

LONDON CITY AIRPORT

PROPOSED AIRCRAFT NOISE CATEGORISATION
SCHEME (ANCS)

Contents	Page No.
1.0 INTRODUCTION	3
2.0 PROPOSED AIRCRAFT NOISE CATEGORISATION SCHEME	11
3.0 NOISE MONITORING.....	24
4.0 INCENTIVES.....	25
5.0 REPORTING	26
6.0 REVIEW PROCESS.....	28

APPENDICES

Appendix 1: Aircraft Noise Categorisation Scheme – Consultation Report

Appendix 2: Current Noise Factored Scheme

Appendix 3: Glossary of Acoustical and Aviation Terms

Appendix 4: Derivation of Departure and Arrival Level for Quota Count Assessment

1.0 INTRODUCTION

1.1 Background and Planning Context to the ANCS

2009 Planning Permission

- 1.1.1 Under its current planning permission (ref: 07/01510/VAR, granted in 2009), London City Airport (LCA) is permitted to operate up to 120,000 aircraft movements each year. In addition to an actual aircraft movement limit, the airport also operates within a 'noise factored movement' (NFM) limit of 120,000 movements each year, which is based on the noise performance of individual aircraft types.
- 1.1.2 The 2009 planning permission also includes a Section 106 legal obligation that requires LCA to consult with the London Borough of Newham (LBN) on, and subsequently implement, an Aircraft Categorisation Review (ACR) to review how it categorises aircraft for noise management purposes and incentivises airlines to emit less noise.
- 1.1.3 The preparation of the ACR has been ongoing since 2011 involving LBN officers, and officers from the Greater London Authority (GLA) at later stages. It has entailed a reassessment of the methodology, noise levels, noise categories and procedures associated with the noise categorisation of aircraft that operate at LCA with the overall objective of providing further incentives for aircraft to emit less noise. The outcome of the ACR process was a draft Aircraft Noise Categorisation Scheme (ANCS) agreed with LBN and GLA that was published for consultation purposes in June 2017.
- 1.1.4 The public consultation process ran from 02 June to 14 July 2017, fulfilling the requirements of the Aerodrome (Noise Restrictions)(Rules and Procedures) Regulations 2003. A draft consultation report was submitted to LBN in August 2017 explaining the public response and outcome. The final consultation report is included at Appendix 1. No issues were raised during the public consultation period which necessitated any substantial changes to the draft ANCS to be made. Having regard to the consultation, the ANCS presented here represents the scheme which, once approved by LBN and checked against the existing NFM system, will replace it.
- 1.1.5 The ANCS uses manufacturers' independently assessed noise certification data to categorise each aircraft operating at the airport, as required by law and mirroring the

approach adopted by other UK airports. It takes into account noise impacts on the wider community, not just the airports immediate surroundings (a limitation of the current NFM scheme), and ensures that no noisier aircraft than currently operate at the airport will be allowed to operate in future.

- 1.1.6 The ANCS will fulfil the requirements of, and operate under, the current 2009 Section 106 Agreement and planning permission until such time that the City Airport Development Programme (CADP1) planning permission is implemented.

2016 CADP1 Permission

- 1.1.7 In July 2016, LCA was granted planning permission to proceed with CADP1¹ (ref. 13/01228/FUL). Condition 18 of that permission requires that before the infrastructure delivered by CADP1 can be used, an ANCS must be submitted to and approved in writing by LBN. Following approval, there must be a year of parallel operation of both the ANCS and the existing NFM system, the purpose of which is to ensure a smooth transition from one to the other.
- 1.1.8 Following this period, the ANCS will be reviewed to check that it is fit for purpose before replacing the NFM system. Until such time as the ANCS has been implemented and reviewed to supersede the existing NFM system, aircraft will also continue to operate within the existing NFM system.
- 1.1.9 LCA intend to start construction of CADP1 in 2017 at which stage the conditions attached to the CADP1 planning permission will be triggered, including condition 18, which requires:
- a) Prior to the first beneficial use of the Development an Aircraft Noise Categorisation Scheme shall be submitted to and approved in writing by the Local Planning Authority; and*
 - b) Such an Aircraft Noise Categorisation Scheme shall be implemented as approved and thereafter the Airport shall be operated in accordance with the approved Aircraft Noise*

¹ CADP1 will deliver seven new aircraft stands, extended terminal buildings and new passenger pier, a new passenger forecourt in front of the terminal building, car parking, and associated works. CADP1 will allow for more of the new generation of aircraft which are quieter and more fuel efficient.

Categorisation Scheme or any review thereof that has been approved in writing by the Local Planning Authority; and

- c) Subsequent to implementation of the approved Aircraft Noise Categorisation Scheme (except in the case of immediate emergency to aircraft and/or persons on board), no aircraft shall land at or take off from the Airport unless the type of aircraft has first been categorised in accordance with the approved Aircraft Noise Categorisation Scheme; and*
- d) The Aircraft Noise Categorisation Scheme shall be based on and include (but not be limited to):*
 - i) a Quota Count System in use for night noise at other UK designated airports;*
 - ii) the use of the Federal Aviation Authority Integrated Noise Model Version 7 or later version adjusted for the specific characteristics of London City Airport;*
 - iii) a Quota Count classification in 1dB steps;*
 - iv) a programme of parallel operation with the Noise Factored Scheme;*
 - v) an overall Quota Count budget for each calendar year;*
 - vi) a maximum permitted noise level or Quota Count classification, and*
 - vii) the noise exposure permissible as a result of Quota Count Budget for annual Aircraft Movements, which shall be:*
 - equivalent to 120,000 Noise Factored Movements per calendar year (as determined in accordance with the Noise Factored Scheme set out in Appendix 2);*
 - no worse than the airborne aircraft noise effects assessed in the UES; and*
 - in accordance with Condition 33 (noise contour area)*

The approved Aircraft Noise Categorisation Scheme will supersede the Noise Factored Movement Scheme, immediately upon the written approval by the Local Planning Authority of the review of the Aircraft Noise Categorisation Scheme after 12 months of its introduction in accordance with Condition 19, and subsequently the total realised Quota Count at the Airport shall not exceed the approved Quota Count Budget in any calendar year.

Transition from 2009 Permission to CADP1

- 1.1.10 The ANCS will fulfil the requirements of, and operate under, the current 2009 Section 106 Agreement and planning permission until such time that CADP1 planning permission is implemented.
- 1.1.11 This new ANCS will not allow noisier aircraft or a higher number of aircraft to operate at LCA, than permitted under the existing 2009 planning permission and once implemented, the 111,000 movements permitted by CADP1.
- 1.1.12 There is provision for a transition within the ANCS for any changes required (to ensure compliance with the requirements of Condition 18 of the CADP1 permission) as a result of moving from current operation under the 2009 permission to those under the CADP1 permission, once implemented.
- 1.1.13 This transition will be addressed by undertaking the first review of the ANCS after the first year of its introduction as described in Section 6.0 (as required by Condition 19 of CADP1 permission), or at least three months prior to the first beneficial use of CADP1 (which is an additional commitment introduced to ensure compliance with requirements of Condition 19), whichever is the sooner. This is to ensure that any modifications required to align the ANCS with CADP1 can be agreed and implemented in advance of CADP1 becoming operational.
- 1.1.14 Under the requirements of the 2009 planning permission, the ANCS must be implemented within three months of written approval being received². LCY will start to implement the ANCS by simultaneously giving to airlines and other interested parties prior notice of the ANCS as required under the 2003 Regulations and starting the 12-month programme of parallel operation during which the ANCS shadows the existing NFM Scheme (before it comes fully into force). Condition 7 of the 2009 planning permission also allows for its terms to be amended after the ANCS is

² Within 3 months of written approval or (if later) the date of the Noise Management and Mitigation Strategy (NOMMS) being in full operation: Part 13 of the Fourth Schedule to the Section 106 Agreement dated 9 July 2009.

approved in order to substitute the ANCS for the NFM Scheme specified in that condition as the main form of aircraft categorisation.

- 1.1.15 The CADP1 permission, once implemented, requires the ANCS is to be implemented by LCA as approved or in accordance with any subsequent review that has been approved in writing by LBN. After a period of parallel running between the ANCS and the NFM Scheme and following a review of the ANCS, the NFM Scheme lapses automatically and will be replaced by the approved ANCS.
- 1.1.16 Provision for parallel running of the two schemes is an integral feature of the ANCS. In the unlikely event that the CADP1 permission has not been implemented by the end of one year of parallel running and the 2009 permission still regulates the airport's operations, LCA will apply to LBN to amend Condition 7 under section 96A Town and Country Planning Act 1990 to ensure that the NFM Scheme is replaced by the approved ANCS.
- 1.1.17 This proposed introduction of the ANCS constitutes a new 'operating restriction' in accordance with the Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003. As well as requiring consultation, the Regulations stipulate that up to 12 months Prior Notice must be given before the final ANCS comes into force.

Existing NFM System

- 1.1.18 The existing NFM system has been in place at the airport since 1991 and is set out in Appendix 2. Its primary purpose has been to ensure that the amenity of the nearby surrounding communities is protected from noise pollution. The existing system is based on monitoring of departure noise only (measured 'sideline' of the aircraft), whereby the annual average departure noise levels are measured and the aircraft placed into one of five categories (A to E) based on 3 dB bands.
- 1.1.19 Category A aircraft, with a noise reference level of 91.6 to 94.5 PNdB, equate to 1.26 NFMs whereas Category B aircraft, with a noise reference level of 88.6 to 91.5 PNdB, count as 0.63 NFMs. The quietest aircraft, Category E, with a noise reference level of less than 82.6 PNdB, count as 0.08 NFMs.
- 1.1.20 Under the 2009 planning permission, LCA has an annual NFM limit of 120,000. Therefore, the number of aircraft that are permitted to fly in any one year is dependent on the mix of these different aircraft types in the fleet, as well as the overarching limit of 120,000 'actual' aircraft movements.
- 1.1.21 Aircraft noise is monitored and measured daily and the annual results are then recorded and published in the LCA Annual Performance Report. If any aircraft are identified as operating above the permitted category noise levels, both LBN and the airline are notified. The aircraft is either re-categorised as being in a higher category or, if already in Category A, steps taken by LCA and the relevant airline to bring it back into category.
- 1.1.22 The existing NFM system was adopted to protect the principal communities of concern, which, at the time of its implementation, were focussed to the south of the airport, in the Silvertown area.
- 1.1.23 A glossary of acoustical terms is included as Appendix 3.

