LONDON CITY AIRPORT

2014 SECTION 106 ANNUAL PERFORMANCE REPORT

APPENDIX 11
ANNUAL NOISE CATEGORISATION REPORT

01 July 2015

London City Airport
City Aviation House
Royal Docks
London E16 2PB
Tel: 020 7646 0000
LondonCityAirport.com

London City Airport
Get closer.

Bickerdike
Allen
Partners
Architecture
Acoustics
Technology

LONDON CITY AIRPORT

ANNUAL CATEGORISATION REPORT

2014 NOISE MONITORING

Report to

Gary Hodgetts
Director Technical Operations
City Aviation House
London City Airport
The Royal Docks
London E16 2PB

A1125.57-R01.15-PH/VdH
20 May 2015

121 Salusbury Road
London NW6 6RG
T 020 7625 4411
F 020 7625 0250
mail@bickerdikeallen.com
www.bickerdikeallen.com

Contents

Page No.

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 provisional 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 provisional categorisation of aircraft.

This report records the results of a review of the provisional categorisation of those aircraft using the airport that received provisional categorisation over the period 1st January 2014 up to and including 31st December 2014. The review is based on the results obtained from noise monitoring in the period 1st January 2014 up to and including 31st December 2014.

In Appendix A, this report includes a list of those aircraft that have already received confirmation of their provisional categorisation to operate at London City Airport, together with their associated mean annual departure noise level (MADNL) recorded over the period 1st January 2014 up to and including 31st December 2014.

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 2014 up to and including 31st December 2014.

2.0 PLANNING REQUIREMENTS

The planning requirements concerning the provisional 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 new 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 where a noise monitor is not located exactly at the noise categorisation point and also for converting from the noise units of dB(A) into PNdB[1]. 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 2014, the noise and flight track monitoring system has been in operation every day. Each noise monitoring terminal was in operation every day with the exception of NMT 2, which, due to a power failure was non-operational on the 26th January, 14th to 16th February and 4th October. The measurement of data achieved a correlation of 94% of all aircraft departures from the airport during 2014.

4.0 RESULTS

4.1 Noise Levels

The following correction factors have been determined from previous studies[2] 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 provisional categorisation is sought for the Bombardier Global 6000, approved April 2014. Table 4.1 below sets out the agreed provisional categorisation together with the measured departure noise level during 2014 and the provisional categorisation for which confirmation is sought.

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

Aircraft Type	Date of Provisional Categorisation on Approval	Measured Noise Level (PNdB)	2014 Approved Noise Category	Noise Category – Confirmation Sought
Bombardier Global 6000	16/04/2014	89.6	A	A

Table 4.1: 2014 Provisional Categorisation

Table 4.1 indicates that for 2014 (66 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 Bombardier Global 6000.

The Embraer Phenom 300 (EMB-505) was approved with a Provisional Category A in November 2014. In accordance with Section 7, (4) of the Planning Conditions, provisional categorisation for this aircraft type will be reviewed following 31st December 2015 to allow an adequate data set to be obtained. A small number of operations in 2014 indicated that this aircraft is capable of operating below Category A.

A full list of aircraft types and their associated mean annual departure noise level recorded over the period 1st January 2014 up to and including 31st December 2014 is included in Appendix A.

4.2 Number of Actual and Factored Aircraft Movements

Table 4.2 shows the number of actual and factored aircraft movements in the period 1st January 2014 to 31st December 2014 inclusive.

Aircraft Type	Number of Aircraft Movements	Noise Factor	Number of Factored Movements *
Airbus A318	1042	1.26	1313
BAe 146	266	1.26	335
RJ85	11707	1.26	14751
RJ1H	7030	1.26	8858
Embraer 135	154	1.26	194
Embraer 170	9986	1.26	12582
Embraer 190	19351	1.26	24382
Embraer 300	24	1.26	30
Dash 8-400	4965	0.63	3128
Fokker 50	9231	0.63	5816
Dornier 328	2432	0.63	1532
ATR 42	1108	0.63	698
Saab 2000	3397	0.63	2140
General Aviation: Turbo-Fan Aircraft	4865	1.26	6130
General Aviation: Non-Jet Aircraft	79	0.63	50
TOTAL:	**75637**		**81939**

* 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 provisionally categorised aircraft based on data measured by the noise monitoring system during the period 1st January 2014 to 31st December 2014. Confirmation of the provisional categorisation of the Bombardier Global 6000 as a Category A aircraft is sought.

