securing consent for development and for airspace change is subject to two separate processes and timescales.

4.1.3 Much of the UK's airspace structure was designed in the 1950s and 1960s. It was designed around ground-based navigation systems and does not currently make best use of modern technologies. The airspace over the southeast of England has the highest volume of traffic across the country and some adaption of the historic airspace has been necessary to accommodate the growth to date.

4.1.4 The current inefficient airspace can lead to delays to passengers and constrains the number of flights that can safely be handled over the southeast of England. With demand for air travel expected to continue to grow, it is recognised by the UK Government, in its recent consultation on the future of UK Aviation: Aviation 2050, that changes to the airspace are now necessary to prevent increases in passenger disruption, economic costs and environmental impacts.

4.1.5 NATS states that LTN may be a significant beneficiary of airspace redesign through the suggestion that the 55 dB noise contour (unspecified noise metric) may reduce by 28% as a potential outcome of airspace redesign base on one optimised scenario[16]. Whilst this is only an indicative figure pending finalisation of the new airspace design, it does suggest that it is likely there will be noise benefits in the areas around LTN from the modernisation of airspace.

4.1.6 A key technology that will replace the current ground-based navigation system in the modernising airspace will be satellite-based Performance Based Navigation (PBN). This technology has the ability to allow clearly defined approach and departure routes to be defined and will accurately provide pilots and air traffic controllers with a predicted trajectory that identifies the point at which an aircraft will arrive in certain airspace.

4.1.7 More accurate information from the PBN system is expected to allow historical airspace protocols, such as 'stacking', to be abandoned in favour of more direct routings on arrival to airports. The reduction in aircraft holding stacks will allow the use of more continuous climbs and descents. LTN is particularly constrained by the Bovingdon stack so the most immediate benefit from

[16] Q4 of Appendix A – Department for Transport (2018), *Airspace Modernisation Supporting Document.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/763085/nats-caa-feasibility-airspace-modernisation.pdf

airspace redesign is likely to occur due to the lifting of altitude constraints imposed by the Bovingdon stack.

4.1.8 PBN will enable aircraft to follow a more precise route so aircraft routes may become narrower and more concentrated than today. This means that while the overall area subject to noise may reduce, noise may become more concentrated for some. However, due to the more precise routing of aircraft, more routes can be established within the same amount of airspace. These additional routes can introduce the potential to provide noise respite as there may be opportunity to vary the routes flown. Consideration of avoiding populated areas and 'quiet areas' (to be defined through the airspace design process) will be undertaken during the redesign of LTN airspace.

4.1.9 Any proposed designs will look to meet the design principles selected by stakeholders in Stage 1 of the CAP 1616 process, which includes exploring route designs that provide respite. Whether modernised airspace leads to one concentrated route or utilises multiple routes to provide respite; airspace redesign will be subject to consultation with local communities prior to a final design in 2024.

4.1.10 A summary of the key measures to be explored in the redesign of LTN airspace that may be implemented to reduce noise include:

- Use a single route to minimise the number of people overflown;
- Provision of multiple routes to allow noise predictable periods of respite for affected local communities;
- Departing aircraft following an efficient continuous climb route to reach 7,000ft; and
- Arriving aircraft using an efficient continuous descent to the runway.

5 GROUND NOISE

5.1.1 For safety reasons, aircraft must undergo regular maintenance checks. Following any engine changes a series of engine ground runs will be carried out. Engine ground running activities are restricted to the purpose-built noise attenuated engine run-up pen.

5.1.2 The area designated for engine run-up has been moved in the Proposed Development to the east end of the runway. The existing area screens receptors through use of a bund, which is estimated from ground height data to be approximately 5 m in height. The new engine run-up pen will be an enclosure with an open side facing south west and will be 12 m in height and

provide enhanced levels of screening of engine testing activities over the current arrangement.

5.1.3 Noise generated by ground operations can be further minimised through the following measures:

- Aircraft taxiing management measures will be adopted to ensure efficient operations on the ground to minimise taxi times and time spent idling by an aircraft waiting to depart or at an occupied gate will be minimised.
- Auxiliary Power Units (APU) are used on aircraft as a power source while the main engines are turned off. The use of APUs is restricted and aircraft are encouraged to used quieter Ground Power Units as an alternative.
- Use of APUs at gates will be minimised through provision of fixed electrical ground power units at the new terminal.
- Aircraft will be encouraged to taxi from the landing runway to the gate with one engine switched off where practicable.

