

LONDON CITY AIRPORT

2015 SECTION 106 ANNUAL PERFORMANCE REPORT

APPENDIX 12 ANNUAL NOISE CATEGORISATION REPORT

01 July 2016

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**LONDON CITY AIRPORT
ANNUAL CATEGORISATION REPORT
2015 NOISE MONITORING**

Report to

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ANC AVIATION NOISE CONSULTANTS

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Appendix A: Mean Annual Departure Noise Levels

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1.0 INTRODUCTION

In accordance with London City Airport's planning obligations, aircraft operating at London City Airport are required to be categorised by their departure noise level into one of five noise categories. This aircraft categorisation process is set out in detail in Condition 7 of the planning permission dated 9th July 2009.

The categorisation procedure requires that, before any aircraft is permitted to operate at London City Airport, a provisional noise categorisation for that aircraft type must be approved in writing by the local planning authority. Annually, a review of the categorisation is undertaken of each approved aircraft type having regard to the departure noise levels recorded using the airport's noise monitoring system. This report records the results of this review.

The airport's noise monitoring system records the departure events of aircraft over the categorisation year (January to December inclusive), the results of which are used to undertake the annual review of the categorisation of aircraft.

This report records the results of a review of the categorisation of those aircraft using the airport that received categorisation over the period 1st January 2015 up to and including 31st December 2015. The review is based on the results obtained from noise monitoring in the period 1st January 2015 up to and including 31st December 2015.

In Appendix A, this report includes a list of those aircraft that have already received confirmation of their categorisation to operate at London City Airport, together with their associated mean annual departure noise level (MADNL) recorded over the period 1st January 2015 up to and including 31st December 2015.

Information is also provided on the number of aircraft movements and noise factored movements that have taken place at the airport over the period 1st January 2015 up to and including 31st December 2015.

2.0 PLANNING REQUIREMENTS

The planning requirements concerning the categorisation of aircraft at London City Airport are set out in Condition 7(4) of the planning permission dated 9th July 2009.

It has been previously agreed that general aviation interim categorisation is simplified due to the small numbers of similar GA type aircraft. This was formally approved on the 19th November 1998 as planning application number P/98/0998, and places "*General Aviation:*

Executive Turbo-Fan Aircraft” in Category A and *“General Aviation: Non-Jet Aircraft”* in Category B, according to the noise exposure categories (NECs) discussed in Section 2.1 below.

2.1 Noise Categories

Condition 7(2) to the planning permission of 9th July 2009 states that:

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

Category	Noise Reference Level (PNdB)	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...”

Figure 1 shows the noise categorisation points (NCPs) which are defined as being 2000 metres from the start-of-roll and 300 metres sideline from the extended centre line of the runway.

The noise reference level is determined using the mean annual departure noise levels (MADNLs) measured by the noise monitoring system. The noise factors are multiplying factors to the actual number of aircraft movements and are used to obtain the number of factored movements at the airport. The permitted numbers of actual and factored movements at the airport are detailed below.

2.2 Number of Aircraft Movements

Condition 8 of the planning permission of 9th July 2009 details the number of movements that are permitted at the airport:

- “(1) The number of aircraft movements at the airport shall not exceed:*
- (a) 100 per day on Saturdays and 200 per day on Sundays but not exceeding 280 on any consecutive Saturday and Sunday*
 - (b) 592 per day on weekdays except 1 January, Good Friday, Easter Monday, the May Day holiday, the late May bank holiday, the late August bank holiday, 25 December and 26 December*

- (c) 132 on 1 January*
- (d) 164 on Good Friday*
- (e) 198 on Easter Monday*
- (f) 248 on the May Day Holiday*
- (g) 230 on the late May Bank Holiday*
- (h) 230 on the late August Bank Holiday*
- (i) 100 on 26 December*
- (j) 120,000 per calendar year*
- (2) In the event of there being a Bank Holiday or Public Holiday in England which falls upon or is proclaimed or declared upon a date or dates not referred to in sub-paragraph (c) to (i) (inclusive) of condition 8(1) then the number of aircraft movements permissible on that date shall not exceed 330 unless the local planning authority otherwise agrees in writing but in any event the limit for any particular date or dates shall not exceed 396 per day."*

In addition, condition 8(4) adds a requirement concerning the number of factored movements as stated below:

- "(4) The number of factored movements shall not exceed:*
- (a) In any one week the number of permitted aircraft movements for that week by more than 25%*
- (b) 120,000 per calendar year."*