This report also presents movement numbers for aircraft operating at London City Airport during the period 1st January 2014 up to and including 31st December 2014. 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.

Valerie Van den Hende
for Bickerdike Allen Partners

Peter Henson
Partner

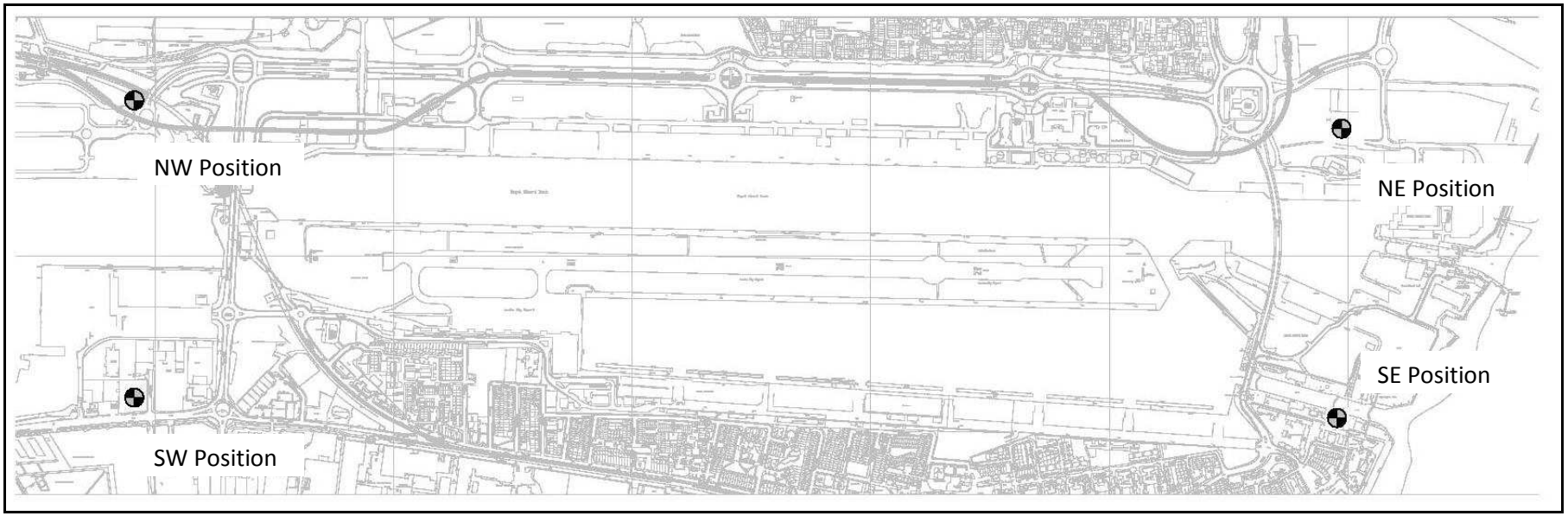

Figure 1 - Noise Categorisation Locations

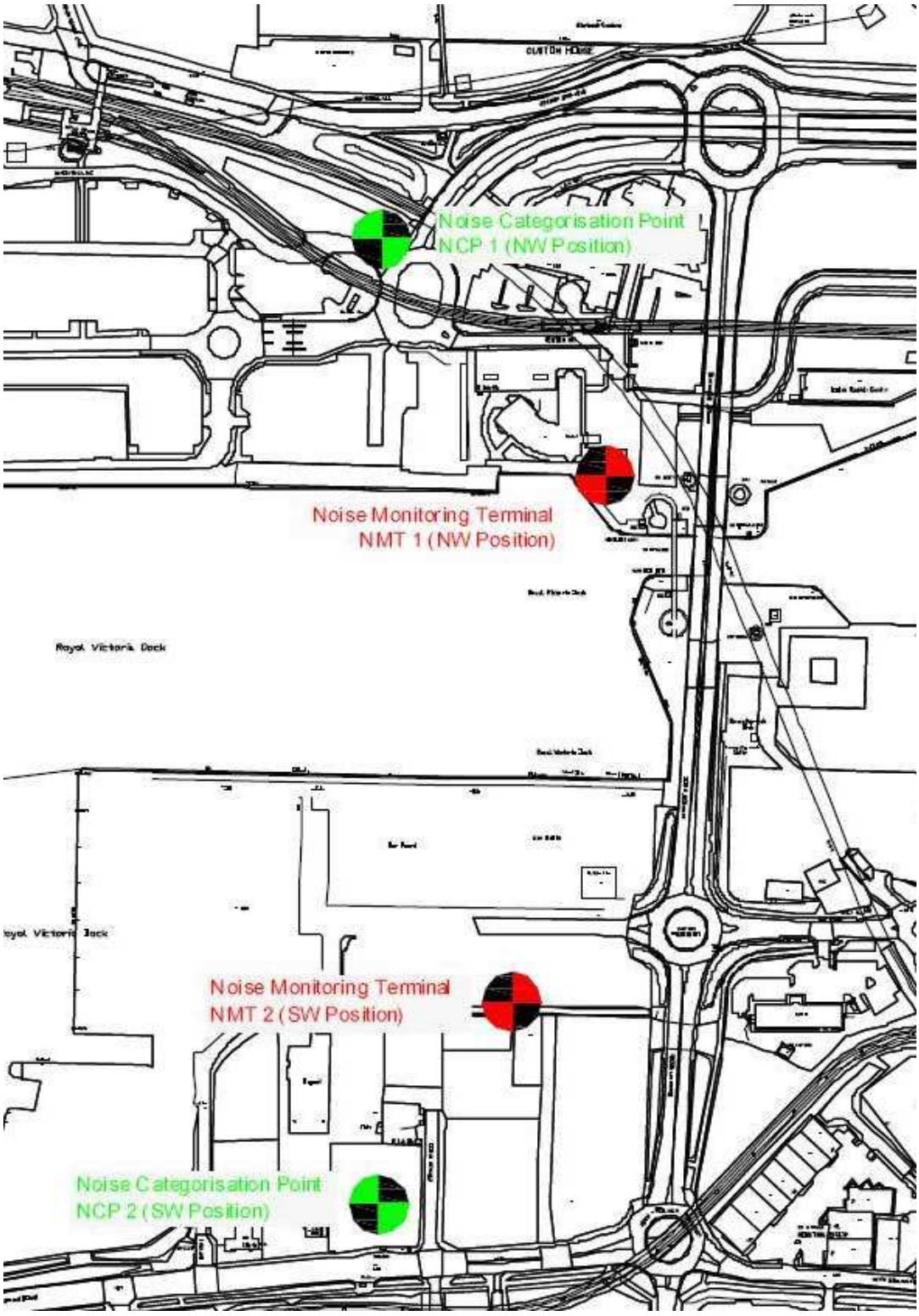

Figure 2 – Noise monitoring locations, west of runway

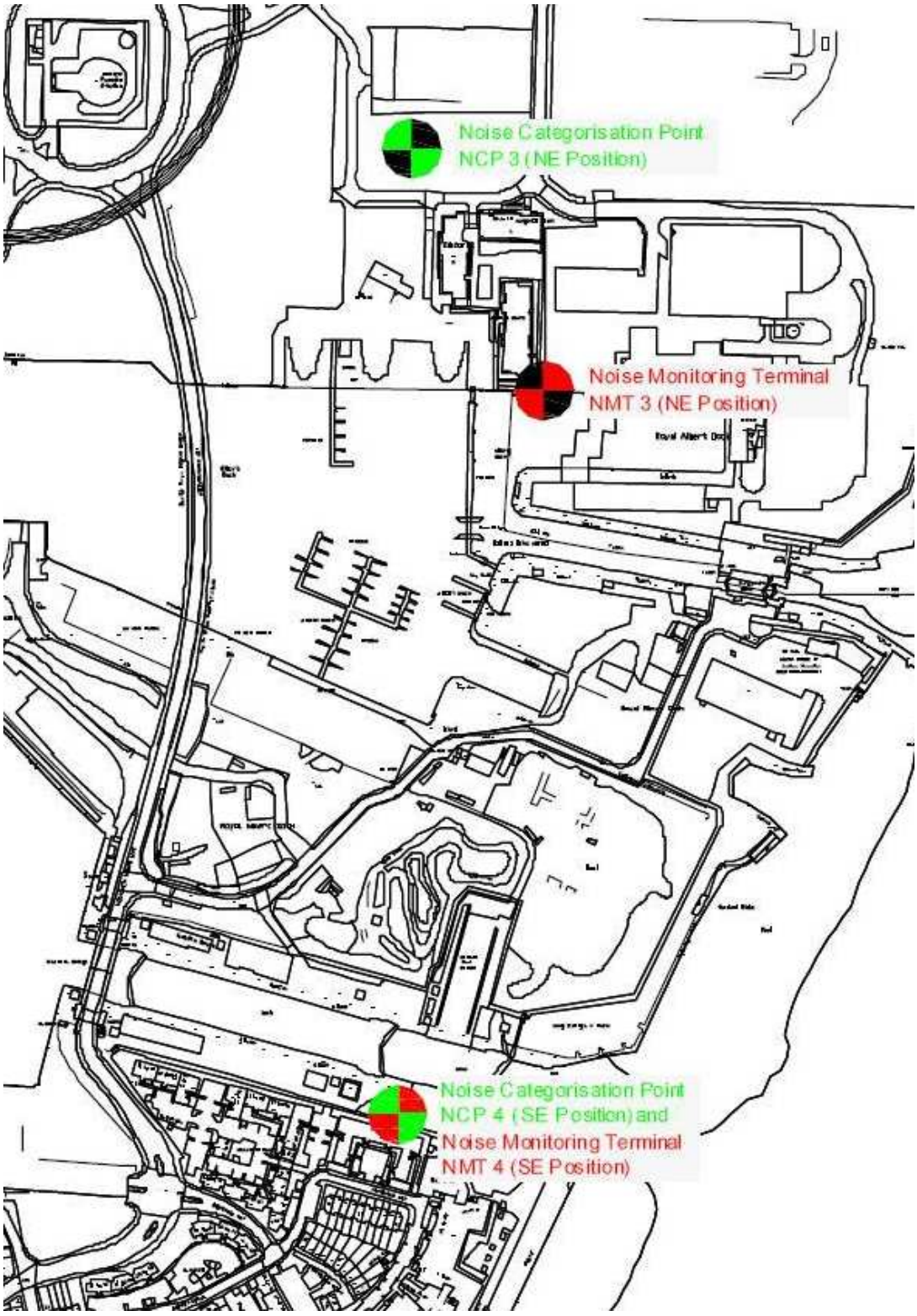

Figure 3 – Noise monitoring locations, east of runway

APPENDIX A

MEAN ANNUAL DEPARTURE NOISE LEVELS

Aircraft Type	Measured Noise Level (PNdB)	Provisional Noise Category[1]
Airbus A318	93.2	A
ATR 42	90.5	B
ATR 72	--*	B
BAe 146-100	--*	A
BAe 146-200	93.1	A
BAe 146-300	93.2	A
Canadair CL60	90.2	A
Cessna Citation C25A	89.4	A