6 SUMMARY OF NOISE MANAGEMENT MEASURES

Action	Performance Indicator	Target
Reduction of Noise at Source		
To phase out noisier aircraft and encourage the use of quieter aircraft	% Chapter 4 aircraft	100% aircraft to be Chapter 4 or equivalent by 2022
	% Chapter 14 aircraft	At least 95% aircraft to be Chapter 14 or equivalent by 2035
Land Use Planning and Noise Management		
Reporting on number above noise contours in the LTN Annual Report	Publication of number above noise contours	To be published from 2022
Review publications on the Low Noise Arrival Metric and explore the possibility of adopting	Evidence of work	To assess the Low Noise Arrival metric and whether if can be implemented
Introduce land use planning zones to restrict noise sensitive development near the airport. Update planning zones annually	Publication of land planning zones	To be published from 2022
Introduce reduced landing to incentivise operators to adopt new quieter aircraft technology and review biennially	Publication of landing charges	Introduce new landing charges in 2020
Reduce the Maximum Noise Violation Limits (NVL) for departing aircraft and biennially review the penalties to ensure it remains effective in seeking to reduce departure noise.	Reduction of NVL's.	Reduce NVL's to 80dB during the day time and 79dB during the night-time by 2020
Enforce NPR track violation fining system and review biennially	% aircraft on the approved Noise Preferential Route	All aircraft to keep to the approved Noise Preferential Routes for departures, unless safety or weather avoidance reasons apply. Investigate each violation, monitor, and identify measures to reduce further.
Explore the possibility of introducing a fining system for aircraft that breach their daytime slot and are required to fly at night	Implementation of fining system	To assess if a system can be implemented

Action	Performance Indicator	Target
To listen to stakeholders and help to reduce the number of noise related complaints	Response times for noise related complaints	Respond to noise related complaints within 8-days
	Number of noise related complaints and complainants	Monitor and report on the number of noise related complaints each year
To monitor noise effectively and report results	Publication of nosie monitoring results	Report on targets quarterly
Explore the possibility of increasing permanent noise monitoring stations on departure routes to monitor noise at further distances than 6.5 km	Evidence of works	Assess the benefit of additional permanent noise monitors
Provide an updated noise compensation scheme to that improves on the current scheme	Number of properties provided with full insulation package	Provide a noise insulation package for habitable rooms of properties within the 60 dB $L_{Aeq,16h}$ noise contour in accordance with Aviation 2050
Noise Abatement and Operational Procedures		
Undertake a review of Noise Abatement Departure Procedures used at LTN to evaluate their effectiveness and work with airline partners to identify and implement improvements.	Evidence of the review.	To assess the effectiveness and establish targets for noise reduction.
Work with Air Traffic Control, airlines and local communities' stakeholders to explore opportunities to facilitate more continuous climb operations (CCO).	Evidence of work.	Explore opportunities and make appropriate changes to facilitate more CCO's
Work with airline partners to promote and encourage the adoption of low power, low drag procedures such as delayed landing gear deployment in order reduce noise from arriving aircraft.	% of aircraft using low power, low drag procedures.	Increase the number of operators using low power, low drag procedures.

Action	Performance Indicator	Target
Work with our airline partners to improve performance relating to Continuous Descent Approach (CDA) with the aim of reducing the noise impact to the communities below.	% aircraft using a Continuous Descent Approach	95% aircraft to adopt a Continuous Descent Approach, where practicable, by 2022
Explore the possibility of introducing steeper approaches	% of operations on Slightly Steeper Approach	Assess if Slightly Steeper Approaches can be adopted and implement recommendations by 2025
Explore the possibility of adopting displaced thresholds for executive jets at night	Evidence of work	Assess the noise benefit and safety constraints of operating displaced thresholds
To keep up-to-date with the latest research on the impact of noise and noise interventions	Amount of money spent on research.	Monitor the amount of funding provided for research into the impact of noise and noise interventions Issue annual reports on the latest research findings
Operating Restrictions		
Operate within the night quota period movement limit	Aircraft movements in the night quota period published annually	A maximum of 9,650 aircraft movements over a rolling 12-month period during the night quota period
Produce a Noise Envelope containing enforceable limits or thresholds	Production of a Noise Envelope	Noise Envelope to be developed and submitted as part of the DCO application
Airspace Modernisation		
Work with community stakeholders to develop a plan to protect quiet areas as defined by UK government policy.	Identification of quiet areas	Develop a plan by 2020 and ensure this is protecting quiet areas.
Use the airspace modernisation process to explore options to reduce the noise impact at communites affected by aircraft noise through measures such as efficient continuous climbs and descents, and provision of respite through multiple routes	Evidence of works	Submit airspace designs to CAA within designated time periods.
Ground Noise		

Action	Performance Indicator	Target
Continue to promote and encourage the use of single engine taxi procedures at LTN.	Minutes of FLOPC meetings.	Increase the number of aircraft using single engine taxi procedures.
The use of Aircraft Auxiliary Power Unit's will be monitored and restrictions on their use enforced.	Minutes of FLOPC meetings.	Ensure operators are aware of the APU procedures at Flight Operations Committee meetings.
Engine testing will only take place in the purpose-built engine ground run-up pen.	Minutes of FLOPC meetings.	Restrict engine testing to the designated engine testing area
Engine testing will be restricted to daytime periods only.	Minutes of FLOPC meetings.	Restrict engine testing for aircraft in the daytime period only.
To supply aircraft ground power requirements through fixed electrical ground power.	% of aircraft using Fixed Electric Ground Power on new stands	To have Fixed Electric Ground Power and target a zero use of Auxiliary Power Unit and Ground Power Unit in Terminal 2 stands, unless in emergencies or the event of FEGP failure.
Taxiing of aircraft will be managed so the time spent idling by an aircraft waiting to depart or at an occupied gate will be minimised.	Minutes of FLOPC meetings.	Reduce aircraft idle time at stands and runways.
Aircraft taxiing will be regulated to prevent aircraft operating with excessive engine use.	Minutes of FLOPC meetings.	Reduce unneccesary engine use during taxiing.

