Bickerdike Allen Partners
Architecture Acoustics Technology

LONDON CITY AIRPORT

GROUND NOISE STUDY 2021

Report to

London City Airport
City Aviation House
London City Airport
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Bickerdike Allen Partners LLP is an integrated practice of Architects, Acousticians, and Construction Technologists, celebrating over 50 years of continuous practice.

Architects: Design and project management services which cover all stages of design, from feasibility and planning through to construction on site and completion.

Acoustic Consultants: Expertise in planning and noise, the control of noise and vibration and the sound insulation and acoustic treatment of buildings.

Construction Technology Consultants: Expertise in building cladding, technical appraisals and defect investigation and provision of construction expert witness services.

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1.0 INTRODUCTION

1.1 General

1.1.1 The City Airport Development Programme (CADP1) planning application (13/01228/FUL) was granted planning permission by the Secretaries of State for Communities and Local Government and Transport in July 2016 following an appeal and public inquiry which was held in March/April 2016.

1.1.2 Condition 55 of the CADP1 permission requires that:

"No Phase of the Development shall commence until a Ground Noise Study has been submitted to and approved in writing by the Local Planning Authority in respect of that Phase.

Noise mitigation measures identified as being necessary in each Ground Noise Study as approved by the Local Planning Authority shall be provided within six months of obtaining any necessary consents for these identified mitigation measures.

Thereafter ground noise studies shall be undertaken at intervals of not less than three years from the date of approval of the first Ground Noise Study. Such additional ground noise studies shall be submitted to the Local Planning Authority within 30 days of their completion. Any necessary mitigation measures identified within those studies shall be implemented as approved.

Reason: In the interests of protecting environmental amenity from noise impacts".

1.1.3 The most recent Ground Noise Study was formally approved by LBN in July 2018 (planning reference 18/00671/AOD). This study utilised measurements taken in a 2016 ground noise survey. A further ground noise survey was undertaken in 2019 which is utilised in this Ground Noise Study. This 2019 data is considered to be the most appropriate for use in this Ground Noise Study as it is representative of the normal operation of the airport.

1.1.4 Due to the significant reduction in the number of aircraft using the airport in 2020 and 2021 as a result of the Covid-19 pandemic, the noise levels in these years are significantly lower than in 2019 and therefore using data from these years would potentially underestimate the noise impacts. A comparison of the 2019 and 2021 modelled ground noise levels is provided in this report to demonstrate the expected reduction in noise level.

1.1.5 The construction of CADP1 has been partially completed, however in 2019 the development was not in operation. Overall aircraft movements in 2019 were similar to 2016. This means that the overall ground based activity at London City Airport (LCY) was similar to that in 2016.

1.1.6 This report considers the 2019 noise exposure levels arising from aircraft ground operations (ground noise) in the immediate vicinity of the airport, the change in ground noise compared with previous similar surveys, and whether the 2019 ground noise levels exceed reasonable levels outside any nearby residential premises and public building. It also considers whether any noise mitigation measures are required.

1.1.7 This study is structured as follows:

Section 2.0 a brief background to the ground noise study and a summary of the strategy proposed to control ground engine running (as required under Condition 49).

Section 3.0 a description of the ground noise study methodology.

Section 4.0 a presentation of ground noise study results.

Section 5.0 a comparison with results from the previous ground noise surveys undertaken in 2013 and 2016.

Section 6.0 a comparison against predictions presented in the CADP1 Updated Environmental Statement (UES).

Section 7.0 a comparison with the noise prediction model.

Section 8.0 a description of any mitigation requirements.

Section 9.0 a summary of the report.

1.1.8 A plan showing the extent of the CADP1 infrastructure is provided at Appendix 1. A glossary of acoustic terminology used is included in Appendix 2. Appendix 3 describes the ground noise modelling methodology and Appendix 4 shows the detailed survey results. Appendix 5 shows the schedule of flight information on ground noise survey days. Appendix 6 provides predicted ground noise contours for 2019.

2.0 THE GROUND NOISE STUDY

2.1 Previous Ground Noise Study

2.1.1 Bickerdike Allen Partners LLP (BAP) on behalf of LCY have carried out a Ground Noise Study at least every three years since 2010, and most recently in 2018.

2.1.2 The 2018 Ground Noise Study was approved by LBN with no additional noise mitigation measures required.

2.1.3 The 2018 Study found a close correlation between noise exposure levels determined from measured results and those determined from the predictive noise model at the three dock edge locations in the immediate vicinity of the airport clearly affected by ground noise (the dominant source of noise at those positions).