Condition 8(5) defines a factored movement as stated below:

- "(5) For the purpose of condition 8(4) the number of factored movements shall be calculated by multiplying the number of take-offs and landings by each aircraft by the relevant noise factor for an aircraft of this type under condition 7 and adding together the total for each aircraft type using the airport."*

3.0 NOISE MONITORING

3.1 The Noise Monitoring System

A precision Brüel & Kjær (B&K) noise monitoring system was first installed in March 1992 consisting of four permanent noise monitoring terminals arranged in two gateway pairs. The four noise monitoring terminals (NMTs) were located as close as possible to the four noise categorisation points (NCPs), taking account of local site constraints. Correction factors were developed to account for any difference in position between the NMT and NCP.

This system was upgraded by B&K in 2000 and a flight track monitoring system added. In September 2013, the B&K noise and flight track monitoring system was replaced by Topsonic Systemhaus GmbH. The Topsonic system uses Norsonic noise monitoring equipment. No changes to the masts were made so measurements continue to be made at precisely the same positions as before.

The NMTs send data to a central computer each day for long-term storage and analysis. The analysis determines which noise events should be correlated with aircraft movements by referring to radar data (previously the flight information display system, FIDS, prior to 2000). The system records the aircraft movements for each day.

The categorisation procedure is based around the measurement of noise from departing aircraft at the four noise categorisation points, two at each end of the runway. As an aircraft flies through a gateway pair of noise monitors, the departure noise level is measured in dB(A) at each noise monitoring terminal. Corrections are applied to the measured noise level to take account of the noise monitors not being located exactly at the noise categorisation points and also for converting from the noise units of dB(A) into PNdB¹. Finally, the mean departure noise level is determined from the average of the resulting gateway pair corrected noise measurements.

This noise control regime described above has been in operation for approximately 20 years. During this time, a large amount of data has been obtained concerning the departure noise characteristics of aircraft in operation at the airport. As a result, it has been possible to categorise each aircraft type operating at the airport.

¹ dB(A) is the unit of the A-weighted Sound Level. PNdB is the unit of the Perceived Noise Level. The latter is considered to better represent the subjective noise of an aircraft noise event by taking into account the presence of any discrete tones.

For the existing noise monitoring system to operate efficiently, it is necessary to maintain the four noise monitors in operation and, as far as possible, to ensure that the landscape around each monitor is relatively clear of any large objects (such as buildings). Significant development has taken place around the airport over the years, particularly in close proximity to some of the noise monitoring terminals. This led to the need to relocate some of the noise monitors from their original positions (e.g. NMT 1 and NMT 3) to ensure more accurate noise monitoring. The current locations of the four noise monitoring terminals are shown in Figures 2 and 3.

During the calendar year of 2015, the noise and flight track monitoring system has been in operation every day. Each noise monitoring terminal was in operation every day with the following exceptions:

- NMT1 was not operational on 4th February due to a failure of the power supply.
- NMT2 was not operational for small parts of September, October, and December, and much of November. This was due to a fault in the fuel cell which required replacing.

The measurement of data achieved a correlation of 85% of all aircraft departures from the airport during 2015. This is above the target correlation rate (80%) set out in the Temporary Noise Monitoring Strategy.

4.0 RESULTS

4.1 Noise Levels

The following correction factors have been determined from previous studies² and are applied to account for the NMT to NCP relationship and any associated reflection effects, see below:

NMT	NMT – NCP and reflection effect correction factors
1 (NW)	-6.1
2 (SW)	-4.6
3 (NE)	-6.4
4 (SE)	-1.7

Confirmation of categorisation is sought for the Embraer Phenom 300, for which provisional categorisation was approved in November 2014. Table 4.1 below sets out the agreed

² NMT Correction Factor Assessment Report, Bickerdike Allen Partners, Report A1125-111-R01-PH, 9th July 2008.

provisional categorisation together with the measured departure noise level during 2015 and the categorisation for which confirmation is sought.

Aircraft Type	Date of Provisional Categorisation on Approval	Measured Noise Level (PNdB)	2015 Approved Provisional Noise Category	Noise Category – Confirmation Sought
Embraer 300	10/11/2014	89.9	A	A

Table 4.1: 2014 Provisional Categorisation

Table 4.1 indicates that for 2015 (90 recorded departures) this aircraft’s mean annual noise level was below the lower noise limit of Noise Exposure Category A of 91.6 PNdB. Turbo-fan aircraft are categorised universally as Category A, therefore the Airport seeks confirmation of Category A for the Embraer Phenom 300.