1.2 Context behind move to ANCS

- 1.2.1 Significant growth of the airport and extensive development around the Docklands area has occurred since the current NFM Scheme was introduced in 1991 and other communities beyond the immediate vicinity of the airport boundary are now also affected by aircraft noise. The current NFM Scheme is heavily reliant on accurate and continuous noise monitoring data output from the NMS. It is therefore necessary to review the role that monitoring takes in the policing and operation of the proposed ANCS . This is particularly the case as it is a regulatory requirement⁴ that any operating restrictions at an airport based on the noise performance of an aircraft should be based, not on measured data, but on noise certification levels determined in accordance with prescribed procedures under ICAO Annex 16⁵.
- 1.2.2 The existing NFM system measures departure noise only, determined from noise measured ‘sideline’ of the aircraft on departure. The NFM system was designed to monitor and limit departure noise from specific turbofan aircraft which represented the predominant aircraft type at that time (i.e. B146 and RJ85). These aircraft tend to be noisier when taking off than in flight and landing and initially, due to the location of communities living near to the airport, noise from departing aircraft represented the dominant source of noise experienced by local people, as opposed to noise from arriving aircraft. However, several changes have occurred since which have left the existing NFM system less well suited to monitoring and controlling the noise of current aircraft using the airport:
- i) In recent years the range of communities affected by noise associated with the airport has extended into other areas to its east and west, as well as to the north and south. This is due to both an increasing number of annual aircraft movements and a significant amount of new residential development nearby. Therefore new communities that were previously not present are now exposed to aircraft noise;

⁴ The Aerodrome (Noise Restrictions)(Rules and Procedures) Regulations 2003

⁵ Annex 16 to the Convention on International Civil Aviation, Environmental Protection, Volume 1, Aircraft Noise

- ii) More modern turbofan aircraft have been introduced to the aircraft fleet using the airport progressively replacing turboprop aircraft. The noise from such aircraft taking off, landing and overflying outlying communities to the east and west of the airport has become more prominent and means that sideline departure noise is no longer the dominant source of noise experienced by local communities; and
- iii) Extensive development of the Royal Docks area has had an impact on the reliability and continuous operation of LCA's existing noise monitors, upon which the existing NFM system is heavily reliant. Additional noise monitors to the east and west of the airport are now required.

1.2.3 The proposed ANCS therefore takes into account those communities to the east and west as well as to the north and south of the airport, and offers a more equitable means of rating aircraft noise and taking into consideration the impact on the wider community areas as well as those communities within the direct vicinity of LCA.

Technical Review with LBN and GLA

1.2.4 The airport and its retained acoustic advisors (Bickerdike Allen Partners) have consulted with both the LBN and the GLA through a series of technical workshops to progress the review of aircraft categorisation. The output of this review process is this proposed ANCS which was agreed in principle between the parties in advance of undertaking the public consultation from 02 June to 14 July 2017.

1.2.5 The process of consultation with both LBN and the GLA satisfies the requirements of both the 2009 Section 106 Agreement and the CADP1 Section 106 Agreement.

2.0 PROPOSED AIRCRAFT NOISE CATEGORISATION SCHEME

2.1 General

2.1.1 The new ANCS is based upon three principles applicable both to the 2009 permission and CADP1. It will:

- 1) allow up to 120,000 aircraft movements and 120,000 NFM's each year, reducing to 111,000 actual movements and 120,000 NFM's once CADP1 is implemented;
- 2) restrict the noisiest aircraft types operating at the airport; and
- 3) set a noise quota which will control the amount of noise emitted on a weekly and annual basis.

2.1.2 These three principles provide the basis for further incentivising the use of quieter aircraft at LCA and the limits and caps set out below have been established to achieve this objective.

2.2 Quota Count Classification System

2.2.1 The ANCS uses a Quota Count (QC) classification system which, in the case of departure noise, is based on official noise certification data derived from measurements made on actual aircraft which have been conducted in accordance with the International Civil Aviation Organisation (ICAO) certification process.

2.2.2 A similar noise certification process exists for civil aircraft on approach, but this is normally based on operations at a glide slope of 3 degrees, not 5.5 degrees as used at LCA. To account for this difference, the INM⁶ has been used to compute, at the approach noise certification point⁷, the noise level based on a 5.5 degree glide slope using the INM in-built aircraft database. Whereas this method provides a reasonable correlation with measurements of turbofan aircraft at LCA, it does not reflect well the noisiness of turboprop aircraft on approach. As a result, measured data at LCA has been used to validate the turboprop aircraft types within the INM to achieve a

⁶ Integrated Noise Model produced by the Federal Aviation Administration.

⁷ 2.0 km from runway threshold.

reasonable correlation between prediction of approach noise at the noise certification point and measurement.

- 2.2.3 The proposed ANCS takes manufacturers' noise certification data to categorise aircraft and allocate a specific 'QC score' to each aircraft type permitted to fly into and out of the airport. Each aircraft has a certified 'sideline', 'flyover' and 'approach' noise level. These are described in **Box 1** below and illustrated in **Figure 1**.
- 2.2.4 The proposed ANCS takes into account those communities to the east and west of the airport which will be affected by aircraft 'flyover' and 'approach' noise produced by aircraft on landing (see **Box 1** below), as well as those to the north and south, typically affected by 'sideline' departure noise.
- 2.2.5 In accordance with the Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003, noise certification data will be derived from measurements made on actual aircraft which have been conducted in accordance with prescribed procedures under the International Civil Aviation Organisation (ICAO) Annex 16⁸. The use of noise certification data rather than monitored data to categorise aircraft will bring the operating restrictions at LCA up to date and in line with what is now expected under the Regulations.
- 2.2.6 This approach, which offers a more equitable means of rating an aircraft's overall noise levels, also mirrors the approach adopted by many other UK airports including Heathrow, Gatwick and Stansted to control noise at night. At LCA, where there are no night flights (between 22:30 and 06:30), the system would be used to control noise during the daytime instead. This will be the first time such an approach has been adopted at a UK airport for daytime operations, making this the most stringent noise control mechanism in the country employed today.

⁸ With the exception of approach noise levels which are derived as explained in paragraph 2.2.2 and Section 2.3.

BOX 1 - Aircraft Certification Data *

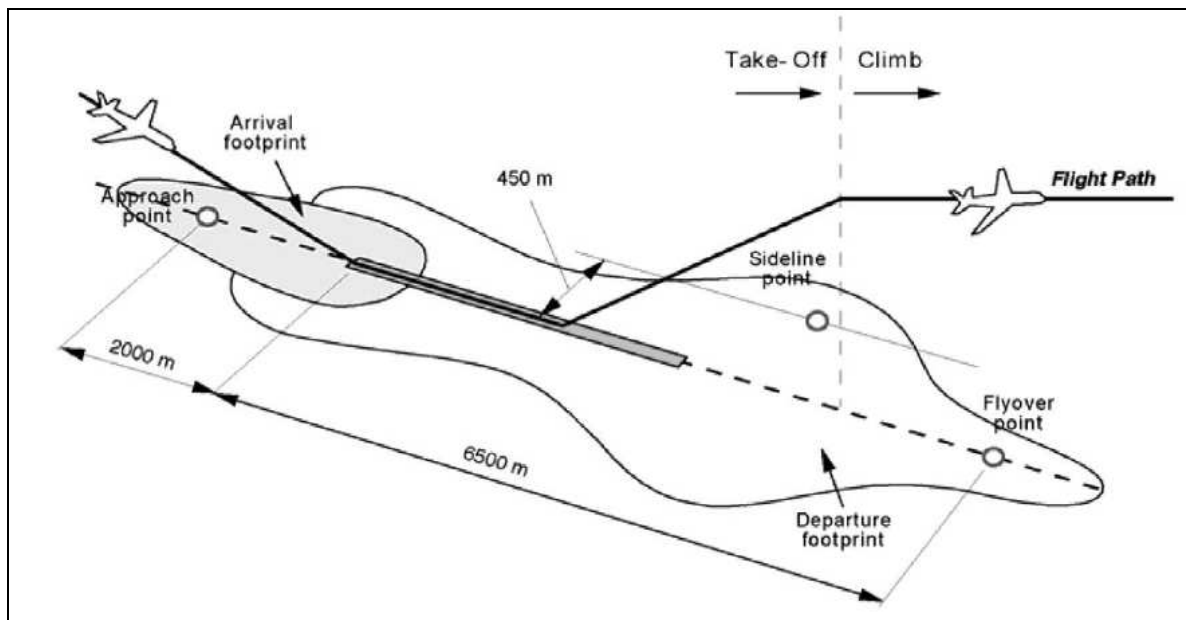
The terms sideline, flyover and approach relate to noise measurement positions which are used when a new aircraft type is tested in accordance with International noise standards. This allows a like for like comparison for various aircraft types.

The International Civil Aviation Organization (ICAO) defines these three terms as:

- **Sideline** – for jet-powered aeroplanes: the point on a line parallel to, and 450m from, the runway centre line, where the noise level is a maximum during take-off. For propeller aircraft: the point on the extended centre line of the runway 650 m vertically below the climb-out flight path at full take-off power;
- **Flyover** – for jet and propeller powered aeroplanes, the point on the extended centre line of the runway and at a distance of 6.5km from the start of roll; and
- **Approach** – for jet and propeller powered aeroplanes, the point on the ground, on the extended centre line of the runway 2,000m from the threshold. On level ground this corresponds to a position 120 m (394ft) vertically below the 3 degree descent path originating from a point 300m beyond the threshold.

*ICAO Chapter 16 noise measurement locations are taken in ideal measurement locations. These differ from the LCA Noise Monitoring Terminal positions which, due to the relatively quiet nature of aircraft operating at LCA, and the constraints of the built environment, are generally located closer to the airport than described above to ensure appropriate noise monitoring is in place at relevant distances and that aircraft noise measurements are not affected by extraneous ambient noise.

Figure 1: Aircraft Noise Certification Measurement Points



Reproduced from ERCD 0205⁹.

⁹. ERCD Report 0205 Quota Count Validation Study: Noise Measurements and Analysis, Civil Aviation Authority

- 2.2.7 Each aircraft in operation at the airport will be allocated a separate QC score (or 'count') for arrival and departure operations, based on its certified noise levels (adjusted to reflect the approach glide slope used at LCA), and categorised into 1 dB bands (rather than 3 dB bands under the existing NFM system). As an example, the proposed ANCS would allocate 1 'count' to one aircraft departure or arrival in a noise band range of 91.0 dB to 91.9 dB and 0.1 counts to a quieter aircraft departure or arrival in a noise band range of 81.0 dB to 81.9 dB.
- 2.2.8 For reference, two of the larger aircraft presently in use at the airport, the Airbus A318 and Embraer E190, would receive 0.4 counts each for one departure, whereas the much smaller Dornier 328 jet would receive 0.125 counts.
- 2.2.9 The use of narrower 1 dB bands instead of 3 dB bands also has the benefit of ensuring aircraft are more accurately categorised based on the noise that they generate.
- 2.2.10 The proposed QC classification bands are set out in Table 1 below:

Table 1 – Aircraft Noise Classifications

(NB. This classification system is a modification and extension of that operated by the designated airports in their Night Noise Quota Count System)

Noise Level Band ¹⁰ , EPNdB	Quota Count (QC) Classification
94 – 94.9	2
93 – 93.9	1.6
92 – 92.9	1.25
91 – 91.9	1
90 – 90.9	0.8
89 – 89.9	0.63
88 – 88.9	0.5
87 – 87.9	0.4
86 – 86.9	0.315
85 – 85.9	0.25
84 – 84.9	0.2
83 – 83.9	0.16
82 – 82.9	0.125
81 – 81.9	0.1
80 – 80.9	0.08
79 – 79.9	0.063
78 – 78.9	0.05
77 – 77.9	0.04
76 – 76.9	0.0315
75 – 75.9	0.025

¹⁰ The grey noise bands are presented for information purposes only as no aircraft would be permitted to commence operations at LCA within these noise bands as a result of a need to comply with the noise certification level limits within the scheme.