GLOSSARY OF TERMS

Term/Abbreviation	Description
Auxiliary Power Unit	APU
Civil Aviation Authority	CAA
Flight Operations Committee	FLOPC
International Civil Aviation Organization	ICAO
London Luton Airport Limited	LLAL
London Luton Airport	LTN
Noise Abatement Departure Procedures	NADP
Noise Action Plan	NAP
National Air Traffic Services	NATS
Noise Preferential Route	NPR
Noise Violation Limits	NVL
Maximum Take-off Weight	MTOW
Operational Noise Management Plan	ONMP
Performance Based Navigation	PBN
Preliminary Environmental Information Report	PEIR

Figure 1. Westerly (26) Noise Preferential Routes

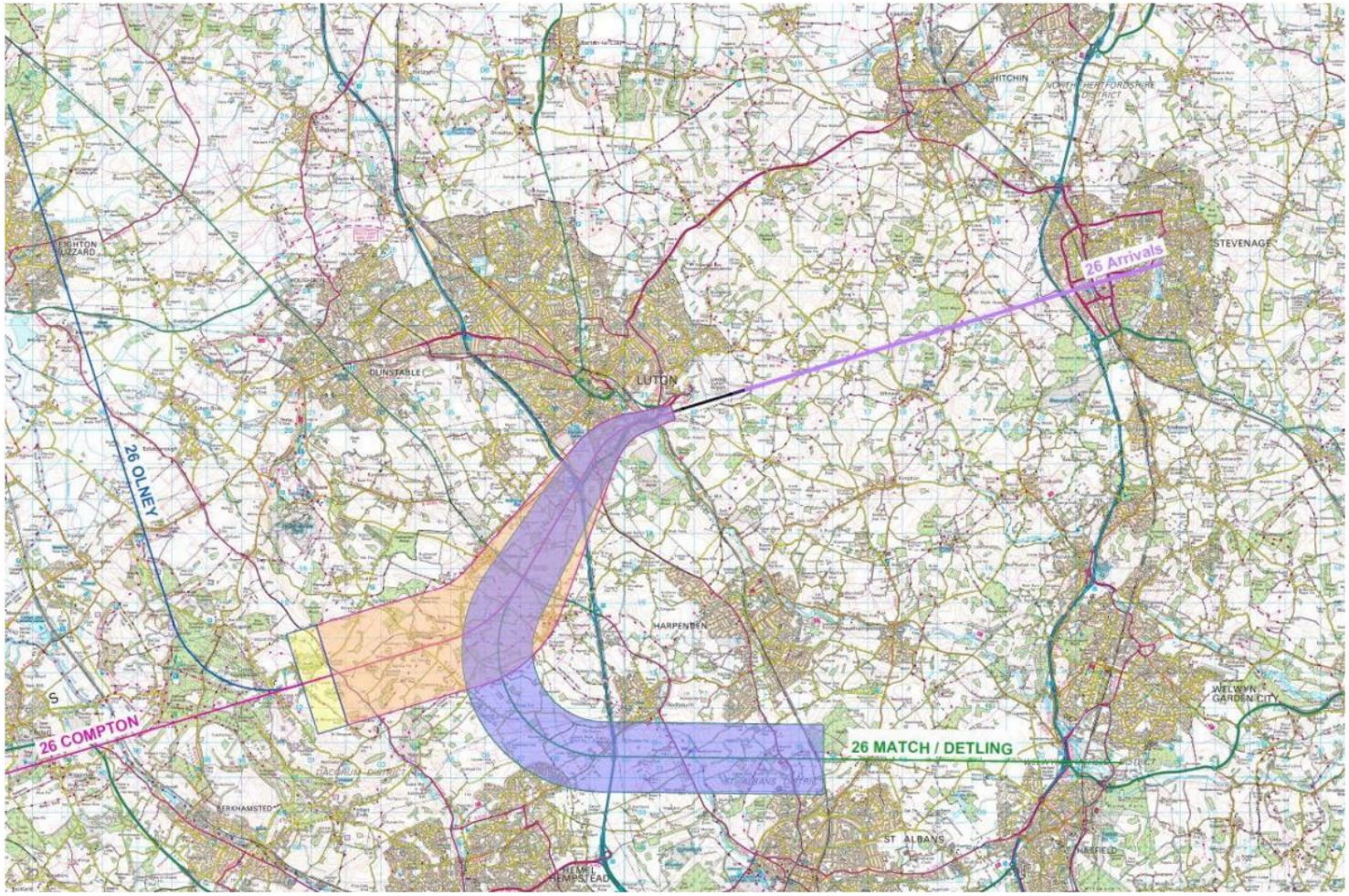

Figure 2. Easterly (08) Noise Preferential Routes