A full list of aircraft types and their associated mean annual departure noise level recorded over the period 1st January 2015 up to and including 31st December 2015 is included in Appendix A.

4.2 Aircraft Performance

The noise levels presented in Appendix A indicate that whilst some aircraft are operating below their categorisation, such as the Embraer 135 and various turbo-fan executive aircraft, two are operating above their category; the RJ-100 and the Dornier 328 Jet.

The RJ-100 aircraft has operated outside of category since 2009, and did so again in 2015 by 0.1 dB. This represents a 0.2 dB improvement on the previous year. This improvement is due to the ongoing work that the airport and the operator of the RJ-100, Swiss International, are doing to bring the aircraft back within category. The RJ-100 has successfully operated within Category A in the past and the annual average has reduced every year since 2012. The performance of the RJ-100 has been provided on a bi-monthly basis to the London Borough of Newham accordingly.

At the same time, the number of RJ-100 departures at the airport continued to reduce in 2015 as it is phased out of operation. The RJ-100 was historically operated by a number of airlines. It has since been replaced by all airlines apart from Swiss International who continue to operate it on one route only, to Geneva. In June 2015, Swiss International replaced the RJ-100 on the Zurich route with the Embraer 190. Swiss International have also confirmed orders for the next generation of quieter aircraft (the Bombardier CS-100) that will replace the RJ-100 on the last remaining route (Geneva) when it arrives at the airport at the end of 2016.

Additionally, another aircraft, the Dornier 328 Jet, measured 2.1 dB over the upper limit of Category A. This aircraft was categorised at the airport in 2008 as a Category A aircraft. This followed some demonstration flights which provided evidence that the aircraft was capable of operating at LCA within Category A. The aircraft has operated only very occasionally since then. In 2015, the aircraft again operated rarely except for a period between June and September when 174 movements occurred. The aircraft is operated by Sun-air and the movements were undertaken by a single aircraft.

As soon as this 2015 exceedence became evident, the airport contacted Sun-air to notify them and to work with them to urgently bring the aircraft back into category. LBN Officers were also informed of the breach.

Sun-air immediately carried out a number of alternative take-off procedures in April 2016 to test the reduction in departure noise levels and bring the aircraft back into category. These alternative flight procedures have resulted in a reduction in noise level and Sun-air are confident that they will be successful in bringing the aircraft back into category in 2016. In the event that the alternative flight procedures do not bring the aircraft back into category in 2016, this aircraft will be banned from any further operations at airport. This ban would remain in place until the aircraft operator is able to demonstrate that it is capable of operating the aircraft within the airport's noise limits taking account of all expected operational conditions.

As of the end of June 2016, the aircraft has measured an average of 2.1 dB below the Category A limit in 2016 to date and therefore no further action is required. However, performance continues to be monitored and LBN are being provided with weekly updates.

Turbo-fan executive aircraft are categorised universally as Category A, and the turbo-prop executive aircraft are categorised universally as Category B. Appendix A indicates that most turbo-fan executive aircraft operated below Category A this year.

4.3 Number of Actual and Factored Aircraft Movements

Table 4.2 shows the number of actual and factored aircraft movements in the period 1st January 2015 to 31st December 2015 inclusive.

Aircraft Type	Number of Aircraft Movements	Noise Factor	Number of Factored Movements *
Airbus A318	979	1.26	1234
BAe 146	734	1.26	925
RJ85	13305	1.26	16764
RJ1H	5306	1.26	6686
Dornier 328 Jet	182	1.26	229
Embraer 135	148	1.26	186
Embraer 170	10486	1.26	13212
Embraer 190	22736	1.26	28647
Embraer 300	218	1.26	275
Dash 8-400	12304	0.63	7752
Fokker 50	5182	0.63	3265
Dornier 328	1644	0.63	1036
ATR 42	2169	0.63	1366
ATR 72	134	0.63	84
Saab 2000	4701	0.63	2962
General Aviation: Turbo-Fan Aircraft	4187	1.26	5276
General Aviation: Non-Jet Aircraft	87	0.63	55
TOTAL:	84502		89953

* Computed to the nearest whole number

Table 4.2: Aircraft Movement Numbers

The analysis indicates that the Airport is currently operating within the annual limits on aircraft movements and factored movements contained in condition 8 of the planning permission dated 9th July 2009.