74 – 74.9	0.002
73 – 73.9	0.016
72 – 72.9	0.0125
71 – 71.9	0.01
70 – 70.9	0.008
69 – 69.9	0.0063
68 – 68.9	0.005

2.3 Derivation of Noise Certification Levels

Departure

- 2.3.1 Under regulations laid out by the European Commission¹¹, all aircraft of the types used at LCA are required to hold a certificate that sets out the departure noise certification levels for the aircraft and states the weight at which the aircraft was certified.
- 2.3.2 Noise certification data for a given aircraft type can exist at a variety of different take-off weights. In addition, some aircraft of a given type are fitted with modified (quieter) engines and are certified accordingly. As a result of this, the selection of certified noise certification levels for an individual aircraft shall be based on:-
- i) the sideline and flyover departure noise values set out on the certified noise certificate for the individual aircraft; or
 - ii) the values set out in the EASA¹² database for the specific aircraft type¹³ accounting for the permitted Maximum Take-Off Weight (MTOW) of that aircraft at LCA. If no entry in the database is available for the specific aircraft at this MTOW, the entry for the next highest MTOW will be used, or, and only under exceptional circumstances,
 - iii) evidence presented to LBN which demonstrates to their satisfaction, confirmed in writing, that the aircraft is capable of operating at its permitted MTOW at LCA within the noise constraints applicable at the airport.

¹¹ Commission Regulation (EU) 748/2012

¹² European Aviation Safety Agency (2016) *Aircraft type certificate data sheets*, [Online], Available: <http://www.easa.europa.eu/certification/type-certificates/aircraft.php> [6/09/2016].

¹³ This relates to the noise certification levels given for the aircraft at a MTOW in the EASA database that equals the average of the maximum take-off weights specified for that aircraft type. If no entry is available, the noise certification levels for the next highest MTOW is to be used.

- 2.3.3 Appendix 4 sets out how to derive the Departure Noise Level from the sideline and flyover noise certification values to enable a QC classification to be derived from Table 1.

Arrival

- 2.3.4 The INM software is used to predict the noise generated by an aircraft on arrival at LCA and contains an in-built database of aircraft types, flight, thrust and noise parameters. This database of information has been developed in consultation with aircraft manufacturers.
- 2.3.5 The approach noise level for a given type of turbofan aircraft is derived by modelling with a glide slope of 5.5 degrees using the INM, at the approach noise certification point described in ICAO Annex 16⁴. The resulting value is equivalent to the noise certification level for that given turbofan aircraft type for a 5.5 degrees approach.
- 2.3.6 The approach noise level for a given type of turboprop aircraft is derived by firstly adjusting the noise profile of the most appropriate aircraft type within the INM to best match the approach noise level measured at LCA during a 5.5 degree approach. This aircraft type is then modelled with a glide slope of 5.5 degrees using the INM to derive the noise value at the approach noise certification point described in ICAO Annex 16⁴. This resulting value is used as the approach noise certification level for that given turboprop aircraft type for the purposes of quota count classification.
- 2.3.7 Appendix 4 sets out how to derive the Arrival Noise Level from the approach noise level to enable a QC classification to be derived from Table 1.

2.4 Maximum Permissible Noise Levels of Aircraft

2.4.1 This section provides a procedure for controlling the noisiness of aircraft operating at the airport. The aim is to ensure that no noisier aircraft than currently operate at LCA will do so in the future and to achieve parity with the current aircraft categorisation scheme (accounting for the fact that the two schemes differ in the way that they rate the noisiness of an aircraft).

2.4.2 The control over the maximum permissible noise levels of an aircraft operating at LCA is dictated to some extent by current UK Regulations⁶ that prevent an airport from restricting operations by Chapter 4¹⁴ aircraft. The first method of control is therefore as follows:

- 1) No aircraft is permitted to operate at LCA unless it complies with the noise requirements of Chapter 4.

2.4.3 In addition, to ensure consistency with the current aircraft categorisation regime, LBN have requested that upper noise limits are applied to the ANCS in order to control the noisiness of an aircraft to ensure no noisier aircraft can operate at LCA than those permitted to operate today. As a result, no aircraft will be permitted to operate at LCA unless the following conditions are met:

- 1) A noise certificate for the specific aircraft type shall be available which, subject to 2.3.2 for its maximum permitted weight of operation at LCA, demonstrates compliance with the following three noise certification levels¹⁵, where the sum of all three levels does not exceed 271:

Flyover: 88.0 EPNdB

Sideline: 93.5 EPNdB

¹⁴ Chapter 4 of Annex 16 to the Convention on International Civil Aviation, Environmental Protection, Volume 1, Aircraft Noise

¹⁵ The positions of which are defined in Annex 16 to the Convention on International Civil Aviation, Environmental Protection, Volume 1, Aircraft Noise

Approach¹⁶: 98.0 EPNdB

- ii) Before any aircraft would be permitted to operate at LCA, evidence of compliance with the above requirements shall be submitted to and approved in writing by the LBN.

2.4.4 These aircraft noise limits will apply once the ANCS and NFM have run in parallel and the ANCS fully replaces the NFM following review. The limits would apply to both the ANCS under the 2009 planning permission and the CADP1 permission once implemented, subject to the completion of one year of parallel running of the NFM and the ANCS.

2.4.5 In addition to these aircraft noise limits, once the CADP1 planning permission is implemented, a noise contour will apply which restricts the area of the 57 dB(A) $L_{Aeq,16hr}$ noise contour to a maximum of 9.1 km². This noise contour, based on the average level of daytime aircraft noise, marks the approximate boundary for the onset of significant community annoyance. The contour is designed to supplement the ANCS once LCA operates under the terms of the CADP1 permission (refer to Condition 33).

2.5 Quota Count Budget

Quota Count Period

2.5.1 The quota count period applies throughout the operational hours of the airport as specified in the airport's entry given in the UK AIP¹⁷. For the purposes of an annual assessment of the quota count and quota, the calendar year shall apply.

Proposed Budget

2.5.2 LCA will be required to operate within an overall noise quota budget set out in the ANCS, which will limit the number of annual flight movements. Each aircraft landing or taking-off will count towards the overall quota budget at the airport. The noisier the

¹⁶ This relates to the specific noise certification level on approach given in the aircraft's noise certificate (which relates to an approach at 3 degrees) rather than the Arrival Level described in 2.2.2 and Appendix 4 which relates to an approach at 5.5 degrees.

aircraft type, the higher its QC score and the more it will count towards the total budget, resulting in fewer permitted flights within the limit. The use of 1 dB bands means that a small reduction in noise levels may result in a lower QC score, thereby incentivising the use of quieter aircraft.

2.5.3 Performance against the quota budget shall be calculated by multiplying the number of departures and arrivals by the respective QC scores for an aircraft and adding together the totals for each aircraft type using the airport¹⁸.

2.5.4 The proposed quota budget has been designed to be equivalent to the 120,000 NFM's which LCA has permission to operate up to under the 2009 planning permission. The quota budget will be reviewed following a period of one year (during which it will operate in parallel with the existing NFM system) to ensure it is fit for purpose before replacing the NFM system. The proposed quota budget is:

- i) 22,000 per calendar year; and
- ii) 742.5 in any one week

2.5.5 Each year's total quota count will be determined based on the schedule of actual aircraft movements for the year and established QC scores. The results will be compared against LCA's permitted noise quota budget as specified in i) and ii) above.

2.5.6 The proposed ANCS will not allow noisier aircraft or a higher number of aircraft to operate at the airport than permitted under its current 2009 planning permission or the CADP1 permission when it is implemented. This will be achieved as described in Section 2.4, by setting upper noise limits for sideline, flyover and approach together with introducing a cumulative noise limit, the net effect of which will ensure specific aircraft will be no noisier than currently permitted. Moreover, the number of aircraft allowed to operate at the airport will be limited to: 120,000 NFM's per year or 120,000

¹⁷ The UK Aeronautical Information Package, NATS Aeronautical Information Service

¹⁸

actual movements per year whilst LCA continues to operate under the 2009 planning permission; and 111,000 actual movements per year under the CADP1 permission.

2.6 Aircraft Eligibility

- 2.6.1 All aircraft operating at LCA shall be included in the quota, other than those engaged in training, positioning, aircraft testing and/or evaluation.

3.0 NOISE MONITORING

3.1 Aircraft Noise Measurement

3.1.1 Throughout each year of operation of the quota count system, noise monitoring shall be undertaken at six locations (NMT's 1 to 6) shown in Figure 1 of Annex 1, Appendix 4 to record at each noise monitor the Effective Perceived Noise Level (EPNL) during aircraft departures and landings. Two new fixed noise monitors, NMT 5 to the west near East India Dock and NMT 6 to the east in Thamesmead, have recently been installed to ensure noise is monitored in these communities beyond the immediate locality of the airport. They will play an important role in both monitoring the performance of the ANCS and the operation of the new Incentives and Penalties Scheme (see Section 4 below).

3.1.2 The data shall be reviewed on an annual basis to establish for each aircraft type, separately for each airline, the following information:-

- the average annual SIDELINE departure noise level (in EPNdB), from NMTs 1,2 3 and 4,
- the average annual FLYOVER departure noise level (in EPNdB), from NMTs 5 and 6,
- the average annual APPROACH noise level (in EPNdB), from NMTs 5 and 6.

3.2 Annual Review

3.2.1 Regardless of whether the ANCS is operating under the 2009 permission or the CADP1 permission, the results of noise monitoring determined in accordance with Section 3.1 above will be reviewed each year to check on whether, year on year, there has been any change in the average results for each aircraft type and associated airline.

4.0 INCENTIVES

- 4.1.1 The ANCS will be further supplemented by a new Incentives and Penalties Scheme (IPS) as part of the Noise Management and Mitigation Strategy (NOMMS) which will further encourage airlines to operate their fleets more quietly. The IPS, which came into operation on 18 August 2017, operates under the 2009 planning permission and, thereafter, will operate under the CADP1 permission once implemented.
- 4.1.2 It works by rewarding improved performance and penalising poor performance in relation to noise. LCA will partner with the airline who has the most improved noise performance each year (based on a single aircraft type) to deliver an annual Community Projects Fund. The fund will provide at least £75,000 per year and is designed to support local community initiatives. Airlines will be penalised for poor noise performance with a minimum fine of £600 per decibel exceeded over a set threshold per flight. The Incentives and Penalties Scheme will supplement the noise restrictions imposed by the ANCS by managing aircraft noise on a day to day basis whilst simultaneously benefiting the local community.
- 4.1.3 As part of this scheme, a league table setting out the performance of each aircraft type, by airline, relative to its previous year's performance will also be published in the airport's Annual Performance Report.

5.0 REPORTING

5.1 Quarterly Report

- 5.1.1 A report on the ANCS shall be submitted to LBN and the London City Airport Consultative Committee (LCACC) on a quarterly basis which sets out the daily and weekly quotas attributable to the actual aircraft movements at the airport. The values will be compared with the permitted weekly and annual quota budgets (refer to Section 2.5) to identify if and when any limits are approached or exceeded.

5.2 Annual Noise Monitoring Report

- 5.2.1 The results of noise monitoring will be reviewed at the end of each calendar year and submitted to LBN and the LCACC by the 31st March each year for approval in writing. A check will be made on whether, year on year, there has been any change in the average results for each aircraft type and associated airline. This information from the noise monitoring system will be used to undertake assessments, as occurs at other airports operating similar quota count systems, to check whether the quota count classifications used for each aircraft type are appropriate. No changes in quota count classification would be permitted without written approval from LBN.
- 5.2.2 A report will also be produced as part of the Annual Performance Report that records the results of the assessments undertaken as part of the quota count regime, including but not limited to:-
- The quota counts used for each aircraft type during the calendar year in question;
 - The total annual quota arising from aircraft operations during the calendar year;
 - The results of noise monitoring undertaken during the calendar year, expressed for each aircraft and airline as averages in relation to sideline, flyover and approach noise levels as determined in accordance with Section 3.1 above;
 - The quota counts to be used for each aircraft for the forthcoming calendar year; and

- The expected total annual quota for the forthcoming year.