Cessna Citation C25B	88.4	A
Cessna Citation C25C	--*	A
Cessna Citation C510	87.2	A
Cessna Citation C525	89.8	A
Cessna Citation C550	87.9	A
Cessna Citation C560	--*	A
Cessna Citation C56X	86.6	A
Cessna Citation C680	88.9	A
Dassault Falcon 10	--*	A
Dassault Falcon 2000EX	86.9	A
Dassault Falcon 50	90.5	A
Dassault Falcon 900	88.5	A
Dassault Falcon 7X	86.3	A
Dornier 328	88.1	B
Dornier 328 Jet	--*	A
Dash 8-400	89.7	B
Embraer 135	90.1	A
Embraer 170	93.1	A
Embraer 190	94.4	A

Aircraft Type	Measured Noise Level (PNdB)	Provisional Noise Category[1]
Fokker 50	90.3	B
Gulfstream G150	--*	A
Learjet 40	--*	A
Learjet 45	87.2	A
Piaggio 180	90.1	B
Piper Navajo 31	--*	B
Raytheon Beechcraft 350	--*	B
Raytheon Beechcraft 200	--*	B
Raytheon Beechjet 400	89.3	A
Raytheon Beechcraft 58	--*	B
Raytheon Hawker 800XP	88.7	A
RJ-85	92.9	A
RJ-100	94.8	A
Saab 2000	88.9	B

[1] Previously confirmed Provisional Categorisation unless otherwise stated.

*Insufficient numbers recorded (ie. fewer than 10 departures).

Table A1 – Mean Annual Departure Noise Levels 2014

Table A1 above indicates that whilst some aircraft are operating below their provisional categorisation, such as the Embraer 135 and various turbo-fan executive aircraft, one is operating above their category; the RJ-100.

The RJ-100 aircraft operated outside of category in 2014 by 0.3dB. This represents a 0.3dB improvement on the previous year. This slight improvement is due to the on-going work LCY 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. The performance of the RJ-100 has been provided on a bi-monthly basis to the London Borough of Newham accordingly.

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.