5.0 CONCLUSIONS

This report presents mean annual departure noise levels of categorised aircraft based on data measured by the noise monitoring system during the period 1st January 2015 to 31st December 2015. Confirmation of the categorisation of the Bombardier Global 6000 and Embraer Phenom 300 as Category A aircraft has been sought.

Two aircraft have operated out of category in 2015; the RJ-100 and the Dornier 328 Jet. The airport is working closely with the airlines involved to bring these aircraft back into category. All other aircraft operated within or below their noise category in 2015.

This report also presents movement numbers for aircraft operating at London City Airport during the period 1st January 2015 up to and including 31st December 2015. During this period, the airport was operating within the annual limits on aircraft movements and factored movements contained in the planning conditions that apply to the Airport.

Nick Williams
for Bickerdike Allen Partners

Peter Henson
Partner

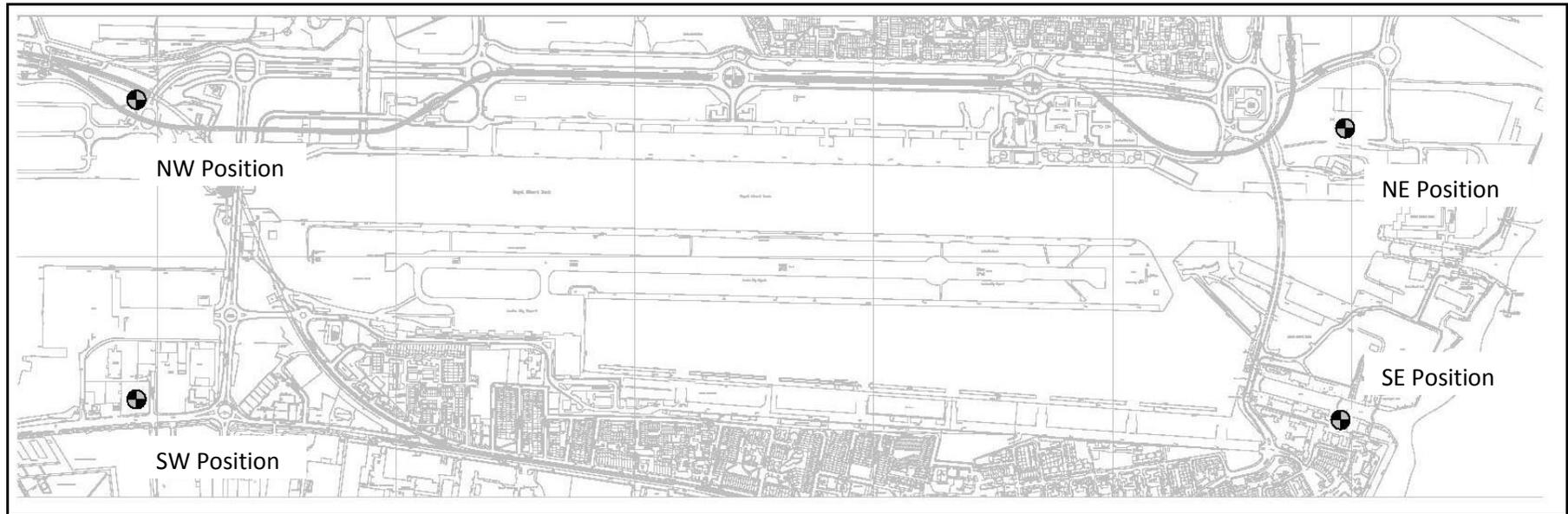


Figure 1 - Noise Categorisation Locations

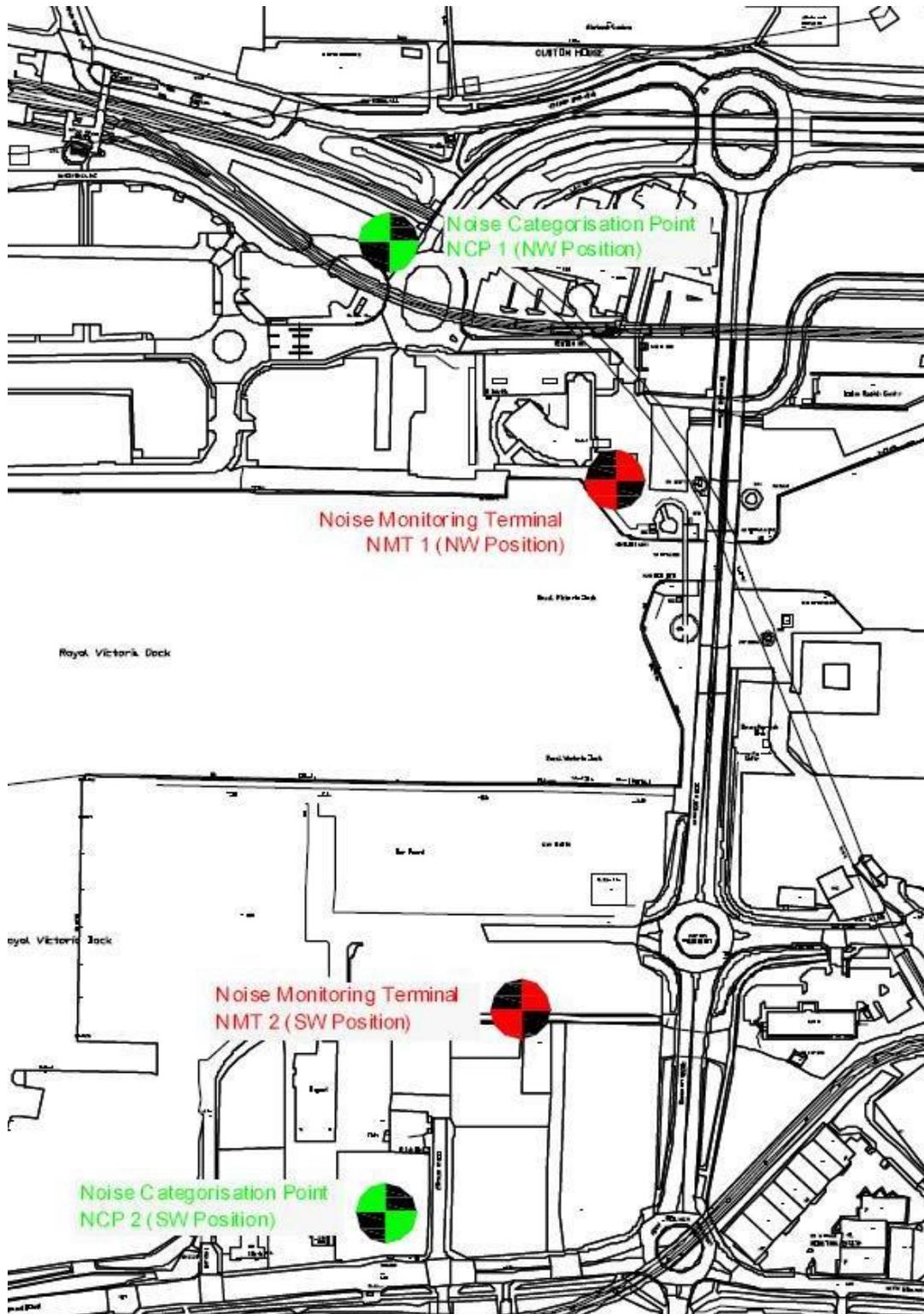


Figure 2 – Noise monitoring locations, west of runway

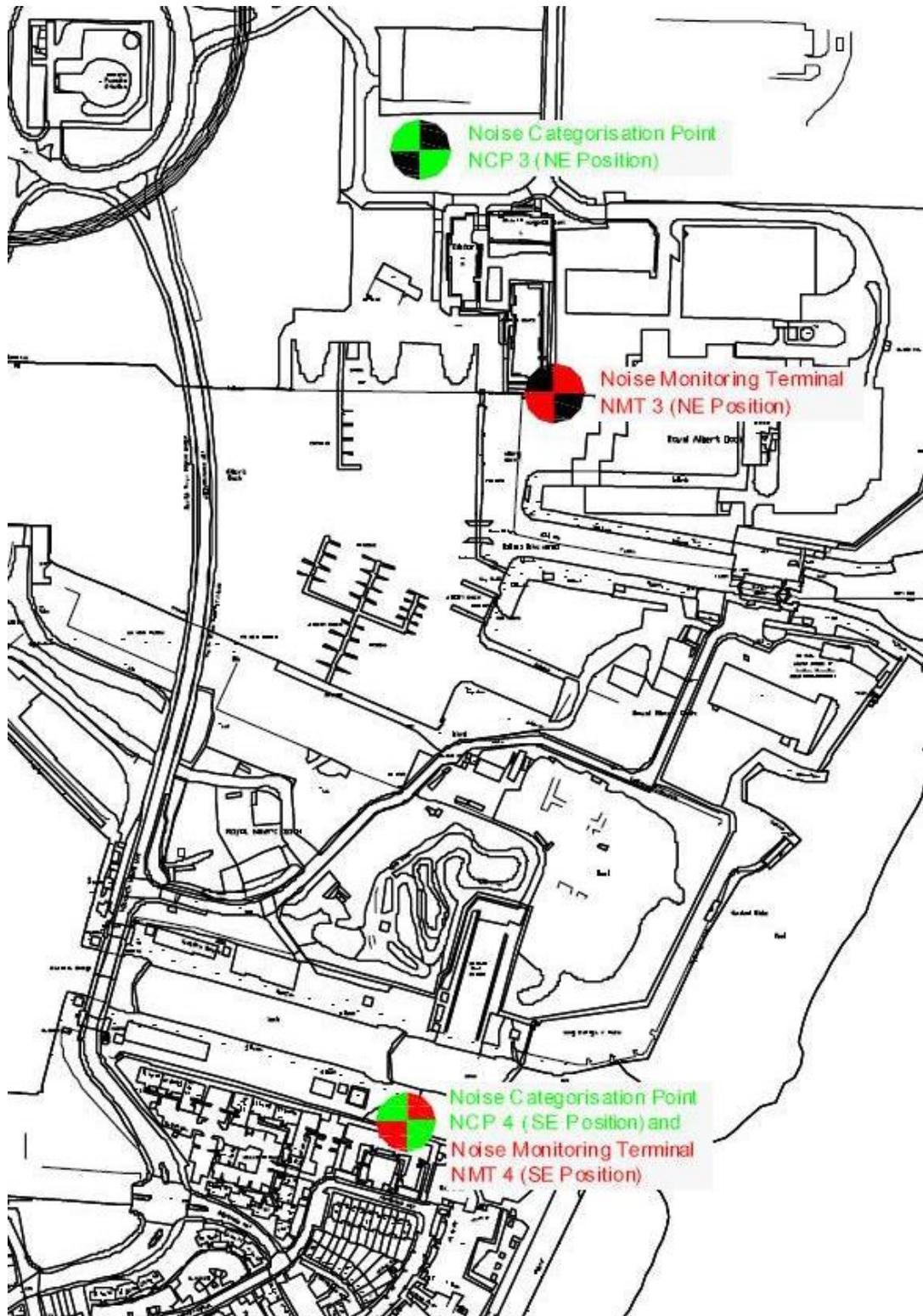


Figure 3 – Noise monitoring locations, east of runway

APPENDIX A

MEAN ANNUAL DEPARTURE NOISE LEVELS

Aircraft Type	Measured Noise Level (PNdB)	Noise Category
Airbus A318	92.7	A
ATR 42	90.1	B
ATR 72	90.9	B
BAe 146-100	--*	A
BAe 146-200	93.0	A
BAe 146-300	93.6	A
Bombardier Global 6000	91.5	A ¹
Canadair CL60	88.9	A
Cessna Citation C25A	88.8	A
Cessna Citation C25B	87.9	A
Cessna Citation C25C	--*	A
Cessna Citation C510	87.1	A
Cessna Citation C525	--*	A
Cessna Citation C550	87.1	A
Cessna Citation C560	--*	A
Cessna Citation C56X	86.9	A