6.0 REVIEW PROCESS

- 6.1.1 The ANCS will be reviewed periodically to ensure that it continues to provide an equitable method of aircraft categorisation at LCA.
- 6.1.2 There is no specific requirement to review and report the ANCS in the 2009 Section 106 Agreement. However, in accordance with Condition 19 of the CADP1 planning permission, once implemented, the ANCS will be reviewed periodically to ensure that it continues to provide an equitable method of aircraft noise categorisation at LCA.
- 6.1.3 Reviews will be undertaken as follows:
- i) Not later than 12 months from the date of the introduction of the ANCS under the 2009 permission or at least 3 months prior to the first beneficial use of CADP1, whichever is the sooner; and
 - ii) Once CADP1 is implemented, not later than 4 years from the date of its introduction and every 5th year thereafter.
- 6.1.4 The reviews (including any revised form of ANCS and the timeframe for its implementation) shall be submitted to LBN within 3 months of such review dates for written approval and the revised ANCS shall be implemented as approved in accordance with the approved timeframe and maintained thereafter.

* * * * *

APPENDIX 1
AIRCRAFT NOISE CATEGORISATION SCHEME
CONSULTATION REPORT

AIRCRAFT NOISE CATEGORISATION SCHEME

CONSULTATION REPORT

**PREPARED UNDER
REQUIREMENTS OF REGULATION
10 OF THE AERODROMES (NOISE
RESTRICTIONS) (RULES &
PROCEDURES) REGULATIONS
2003**

October 2017

Our Ref: JCG22431

RPS
140 London Wall
London
EC2Y 5DN

Tel: 020 7280 3300
Fax: 020 7283 9248
Email: rpslp@rpsgroup.com



CONTENTS

1	INTRODUCTION	2
2	CONSULTATION METHODOLOGY	5
3	CONSULTATION FINDINGS.....	7
4	CONCLUSIONS AND NEXT STEPS.....	13
APPENDIX A: CONSULTATION RESPONSES		14

1 INTRODUCTION

Introduction

- 1.1 Under its current planning permission (ref: 07/01510/VAR, granted in 2009), London City Airport (LCA) is permitted to operate up to 120,000 aircraft movements each year. In addition to an actual aircraft movement limit, the airport also operates within a 'noise factored movement' (NFM) limit of 120,000 movements each year, which is based on the noise performance of individual aircraft types.
- 1.2 The 2009 planning permission also includes a Section 106 legal obligation that requires LCA to consult with the London Borough of Newham (LBN) on, and subsequently implement, an Aircraft Categorisation Review (ACR) to review how it categorises aircraft for noise management purposes and incentivises airlines to emit less noise.
- 1.3 The ACR has been ongoing since 2011 involving LBN officers, with officers from the Greater London Authority (GLA) at later stages. It has entailed a reassessment of the methodology, noise levels, noise categories and procedures associated with the noise categorisation of aircraft that operate at LCA with the overall objective of providing further incentives for aircraft to emit less noise. The ACR preparation process is now nearing completion with a draft Aircraft Noise Categorisation Scheme (ANCS) agreed with LBN and GLA and published for public consultation purposes. This report presents the outcomes of that public consultation process which ran from 02 June to 14 July 2017, fulfilling the requirements of the Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003.
- 1.4 In July 2016 LCA was granted planning permission for the City Airport Development Programme (CADP1) (planning application reference: 13/01228/FUL) which will deliver extended passenger facilities and new airfield infrastructure. The CADP1 permission, once implemented, will permit LCA to operate up to 111,000 aircraft movements each year. Condition 18 of the permission also requires that before the infrastructure delivered by CADP1 can be used, a new ANCS which categorises aircraft for noise management purposes must be submitted to and approved in writing by LBN.
- 1.5 The new ANCS, once approved by LBN (anticipated by November 2017) and checked against the existing NFM system, will replace it. The ANCS will fulfil the requirements of, and operate under, the current 2009 Section 106 Agreement and planning permission until such time that the CADP1 planning permission is implemented. On implementation of the CADP1 permission (anticipated later this year) the approved ANCS will continue to apply under the terms of Condition 18 of that consent (see para 1.4 above).

Overview of ANCS Consultation Material

- 1.6 The consultation material for the proposed draft ANCS was comprised of three reports as follows:
 - Proposed Draft Aircraft Noise Categorisation Scheme (ANCS), London City Airport, *Bickerdike Allen Partners*;

- Proposed Draft Aircraft Noise Categorisation Scheme (ANCS), London City Airport – Non Technical Summary, *RPS Group*; and
- Proposed Draft Aircraft Noise Categorisation Scheme (ANCS), London City Airport – Environmental Report¹, *RPS Group*.

1.7 To summarise, the proposed draft ANCS is based upon a quota count (QC) classification system and in tandem with current and future (CADP1) planning conditions, sets controls based on:

- The current planning permission to operate up to 120,000 actual aircraft movements each year and a NFM limit of 120,000 movements each year (reducing to 111,000 actual movements when the CADP1 permission is implemented);
- Restrictions on the noisiest aircraft types; and
- Noise quotas which control the amount of noise emitted on a weekly and annual basis.

1.8 The proposed ANCS is based on a noise QC system which uses manufacturers' independently assessed noise certification data to categorise each aircraft operating at LCA, as required by law and mirroring the approach adopted by other UK airports.

1.9 Each aircraft type permitted to fly into and out of LCA is allocated a specific 'QC score' based on its certified 'sideline', 'flyover' and 'approach' noise level. Each aircraft will be allocated a separate QC score for arrival and departure operations and categorised into 1dB bands (instead of 3dB bands as is currently the case). The use of 1dB bands has the benefit of ensuring aircraft are more accurately categorised based on the noise that they generate and also means that a small reduction in noise levels may result in a lower quota count value, thereby incentivising the use of quieter aircraft.

1.10 LCA will be required to operate within an overall noise quota budget which will limit the number of annual flight movements. Each aircraft landing or taking-off will count towards the overall quota budget at LCA such that the noisier the aircraft type, the more it will count towards the total budget, resulting in fewer permitted flights within the limit.

1.11 The proposed quota budget has been designed to be equivalent to the 120,000 NFMs which LCA has permission to operate under today. The budget will be reviewed following a period of one year (during which time it will operate in parallel with the existing NFM system) to ensure it is fit for purpose before replacing the NFM system. The proposed quota budget is:

- i) 22,000 quota counts per calendar year
- ii) 742.5 quota counts in any one week

¹ The Environmental Report does not form part of the ANCS but was prepared under the requirements of Regulation 6 and Schedule 2 of the Aerodromes (Noise Restrictions) (Rules & Procedures) Regulations 2003. It includes an explanation of why the ANCS is necessary, the main concepts of the new system and any resulting environmental effects; it specifically addresses all the matters which LCA is required (under the 2003 Regulations) to consider before introducing operating restrictions at the airport.

- 1.12 This ANCS will not allow noisier aircraft or a higher number of aircraft to operate at LCA than permitted under its current operational planning permission or the CADP1 permission. In addition, upper noise limits have been applied to the ANCS to control the noisiness of an aircraft and ensure that no noisier aircraft than currently operate at LCA will be allowed in future under the ANCS.
- 1.13 The ANCS will be reviewed periodically to ensure that it continues to provide an equitable method of aircraft noise categorisation at LCA. A report on the ANCS will be submitted to LBN on a quarterly basis. The results of noise monitoring will also be reviewed at the end of each calendar year and submitted to LBN.
- 1.14 The ANCS will be supplemented by a new Incentives and Penalties Scheme (IPS) as part of the proposed Noise Management and Mitigation Strategy (NOMMS) which is intended to further encourage airlines to operate their fleets more quietly by rewarding improved performance and penalising poor performance. LCY will reward improved noise performance by partnering airlines in delivering an annual Community Projects Fund of £75,000 in the local community. Airlines will be penalised for poor noise performance with a minimum fine of £600 per flight, per decibel exceeded above a fixed threshold².

Need for Consultation

- 1.15 This proposed introduction of the ANCS constitutes a new 'operating restriction' in accordance with the Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003. Regulation 10 of the Regulations requires that:

"The competent authority for a relevant airport shall consult interested parties on the application of regulations 6 and 7 to that airport allowing a reasonable time in each case for their opinions to be taken fully into account before it reaches its decision."
- 1.16 In this instance LCA is the 'competent authority' and therefore the Airport itself undertook consultation on the draft ANCS with relevant stakeholders and interested parties ahead of finalising for submission to LBN for approval. The consultation ran for six weeks from 02 June 2017 to 14 July 2017 where interested parties were invited to review the scheme proposals (and accompanying environmental report) and to submit feedback. The consultation process and findings are described in the following sections of this report.

² The Incentives and Penalties Scheme was implemented on 18 August 2017.

2 CONSULTATION METHODOLOGY

- 2.1 The official consultation on the draft ANCS ran for six weeks from 02 June to 14 July 2017.
- 2.2 There are no statutory requirements in respect of the duration and extent of consultation that should occur with interested parties. LCA sought to engage with all relevant parties, including the general public, airlines operating at LCA, aircraft manufacturers, London Boroughs (the eight Boroughs located within the LCA operational noise contours), and local community groups, through a comprehensive range of methods.
- 2.3 The ANCS has been developed in consultation with both the LBN and the GLA, which began in 2015. A series of technical workshops were held to progress the review of aircraft categorisation and covered fleet mix analysis, the mechanism of calculation and the impact on deriving a quota count budget. The process of consultation with both LBN and the GLA satisfies the requirements of both the 2009 Section 106 Agreement and the CADP1 Section 106 Agreement.
- 2.4 On 07 March 2017 following agreement with LBN and the GLA on the draft ANCS, a presentation of the draft scheme and proposed consultation material was given to the London City Airport Consultative Committee (LCACC). The LCACC is made up of representatives of a number of groups including: eight London Boroughs (Newham, Greenwich, Bexley, Barking and Dagenham, Tower Hamlets, Waltham Forest, Redbridge and Havering); the GLA; Local Communities and Community Groups; and Passengers. A full list of the committee members is available at <http://lcacc.org/officers-and-members/>.
- 2.5 The activities listed below were undertaken by LCA to publicise the proposed ANCS to relevant stakeholders and the general public. The consultation approach was comprehensive and ensured that the ANCS consultation was widely publicised and that the communities affected by noise from LCA were included in the process and given the opportunity to respond.
- 1) Advertisements notifying readers of the availability of the draft ANCS were published in key local publications. The adverts briefly summarised the key features of draft ANCS proposals and explained how interested parties could find further information on the scheme. The publications included:
 - Newham Recorder;
 - East London Advertiser;
 - Lewisham & Greenwich Mercury;
 - The Wharf;
 - Newham Magazine;
 - Waltham Forest Guardian; and
 - Greenwich Info.

- 2) Planning and Environmental Health Officers of the following London Boroughs were formally consulted on 02 June 2017: Newham, Greenwich, Barking & Dagenham, Tower Hamlets, Redbridge, Havering and Waltham Forest;
- 3) The LCACC was given notice and provided consultation materials at a meeting on 10 June 2017, and members were asked for their comments;
- 4) All airlines operating at LCA were formally consulted on 02 June 2017, 04 July 2017 and 13 July 2017; and
- 5) Consultation materials were published on the LCACC website and the LCA website at the following location:

<https://www.londoncityairport.com/aboutandcorporate/page/aircraft-noise-categorisation-scheme>).

- 2.6 In all cases, contact details were provided to allow consultees to provide responses via email and/or by post.

3 CONSULTATION FINDINGS

Overview

- 3.1 Consultation responses were received throughout the consultation period, the majority of which were in the form of an emails sent to ANCS@londoncityairport.com. One letter was also received.
- 3.2 LCA received a total of 13 written responses. At least one response from each of the key stakeholder groups consulted was received. The responses received therefore reflect a broad range of interests and concerns:
- Airlines (6 responses received);
 - Aircraft manufacturers (1 response received);
 - Local Boroughs (2 responses received);
 - Residents (3 responses received); and
 - Local community groups/ HACAN East (1 response received).
- 3.3 The feedback from the consultees was broadly positive and the majority of respondents welcomed the proposals and the introduction of a more up-to-date and more comprehensive system of noise measurement than is currently used. A small number of concerns were raised and clarifications requested; LCA's responses to which are detailed in the following section.
- 3.4 The consultation responses received are included in full in Appendix A.
- 3.5 For the reasons set out below, no changes to ANCS are considered necessary following consultation on the draft and the nature of the representations received.

Summary of Main Points Raised

Support for the ANCS

- 3.6 The majority of consultee responses acknowledged that ANCS would bring about an improvement with regard to managing noise impacts from aircraft, and that the system would be more appropriate than the existing Noise Factored Movement (NFM) system. In particular, consultees noted and welcomed the following changes:
- 1) The use of 1dB bands to categorise aircraft (instead of the 3dB used at other UK airports);
 - 2) The fact that it will take into account the wider community by accounting for flyover and approach noise, as well as sideline noise;
 - 3) The assurance that no noisier aircraft will be allowed to operate than those permitted under the existing 2009 planning permission; and

- 4) The ANCS will not allow a higher number of aircraft to operate at LCA than permitted under the existing 2009 planning permission (120,000 actual movements per calendar year, which will decrease to 111,000 actual movements under CADP1).

LCA Response: No response required.

Action: No further action is considered necessary.

Robustness of Consultation Process

- 3.7 One resident believed that the level of consultation was inadequate and that it should be extended in duration and include all affected boroughs and residents.

LCA Response: LCA considers that the extent and duration of consultation undertaken was comprehensive and sufficient. The approach to the consultation is detailed in Section 2 of this Report. The consultation period ran for six weeks and a broad range of stakeholder groups were engaged including airlines, aircraft manufacturers, residents, community groups and all eight London Boroughs within the LCA operational noise contours. The LCACC was also given notice and provided consultation materials. Advertisements notifying readers of the availability of the draft ANCS were published in key local publications and on the LCA website and London Boroughs and other stakeholder groups were formerly written to and engaged with directly.

Action: No further action is considered necessary.

Noise Quota

- 3.8 One resident raised concerns that the noise quotas allowed aircraft noise which is too high. Instead of an annual quota, there should an upper decibel limit.

LCA Response: Upper noise limits will be applied to the ANCS to ensure that no noisier aircraft can operate at LCA than those permitted to operate today (refer to Section 2.4 of the ANCS).

The proposed quota budget of 22,000 has been designed to be equivalent to the 120,000 noise factored movements which LCA has permission to operate up to under the 2009 planning permission. It is therefore considered appropriate but will be reviewed following a period of one year (during which it will operate in parallel with the existing NFM system) to ensure it is fit for purpose.

Action: No further action is considered necessary.

Noise monitoring

- 3.9 There is a concern that the noise monitoring results would be used to review the aircraft types permitted to operate at the Airport, and that the location of the noise monitors may not accurately reflect the three noise certification points.

- 3.10 Residents requested that continuous noise monitoring stations be located under flight paths (such as in Waltham Forest) and not just in the immediate vicinity of the airport. The noise monitors are essential to validating whether the certification data is accurate.

LCA Response: The four existing noise monitors (located to the north and south of the runway) have recently been supplemented by two new monitors east and west of the airport (located underneath the flight path) that will continually record the noise of every departure and arrival. These two new monitors have been located at positions carefully selected to accurately record both departure and arrival noise levels farther out than the existing monitors, among communities to the east and west of the airport, and to gather data indicative of flyover and approach noise certification performance. The combined results from the six noise monitors are expected to provide sufficient data to enable the performance of each aircraft to be compared with what might be expected from an aircraft's noise certification data.

The two new noise monitors have been carefully located to both minimise ambient noise effects and maximise the collection of accurate aircraft noise data from departing and arriving aircraft. These monitors are each positioned approximately 4.5 km from an aircraft departure point and 3.0 km from touchdown. Given the nature of the docks, land use requirements, built-up surroundings and relatively quiet nature of the aircraft operating at LCA, it is not practicable to locate a noise monitor at precisely the 6.5 km flyover point nor at the 2.0 km approach point used in noise certification procedures.

A mobile noise monitor is available to the airport to investigate the variation in noise level over a representative period at any given point. This facility, supplemented as necessary with observations concerning the contribution of surrounding noise sources, could be used to investigate the variation in aircraft noise over Waltham Forest over a period of time.

Action: No further action is considered necessary to the location of the fixed noise monitors. Temporary noise monitoring will be used to supplement noise data received from the fixed noise monitors to investigate the variation in aircraft noise around areas near the airport. The number of noise monitoring units will be kept under review and increased if the data provided is not sufficient

Reporting

- 3.11 Consultees were supportive of the strategy on reporting on the ANCS performance and noise monitoring results. A request was received for other London Boroughs, in addition to LBN, to receive of the quarterly and annual noise monitoring reports.

LCA Response: We agree with this request. Quarterly and annual noise monitoring reports will be submitted to LCACC on which all Boroughs are represented.

Action: The wording of the ANCS will be amended to clarify that reports will be provided via the LCACC.

Permitted Aircraft

- 3.12 The ANCS states that “No aircraft is permitted to operate at LCA unless it complies with the noise requirements of Chapter 4”. Clarification was requested as to whether an aircraft has to be certificated under Chapter 4 rule or just comply with Chapter 4 noise requirements.

LCA Response: The purpose of the ANCS is to ensure that any aircraft operating at LCA carries a noise certificate that complies with the noise requirements of Chapter 4. It is possible that some older aircraft will have been certified under Chapter 3 for example but show a performance that would comply with Chapter 4 noise requirements. Under these circumstances, the aircraft would comply with the ANCS and be permitted to operate at LCA.

Action: No further action is considered necessary.

Incentives and Penalties Scheme

- 3.13 Further details were requested by airlines on the rules and mechanism of operation of the IPS, in particular the thresholds that will be considered and their calculation method and the frequency of fine application.
- 3.14 A transition period was requested by one airline while the proposed ANCS and existing scheme are running parallel to each other so that fines are not imposed immediately upon implementation of the scheme.
- 3.15 Concerns were raised by airlines that the current level of the fine (£600 per dB exceeded) would do little to incentivise airlines to be quieter as airline crews already do as much as they can to reduce noise levels. There is a belief that once an aircraft is permitted to operate at LCA, there will be no incentive to operate more quietly. Instead, airlines should be rewarded (using cash generated from fines) for good performance with regard to noise.
- 3.16 One resident believed the penalties were too low and should be based on a percentage of the airline’s annual profit.
- 3.17 With regard to Community Projects Fund, some airlines believed there would be little benefit to them and therefore such a scheme would not incentivise airlines to operate differently. A request was received for other London Boroughs, in addition to LBN, to be involved in the Community Projects Fund.

LCA Response: The IPS is supplemental to but separate from the ANCS, and forms part of the proposed NOMMS. While the ANCS determines and controls the extent to which aircraft operate at LCA with the overall objective of providing further incentives for aircraft to emit less noise, the IPS is designed to incentivise quieter operation on a daily basis.

The IPS was formally submitted to LBN for approval in March 2017 and was approved in May 2017. The IPS was implemented on 18 August 2017.

The IPS was developed in consultation with LBN and included a period of consultation with all airlines that took place between 02 September 2016 and 03 October 2016. A workshop to discuss the IPS with airline representatives was also held on 30 August 2016. LCA carefully considered the feedback from LBN and the airlines in finalising the scheme, a key

element of which is to allow for a 12 month review period during which penalties will not be charged, allowing new trigger noise levels to be assessed and fully calibrated. A review of the IPS will be undertaken after a period of 12 months. This will provide an opportunity for the concerns raised above by non-airline representatives relating to the IPS to be addressed.

LCA agrees that the Community Projects Fund will be for local communities in the eight London Boroughs surrounding the airport.

Action: No further action is considered necessary.

Sound Insulation

- 3.18 It was suggested by one resident that instead of a Community Projects Fund, LCA should consider triple glazing houses under the flight path.

LCA Response: LCA has a well-established Sound Insulation Scheme (SIS) which works in conjunction with annually published noise contours to manage noise levels within homes and public buildings. A range of treatments are offered dependent on the property location with the overall aim of ensuring that noise levels within a dwelling are maintained at reasonable levels as set out in BS 8233³. These include high performance thermal double glazing or secondary glazing to double glazed windows and sound attenuating ventilators.

Those within the 57 dB LAeq, 16h summer noise contour, also known as the First Tier Boundary are eligible for sound attenuating ventilators, which allow a steady flow of air into the property without the need to open windows.

If a property has currently only single glazing installed and is located within the First tier boundary, they will be additionally eligible for either secondary glazing or a contribution of equal amount towards the cost of double glazing.

Properties located within the 66 dB LAeq,16 contour, also known as the Second Tier Boundary, are eligible for secondary glazing or a contribution towards the cost of high acoustic performance double glazing. These properties are also eligible for sound attenuating vents.

Further details are available at:

<https://www.londoncityairport.com/aboutandcorporate/page/sound-insulation-scheme>.

The Airport under CADP will improve the first tier of works, introduce an intermediate tier of treatment, and also upgrade the second tier to further protect those most affected by noise.

The first tier of works will be improved by ensuring any existing single glazed properties that are eligible under the scheme will be offered 100% of the cost for replacement

³ BS 8233:2014 Guidance on sound insulation and noise reduction for buildings, BSI

standard thermal glazed windows or secondary glazing, whichever is preferred, together with acoustic ventilation.

For those residential properties that are already or become exposed to air noise at a level of 63 dB LAeq,16h, an offer of secondary glazing and acoustic ventilation will be made or alternatively, a contribution of £3,000 towards high performance acoustic double glazing and acoustic vents. This additional tier of works will be eligible to all existing dwellings exposed currently to 63 dB or more as well as any existing dwellings that come into the eligibility noise contour in the future.

The Airport will also enhance the existing Second Tier Scheme by offering improved secondary glazing or a 100% contribution towards high performance double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.

Action: Given the existing and future extensive sound insulation scheme delivered by the airport, no further action is considered necessary.

Aircraft Altitude

- 3.19 One resident was concerned about the height of aircraft passing over Walthamstow and believes the scheme allows aircraft to fly too low over high density residential areas.