Cessna Citation C680	88.8	A
Dassault Falcon 10	--*	A
Dassault Falcon 2000EX	85.8	A
Dassault Falcon 50	91.0	A
Dassault Falcon 900	87.6	A
Dassault Falcon 7X	85.9	A
Dornier 328	87.7	B
Dornier 328 Jet	96.6	A
Dash 8-400	89.6	B
Embraer 135	89.8	A
Embraer 170	92.9	A

Aircraft Type	Measured Noise Level (PNdB)	Noise Category
Embraer 190	94.3	A
Embraer 300	89.9	A ¹
Fokker 50	90.5	B
Gulfstream G150	--*	A
Learjet 40	--*	A
Learjet 45	86.6	A
Piaggio 180	90.3	B
Piper Navajo 31	--*	B
Raytheon Beechcraft 350	--*	B
Raytheon Beechcraft 200	--*	B
Raytheon Beechjet 400	--*	A
Raytheon Beechcraft 58	--*	B
Raytheon Hawker 800XP	89.4	A
RJ-85	93.2	A
RJ-100	94.6	A
Saab 2000	89.0	B

¹ Provisional Categorisation approved. Confirmation of Categorisation is being sought by the airport.

*Insufficient numbers recorded (i.e. fewer than 10 departures).

Table A1 – Mean Annual Departure Noise Levels 2015