LCA Response: The ANCS will have no effect on the altitude at which aircraft fly over Walthamstow as this is controlled by Air Traffic Control (ATC). Aircraft are required to fly along a defined route within a specific corridor as directed by ATC and detailed within the Airport Information Publication (AIP) made available by National Air traffic Services (NATS) and governed by the Civil Aviation Authority (CAA).⁴

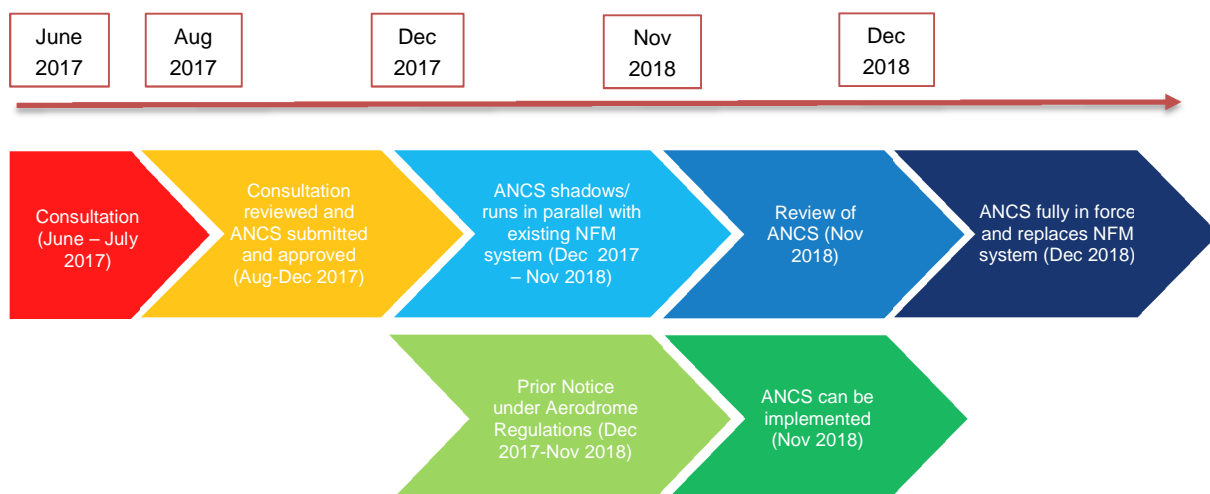
Action: No further action is considered necessary.

⁴http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=92&Itemid=141.html

4 CONCLUSIONS AND NEXT STEPS

- 4.1 Over the duration of the six week consultation period for the ANCS, 13 written responses were received. The respondents represented a broad range of stakeholder groups with varying interests and concerns, including residents, airlines and local councils.
- 4.2 The feedback from the consultees was broadly positive and the majority of respondents were supportive of the proposals, highlighting the benefits of the proposed ANCS over the existing noise categorisation scheme.
- 4.3 A small number of concerns were raised and clarifications requested. LCA's responses to these are summarised in Section 3 and there are no outstanding remarks which would necessitate any changes to the proposed draft ANCS to be made.
- 4.4 A copy of this consultation report will be made available to LBN; the GLA and all respondents to the consultation on the proposed draft ANCS. A copy will also be uploaded to the LCA website and LCACC website alongside the previous consultation material.
- 4.5 The ANCS will now be submitted to LBN for approval in August 2017. Following LBN approval, the Regulations stipulate that up to 12 months Prior Notice must be given before introduction of the final ANCS. A summary timeline for the submission and implementation of the ANCS is illustrated in Figure 1 below.
- 4.6 Once introduced, there will be a period of parallel operation of both the ANCS and the existing noise categorisation system, the purpose of which is to ensure a smooth transition from one to the other. Following this period, the ANCS will be reviewed to check that it is fit for purpose before replacing the existing system. Aircraft will continue to operate under the existing system until such time as the ANCS has been implemented and reviewed to supersede the existing system.

Figure 1: Post- Consultation ANCS Timeline



APPENDIX A: CONSULTATION RESPONSES

All of the consultation responses received are included in this Appendix. All responses have been kept anonymous.

"In general I have to say, that the scheme where one noise level applies for all fans seems the fair solution. I cannot judge the values itself.

We will still have to establish where the reporting has to be sent to."

Airline, 27 September 2016

"We, of course, do not agree on your proposal as there are several other IATA structured possibilities to charge for Noise pollution. Such a penalty scheme can have an impact on Flight Safety and is not monitorable for airlines.

We propose to implement a charge according to IATA noise certificate instead. It is well known and common in aviation industry. We can also propose to sensitize our crew to reduce noise pollution whenever possible but for landing and takeoff we do not have much space for specific actions."

Airline, 03 October 2016

"Our position at [confidential] is that we fully understand the need for airports to be a good neighbour and we work closely with several airports to help manage noise nuisance. We understand that it is in our own interest to do this so our aircraft owners have continued access for their business needs.

In the case of LCY specifically, this is a major airport for our aircraft owners so we have put significant resource into developing and training a better noise abatement departure procedure on our [aircraft type] fleet for example. We are pleased that LCY has resumed sharing the actual departure noise readings – this enables us to share this with our crew to help them hone their flying technique which in turn will help lower future noise footprint at LCY.

We appreciate that the London Borough has placed the ANCS obligation on LCY which in turn has placed this obligation on us as an operator. We have previously expressed concerns with some elements of the ANCS and these can be summarised as follows...

- *We have concerns with the potential financial penalty in general but specifically for the [aircraft type]. As highlighted above we have for several years now invested significant effort in making these departures quieter at LCY on this type. As future departures will be measured against this already much improved average noise level and we are by far the largest operator of this type, we will risk the financial penalty but be unable lower this further. We are in effect a potential victim of our own effort and success. A financial penalty for this type without being credited for the work done in lowering the average noise level would be unfair.*

- *We have concerns that the points and credits scheme may inadvertently penalise our type of operation even though it may work well with a scheduled airline. This is because an executive jet operation is hugely varied in comparison to an airline. A scheduled airline flies the same route each day with a similar payload and fuel load which will help produce a more consistent noise average. An executive jet operation on the other hand has a vastly varying operational requirement. This will necessitate a much more varied payload and fuel load which in turn will cause a much more varied noise average.*
- *Finally, as outlined in the opening paragraph, we will continue to work closely with LCY to ensure the obligations to the London borough are met and the planning is a success as it is in our aircraft owners interest to ensure this happens. However, we are not convinced the points, potential fine and credit scheme will have the additional motivating effect that is hoped. For our operation, the ability to provide continued access to our aircraft owners is adequate 'carrot' for us. It is hard for me to personally foresee a scenario where the proposed community projects fund would have a benefit to us or to our aircraft owners, it is more likely to be viewed as an additional potential financial burden.*

We hope the above feedback is useful and wish LCY well with this project."

Airline, 14 June 2017

"Are you looking to reduce the number of actual movements from 120k to 111k?

The old scheme and the new scheme will run in parallel from july '17- july '18. Will there be fines imposed during that period (£600/dB)?

2.5.4 is a little unclear: "The proposed quota budget is: i) 22,000 per calendar year; and ii) 742.5 in any one week". 22,000 of what?

4.1.2 seems oddly pointless; I understand the 600/dB fine element, but the "LCA will partner with the airline who has the most improved noise performance each year (based on a single aircraft type) to deliver an annual Community Projects Fund." isn't going to incentivise an airline crew to operate differently - as we've discussed before we already do more of less everything we can to reduce noise on the takeoff roll, (though there could be improvements after takeoff).

It seems to me that once an aircraft type is permitted, there is no incentive for us to operate more quietly. The only significant incentive will be to avoid the £600/dB fine, which we won't have much choice about if it's either that or not taking off safely.

A more progressive solution might be for the cash created from the 600/dB fines to be paid back to an airline that operates on yearly average more than 0.5dB under their certified noise level, or some similar system."

Airline, 30 June 2017

"We welcome:

- *The introduction of a more up-to-date and more comprehensive system of noise measurement than is currently used. At present only noise from departures are measured and only very close to the airport. The new system will monitor arrivals and departures and across a wider geographical area*

- *The fact the new system will categorise aircraft in 1db bands rather than 3db under the existing system, so will be more exact.*
- *The agreement that a report on ANCS will be submitted to Newham each quarter and that the results will be reviewed each year*
- *The commitment that no noisier aircraft than currently operate at the airport will be allowed to operate in future.*
- *The actual movements (under the CADP1 permission) will be a maximum of 111,000 per year. "*

Community Group, 03 July 2017

- 1) *"Why are you not consulting the London Borough of Waltham Forest or its residents when so many residents here are directly and adversely affected by aircraft noise?"*
- 2) *More aircraft noise monitors are needed to establish the effect on all the communities under the flight paths. We need monitors in Waltham Forest directly under the flight paths.*
- 3) *The noise quotas suggested in the draft proposals allow aircraft noise which is far too high (in particular band A and B: 91.6 -94.5 and 88.6 to 91.5 perceived noise decibels). I am disturbed by loud aircraft noise every few seconds, I cannot escape it anywhere in my house, the garden which used to be peaceful, is now a stressful place to spend time in.*
- 4) *The penalties for exceeding noise levels/quotas are far too low (i.e. £600 per decibel) considering how much profit airlines make. The penalties should be based on a percentage of annual profit. I would suggest a penalty of 30% of annual profit per decibel as a tax on poor quality noise control, this would be a far greater incentive to reduce noise levels.*
- 5) *The report says that money collected from penalties for exceeding decibel limits will go to fund "local community initiatives" to benefit the local community. Could you also consider triple glazing houses under the flight paths? In addition, there needs to be a fund to compensate people who cannot sell their houses because of aircraft noise.*
- 6) *I am opposed to an annual quota of aircraft noise as it allows large aircraft to fly too low over high density residential areas, there should be an upper decibel limit that an individual aircraft can make so that it does not disturb residents below its flight path.*
- 7) *The draft proposals state that there are no night flights between 22.30 and 6.30, but I hear planes after 11pm, I hear them at 3am and the planes start flying over my house every few seconds from 5.30am. Can you explain this?*
- 8) *Why can't the aircraft fly higher over densely populated areas like Walthamstow to reduce air and noise pollution?*
- 9) *This consultation has not been carried out properly as many residents of Waltham Forest directly affected by aircraft noise will be unaware of it. If the London Borough of Waltham Forest had been part of the consultation process they could have called a public meeting so that residents could discuss the*

implications of the proposals on their daily lives. Therefore this consultation should be carried out again with an extended deadline and the consultation should include all the residents and London Boroughs affected by aircraft noise from City Airport."

Resident, 03 July 2017

"I reviewed the scheme, and as far as I understand it does not ban the two types of [aircraft type]."

Airline, 05 July 2017

Having read the Non Technical Summary relating to the above, I am of the view that the ANCS will be an improvement on the current Noise Factored Movement (NFM) system. I think the ANCS offers a more refined and comprehensive system for measuring aircraft noise. I am pleased the proposed ANCS will not allow noisier aircraft than those currently operating at the airport or a higher number of aircraft to operate at the airport than permitted under its current 2009 planning permission or the CAPP 1 permission, when it is implemented.

The introduction of an Incentives and Penalties Scheme to reward improved performance and penalise poor performance in relation to aircraft noise is a welcome supplement to the noise restrictions imposed by the ANCS, especially as the scheme will benefit the local community.

I note a report will be produced as part of the Annual Performance Report that will record performance and/or compliance with the approved ANCS during the previous calendar year, and that the results of noise monitoring will be reviewed at the end of each calendar year and submitted to the London Borough of Newham (LBN). I think these arrangements are also a positive feature of the proposed ANCS.

ANCS with its more accurate categorisation and the introduction of quieter planes could allow more planes to use the airport. It is therefore welcome that in late 2019 approximately flights will be limited to 111,000 per year, as per the July Airport Development Programme Planning Permission (CADD 1) REF. (13/01228/FUL) condition 23 k, rather than the current 120,000 flights per year.

It is very good that you are consulting the Environmental Teams of the London Boroughs of Newham, Greenwich, Barking and Dagenham, Tower Hamlets, Redbridge, Havering and Waltham Forest. about this matter. My one concern about this is that the communication may not always find its way to the person responsible for dealing with it. If you are not already doing so, I think you need to identify the person concerned and contact them directly, to ensure your communication is given due consideration and that hopefully you receive a considered response.

Thank you for considering my comments.

Resident, 08 July 2017

"I live in Wanstead E11 under existing flight paths and can confirm a major increase in aircraft noise since the 2016 concentration of flight paths.

I therefore welcome any move to better measure and restrict aircraft noise and the proposed quota system seems sensible.

My main question is where the "continuous monitoring" stations will be situated and how accurately these will reflect the real-world impact of noise across the full range of affected neighbourhoods. As these will be the only way of validating whether the certification data is accurate, it's key that monitoring is not just conducted in the immediate vicinity of the airport."

Resident, 12 July 2017

"Noise from overflying aircraft from London City Airport is noticeable to residents in parts of the London Borough of [confidential] and for some it has been the cause of complaint.

The LB [confidential] broadly welcomes the new ANCS. In particular we strongly support the following :-

- 1) That it takes into account noise impacts on the wider community, not just the airport's immediate surroundings.

- 2) *That it ensures that no noisier aircraft than currently operate at the airport will be allowed to operate in future.*
- 3) *That it improves on the existing NFM system by taking account of “flyover” noise in as well as “sideline” noise, the former being more relevant to [confidential] residents.*
- 4) *That aircraft are more accurately categorised into narrower 1dB noise bands.*
- 5) *That upper noise limits have been set and the granting of certificates for aircraft types depend on meeting a standard for flyover noise.*

Recently we have been contacted by [confidential] of HACAN East. She suggested that flightpaths can be increased in number or broadened so as to make them less concentrating of noise at ground level. If this is feasible within the constraints of safety then LB [confidential] would be supportive”.

London Borough, 12 July 2017

“We have reviewed the AMCS documentation and estimated it as acceptable.”

Airline, 13 July 2017

- 1) *“Article 2.4.2: Clarify if the aircraft has to be certificated under Chapter 4 rule or just to comply with Chapter 4 noise requirements to be eligible for operation permission in London City Airport.*
- 2) *Article 3.2.1: Clarify if the results of noise monitoring will be used to eventually review the aircraft type permission to operate on London City Airport.*

Comment: the position of the noise monitors may not accurately replicate the three noise certification points (flyover, approach and sideline).

- 3) *Article 4.1.2: Define the threshold (noise limits) that will be considered on the application of the fine and detail the rules (threshold calculation method, fine application frequency and possible different thresholds by aircraft type).”*

Aircraft Manufacturer, 14 July 2017

“The London Borough of [confidential] welcomes the introduction of the Aircraft Noise categorisation Scheme (ANCS).

LB [confidential] residents, particularly those residing in the South of the Borough, are impacted by noise from aircraft using City Airport and we receive regular complaints from residents in Leytonstone and Leyton areas about this issue. LB [confidential] would like to receive the quarterly and annual noise monitoring results, as these areas are the worst affected in the borough from aircraft noise.

It is not clear from the report how the Community Projects Fund is to be managed. Our expectation is that it would expect community projects in the borough to benefit from such monies and would like further involvement in this fund.”

London Borough, 14 July 2017

APPENDIX 2

CURRENT NOISE FACTORED SCHEME

as described in Condition 7 and the Section 106 Agreement
associated with the planning permission for 120,000 annual aircraft movements
(dated 9 July 2009)

(7) (1) No type of aircraft may, save in an emergency, use the Airport unless the noise level of that aircraft complies with a category established in accordance with this condition.

(2) Aircraft types using the airport shall be placed in categories and allocated noise factors as set out below:

Category	Noise Reference Level	Noise Factor
A	91.6-94.5	1.26
B	88.6-91.5	0.63
C	85.6-88.5	0.31
D	82.6-85.5	0.16
E	Less than 82.6	0.08

- where the noise reference level is the departure noise level at the four noise categorisation locations shown on Plan P1 that accompanies this permission, expressed in PNdB and established as set out below.

(3) Before any aircraft shall use the Airport a provisional noise categorisation for that aircraft type shall be approved in writing by the local planning authority and shall be based on the results of monitored trial flights of the particular aircraft type from the airport carried out in accordance with written proposals (including details as to how the trial flights are to be organised) before any such trial flights take place to be submitted to and approved in writing by the local planning authority.

(4) Annually on 31 December the provisional categorisation of each approved aircraft type shall be reviewed (PROVIDED THAT if the provisional categorisation for an aircraft type has been approved in the period between 1 October and 31 December of the year in question then the provisional categorisation of that aircraft type shall be reviewed on 31 December in the following year) having regard to the departure noise levels recorded in accordance with paragraph (6) below, and by 1 July in the following year details shall be submitted in writing to the local planning authority of the results of the review whereupon the provisional categorisation of each approved aircraft type shall be confirmed or amended in agreement in writing with the local planning authority having regard to the monitored values.

(5) Any such amendment may, with the agreement in writing of the local planning authority, include the introduction of sub-categorisation into narrower bands provided that noise factors appropriate to any such bands are calculated and applied.

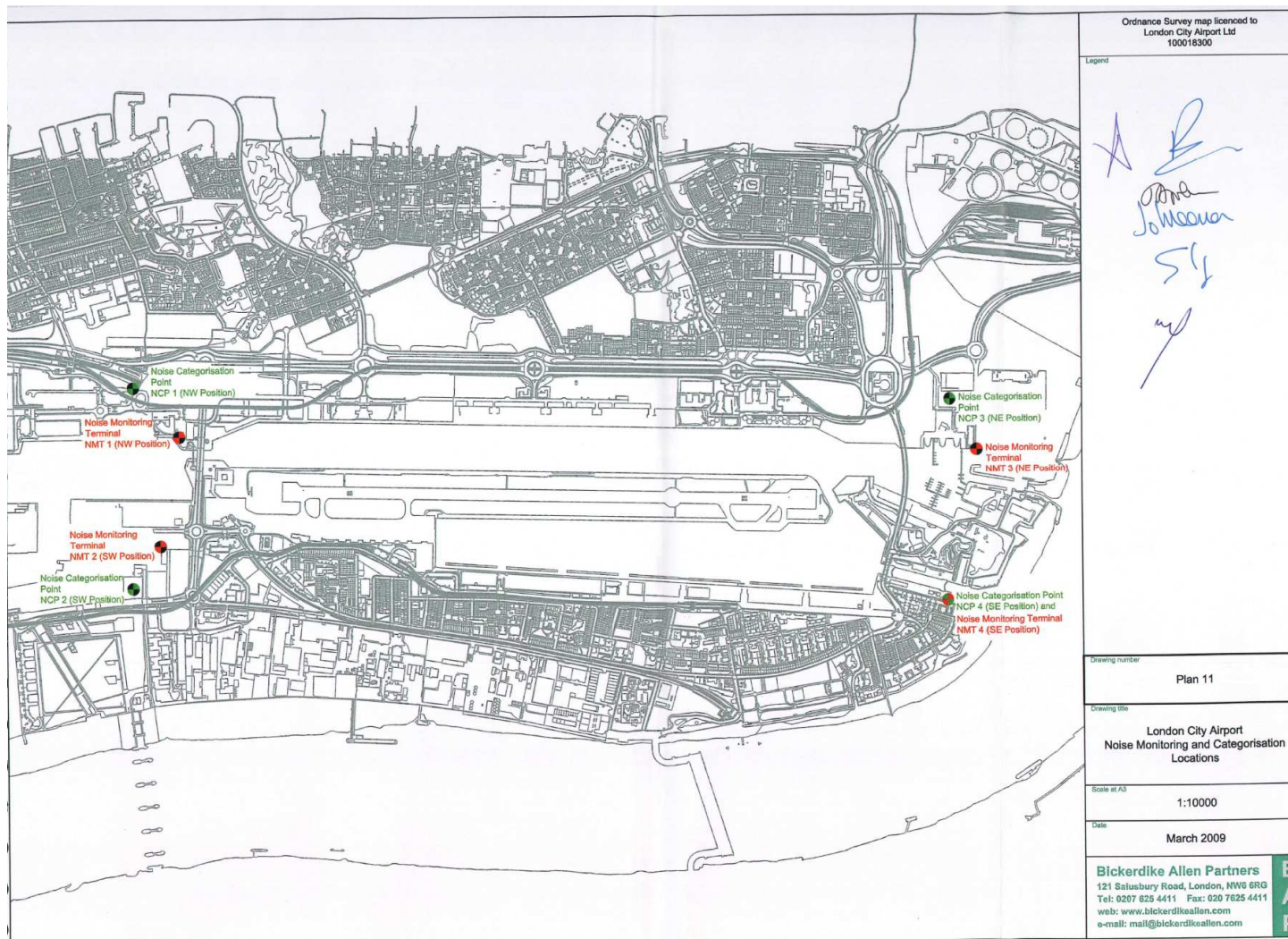
(6) The Airport shall for the above purposes operate a system of continuous noise monitoring at positions as close as practicable to the four noise categorisation locations shown on Plan P1

that accompanies this permission; the details of the system are to be as approved in writing by the local planning authority and the results made available to the local planning authority.

(7) Annually on 1 July, 57 dB $L_{Aeq, 16h}$ 66 dB $L_{Aeq, 16h}$ and 69 dB $L_{Aeq, 16h}$ contours (average mode summer day) shall be produced as required by the S106 Agreement in accordance with the Federal Aviation Authority's Integrated Noise Model Version 7 or later version or other model, any of which complies with the methodology described in ECAC CEAC Doc 29 or Department for Transport equivalent method.

(8) If agreed expressly by the local planning authority in writing, the terms of this condition shall be superseded by any relevant new methodology, noise categories, noise reference levels, noise factors and procedures for categorisation agreed with the local planning authority, following completion of the Aircraft Categorisation Review, and by any relevant noise monitoring agreed with the local planning authority as part of the new Noise Monitoring and Mitigation Strategy (NOMMS), both of which are required by the Section 106 Agreement that accompanies this permission.

Plan 1 as referenced in Condition 7 (Plan 11 in S106 Agreement dated 9 July 2009)



APPENDIX 3
GLOSSARY OF ACOUSTICAL AND AVIATION TERMS

GLOSSARY OF ACOUSTICAL AND AVIATION TERMS

General

Sound

This is a physical vibration in the air, propagating away from a source, whether heard or not.

The Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2×10^{-5} Pascals) and the threshold of pain is around 120 dB.

The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in watts. The sound power level, L_w is expressed in decibels, referenced to 10^{-12} watts.

Frequency, Hz

Frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules that transmit the sound and is measure as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the ranges which are typically used for building acoustics purposes are 63 Hz to 4 kHz (octave bands) and 100 Hz to 3150 Hz (one-third octave bands).

A-weighting

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

Environmental Noise Descriptors

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

Statistical Term	Description
$L_{Aeq,T}$	The most widely applicable unit is the equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound.
L_{A90}	The level exceeded for 90% of the time is normally used to describe background noise.
$L_{Amax,T}$	The maximum A-weighted sound pressure level, normally associated with a time weighting, F (fast), or S (slow)
PNL	Perceived Noise Level (PNL), in units of PNdB, is an instantaneous measurement of noise corrected for the typical human response to aircraft noise, based on the equal loudness contours.
EPNL	Effective Perceived Noise Level (EPNL), in units of EPNdB, is a single number evaluator of the subjective effects of aircraft noise in human beings. It is derived from a series of instantaneous PNL values over the duration of an event and corrected for spectral irregularities, also known as tonal effects.

Ambient Noise

Usually expressed using $L_{Aeq,T}$ unit, commonly understood to include all sound sources present at any particular site, regardless of whether they are actually defined as noise.

Background Noise

This is the steady noise attributable to less prominent and mostly distant sound sources above which identifiable specific noise sources intrude.

Sound Transmission in the Open Air

Most sources of sound can be characterised as a single point in space. The sound energy radiated is proportional to the surface area of a sphere centred on the point. The area of a sphere is proportional to the square of the radius, so the sound energy is inversely proportional to the square of the radius. This is the inverse square law. In decibel terms, every time the distance from a point source is doubled, the sound pressure level is reduced by 6 dB.

Road traffic noise is a notable exception to this rule, as it approximates to a line source, which is represented by the line of the road. The sound energy radiated is inversely proportional to the area of a cylinder centred on the line. In decibel terms, every time the distance from a line source is doubled, the sound pressure level is reduced by 3 dB.

Factors Affecting Sound Transmission in the Open Air

Reflection

When sound waves encounter a hard surface, such as concrete, brickwork, glass, timber or plasterboard, it is reflected from it. As a result, the sound pressure level measured immediately in front of a building façade is approximately 3 dB higher than it would be in the absence of the façade.

Screening and Diffraction

If a solid screen is introduced between a source and receiver, interrupting the sound path, a reduction in sound level is experienced. This reduction is limited, however, by diffraction of the sound energy at the edges of the screen. Screens can provide valuable noise attenuation, however. For example, a timber boarded fence built next to a motorway can reduce noise levels on the land beyond, typically by around 10 dB(A). The best results are obtained when a screen is situated close to the source or close to the receiver.

Meteorological Effects

Temperature and wind gradients affect noise transmission, especially over large distances. The wind effects range from increasing the level by typically 2 dB downwind, to reducing it by typically 10 dB upwind – or even more in extreme conditions. Temperature and wind gradients are variable and difficult to predict.

Aviation Terms

Air Transport Movements

Air transport movements are landings or take-offs of aircraft engaged on the transport of passengers, cargo or mail on commercial terms. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.

NPR

Noise preferential route – departure flight ground tracks to be followed by aircraft to minimise noise disturbance on the surrounding population.

Dispersion

Due to the effect of the wind, aircraft speed, and pilot choice differing aircraft tracks about the nominal track are flown; this is known as dispersion around a nominal track.

Start of Roll

The position on a runway where aircraft commence their take-off runs.

Threshold

The beginning of that portion of the runway usable for landing.

Radar Vectoring

Aircraft are provided by Air Traffic Control with various instructions which result in changes of heading, altitude and speed. The controller affects safe separation from other traffic by use of radar.

Nominal Tracks

Using recognised international design techniques, tracks across the ground can be delineated for departing and arriving aircraft. These tracks are nominal because they can be influenced by the wind, ATC instructions, the accuracy of navigational systems and the flight characteristics of individual aircraft. In UK it is usual to permit a 1500m swathe to be established about the nominal track for the purposes of assessing whether an aircraft has stayed on track.

AAL

Height of aircraft above aerodrome level.

Altitude

Height of aircraft above sea level.

Night Period

The period from 23.00 to 07.00 hours.

Night Quota Period

The period from 23.30 to 06.00 hours.

Noise Classification (QC Value)

This means the noise level band in EPNdB, for take-off or landing, as the case may be, for the aircraft. The bands are identified as QC/0.5, QC/1, QC/2, QC/4, QC/8, QC/16, and are 3 dB wide.

Quota Count

This means the amount of the quota assigned to one take-off or to one landing by an aircraft, this number being related to its noise classification.

Noise Footprint

A noise contour which joins points on the ground which receive the same maximum noise level from the nearby airborne aircraft; often for night studies 90 dB(A) SEL is the level used.

APPENDIX 4
DERIVATION OF DEPARTURE AND ARRIVAL LEVEL FOR QUOTA COUNT
ASSESSMENT

Derivation of Departure and Arrival Level for Quota Count Assessment

The basic principles of how to calculate the departure and arrival level as part of the Night Noise Quota Counts that are in place at Heathrow, Gatwick and Stansted Airports are described in a report prepared by the Civil Aviation Authority¹⁹

These principles are adopted in the LCA Quota Count Scheme with some slight modifications and are as follows:-

- i) The noise classification of aircraft into 1 EPNdB wide QC categories or bands is based on certificated (for departure) and calculated (for approach) Effective Perceived Noise Level (EPNL, in units EPNdB).
- ii) The Departure Noise Level is determined from the aircraft's noise certification values (EPNLs) for sideline and flyover based on the following equation:
$$\text{Departure Noise Level} = (\text{Sideline EPNL} + \text{Flyover EPNL})/2$$
- iii) The Arrival Noise Level is determined from the approach noise level derived as described in Section 2.2.2 above and the equation:
$$\text{Arrival Noise Level} = \text{Approach Noise Level EPNL} - 9$$
- iv) For propeller aircraft with maximum take-off weight (MTOW) not exceeding 5700 kg (i.e. those not subject to such criteria) and older propeller aircraft also not subject to these criteria are classified according to assumptions based on available noise data.
- v) The Departure Noise Level and (separately) the Arrival Noise Level are matched in Table 1 with the relevant noise band to determine the associated quota count (QC) classification for the specific aircraft type.

The terms “sideline” and “flyover” appear in this ANCS and also in LCA’s Noise Management and Mitigation Scheme (NOMMS) but carry different meanings in each. Annex 1 attached to this appendix provides an explanation of these terms in the context of both the ANCS and the NOMMS.

¹⁹ ERCD Report 0204 Review of the Quota Count (QC) System: Re-Analysis of the Differences Between Arrivals and Departures

ANNEX 1

EXPLANATION OF “SIDELINE” AND “FLYOVER” POINTS IN THE NOMMS AND ANCS

The *terms* “sideline” and “flyover” are used in the NOMMS²⁰ and ANCS²¹ to describe a point or location where aircraft noise is either measured or assessed. In the NOMMS, the terms are used to describe locations where London City Airport’s (LCA’s) fixed noise monitors are located. In the ANCS, the terms are used to describe noise certification points prescribed by the International Civil Aviation Organisation (ICAO). Although the terms “sideline” and “flyover” used in the NOMMS and ANCS are identical, they are not in the same position. To avoid confusion, this note provides a short description of the location of the sideline and flyover points for both the NOMMS and ANCS.

NOMMS uses a number of fixed noise monitors to determine noise levels from departing and arriving aircraft at the airport. For historic reasons the location of these monitors are categorised as either *sideline* or *flyover* locations depending on where they are with respect to the flight path of departing or arriving aircraft. The results are used primarily for noise management purposes through a Penalties and Incentives Scheme.

The ANCS categorises and assesses aircraft by using noise certification data determined in accordance with procedures set out by ICAO. Each aircraft operating in the UK has a noise certificate describing its noise emissions under carefully controlled conditions, at three noise certification points. These certification levels are indicators of aircraft noise performance and are determined at three points in accordance with prescribed international procedures. These procedures also use the terms *sideline* and *flyover* for two of these three points (the third is the *approach* point).

NOMMS - noise monitor locations

A continuous noise monitoring system was first installed and became operational at the Airport in 1992. A system of this type has been in place ever since that time and was upgraded in 1999 when a flight track monitoring system was also installed. The noise and flight track monitoring system was further updated in 2013. Historically, this noise and flight

²⁰ NOMMS – Noise Management and Mitigation Strategy

²¹ ANCS – Aircraft Noise Categorisation Scheme

track monitoring system (NFTM) comprised four fixed noise monitors. These four monitors known as NMTs 1 to 4 are all located close to the Airport.

Under the NOMMS, two new fixed noise monitors (NMTs 5 and 6) and a mobile noise monitor are incorporated within the NFTM.

The six fixed noise monitors shown in Figure 1 are used to measure noise levels during an aircraft departure. These measured noise levels are used to determine the Sideline Noise Level and Flyover Noise Level for comparison with limits set in relation to the airport's Penalties and Incentives scheme which forms part of the NOMMS. The Sideline Noise Level and the Flyover Noise Level are compared against the fixed penalty limit and credit thresholds to determine whether a credit or penalty should be applied to the operator of the aircraft.

As NMTs 1 and 2, and 3 and 4 lie on either side of the flight path of a departing or an arriving aircraft these are designated as "sideline" locations. For aircraft departures on Runway 27, the Sideline Noise Level is determined from the arithmetic average of the maximum noise level ($L_{Amax,S}$) measured at NMT 1 and 2.

For aircraft departures on Runway 09, the Sideline Noise Level is determined from the arithmetic average of the maximum noise level ($L_{Amax,S}$) measured at NMT 3 and 4.

As NMTs 5 and 6 lie approximately underneath the flight path of a departing aircraft these are designated as "flyover" locations. For aircraft departures on Runway 27, the Flyover Noise Level is determined from the maximum noise level ($L_{Amax,S}$) measured at NMT 5. For aircraft departures on Runway 09, the Flyover Noise Level is determined from the arithmetic average of the maximum noise level ($L_{Amax,S}$) measured at NMT 6.

The locations of NMTs 1 to 6 are shown in Figure 1.



Figure 1: NOMMS - Location of Noise Monitoring Terminals

ANCS - noise certification level positions

The ANCS uses a Quota Count (QC) system as a means of limiting the noise generated by aircraft movements in a transparent and easily administered manner. It operates in a similar manner to the Night Noise Quota Count scheme used at the designated airports such as Heathrow, Gatwick and Stansted, and used at other UK airports such as Manchester. The QC system at LCA however would apply during the daytime, not the night-time. LCA seek to be the first airport to operate a daytime QC system in the UK. As is the case for the Night Noise Quota Count scheme, the QC system is based on aircraft noise certification data where each aircraft type is allotted a QC value based on the noise generated by the aircraft type on departure and arrival under prescribed certification conditions²².

²². Based on the certified operating weight or maximum permitted operating weight at LCA or on evidence presented to LBN which demonstrates to their satisfaction, confirmed in writing, that the aircraft is capable of operating at its permitted MTOW at LCA within the noise constraints applicable at the airport.

Certification levels, determined in accordance with prescribed procedures under ICAO Annex 16²³ and given in terms of the Effective Perceived Noise Level (EPNL), are used within the ANCS for a variety of reasons, including:

- to comply with UK Regulations²⁴
- they are reliable and independently verified indicators of aircraft noise performance;
- they are freely available for practically every relevant aircraft type²⁵.

Certificated noise levels for departing and arriving aircraft are determined under carefully controlled conditions at three positions:

- 450 metres sideline at noisiest point during an aircraft departure (referred to as Sideline or Lateral point);
- 6500 metres from start of roll, directly beneath the departing aircraft (referred to as Flyover point);
- 2000 metres from runway threshold, directly beneath the arriving aircraft (referred to as Approach point).

Figure 2, reproduced from ERCD 0205²⁶, illustrates these three noise certification points below.

²³. Annex 16 to the Convention on International Civil Aviation, Environmental Protection, Volume 1, Aircraft Noise

²⁴. Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003

²⁵. European Aviation Safety Agency (2016) *Aircraft type certificate data sheets*, [Online], Available: <http://www.easa.europa.eu/certification/type-certificates/aircraft.php> [6/09/2016].

²⁶. ERCD Report 0205 Quota Count Validation Study: Noise Measurements and Analysis, Civil Aviation Authority