2.1.4 The 2018 Study found that the ground noise exposure levels for the CADP1 Interim Works and Completed Works, determined as part of the Updated Environmental Statement (UES) submitted to accompany the CADP1 planning application in September 2015 remained valid and that no additional mitigation measures were required at that time.

2.2 CADP1 Ground Noise Assessment

2.2.1 The UES, submitted to LBN in September 2015, included an objective assessment of the ground noise impact. Ground noise levels were predicted at key receptors around the airport using a proprietary software package, CadnaA. The noise impact was tested by reference to both the absolute level of ground noise and the change in ground noise.

2.2.2 The ground noise impact set out in the UES was assessed by LBN and its technical advisers and was found to be reasonable.

2.2.3 The UES (Chapter 8) identified the ground noise levels predicted for conditions in 2014 and also future conditions with CADP1 in place, including the Eastern Terminal Extension (ETE), new East Pier and permanent noise barrier. The predicted results at representative assessment locations used in the UES are set out below in Table 1. The locations are shown in Figure 1.

Assessment location	Daytime noise levels (dB $L_{Aeq,16h}$)	
	2014 Baseline	2025 with CADP1 development
1. Drew Road	51	53
2. Camel Road flats	52	54
3. Storey Road School	49	51
4. UEL – University of East London	57	59
5. RDBP – Royal Docks Business Park	59	61

Table 1 - Ground noise predictions

Figure 1 – UES Ground Noise Assessment Locations

2.2.4 The impacts associated with these levels were deemed acceptable subject to mitigation measures to regularly monitor and assess ground noise levels (Condition 55 of the CADP1 permission).

3.0 GROUND NOISE MEASUREMENT METHODOLOGY

3.1 Ground noise activities

3.1.1 Sources of aircraft related ground noise include engine running on the apron/stand, taxiing, manoeuvring and holding on the apron and runway. Noise produced by specific aircraft engine ground running for engine maintenance purposes is assessed separately from these ordinary, everyday types of aircraft ground noise sources.

3.1.2 The measurement of these types of aircraft ground noise sources at locations around the airport is complicated by the presence of other ambient noise sources. These include road traffic (local and distant), airborne aircraft, the Docklands Light Railway (DLR) pass-bys, construction, industry and general street activity.

3.1.3 Short duration and high magnitude noise events such as airborne aircraft departures and nearby DLR or road traffic movements can reasonably be identified and excluded from the measured results and subsequent assessment. However, continuous or lower magnitude noise sources such as road traffic noise construction noise cannot be fully excluded from the results and will contribute to the overall noise level measured, particularly at locations where the ground noise level is lower.

3.1.4 Measurement locations with a direct line of sight to the runway and apron, such as Building 1000, will provide a more reliable indicator of ground noise levels. Aircraft ground noise will be one of the dominant noise sources and airborne activity can be clearly identified and excluded from this study.

3.1.5 Measurement locations with no direct line of sight to the airport, such as Camel Road, will provide a much less reliable indicator of ground noise levels. For locations such as this, road traffic noise is usually the dominant noise source and airborne activity is less likely to be clearly identified. Noise sources associated with airborne aircraft noise assessment, such as start of roll noise on departure and reverse thrust noise on arrival, are difficult to clearly identify where there is no direct line of sight. As a result, these can be included within this study resulting in an artificially high level of ground noise.

3.1.6 Although the aircraft is on the ground, both start of roll engine acceleration noise and reverse thrust noise are already included in the assessment of air noise and represented within air noise contours. Therefore, they are not included in this study. This is consistent with the approach taken to the assessment of ground noise in the UES and previous Ground Noise Studies.

3.1.7 As a result of the above constraints, a flexible approach is needed to the measurement and subsequent assessment of ground noise in order to obtain meaningful and realistic results, which is in accordance with the approach used in previous Ground Noise Studies submitted and approved to LBN.

3.2 Survey locations

3.2.1 The measurement locations were selected for consistency to match those used in previous Ground Noise Studies, in order to enable a comparison of noise levels between studies. The locations were chosen following a review of potential sites to identify those best suited for the reliable measurement of ground noise from aircraft activities with minimal noise contributions from other activities such as car pass-bys, the DLR and significant street noise events. The measurement locations are shown in Figure 2 and described in Table 2 and Section 4.0.

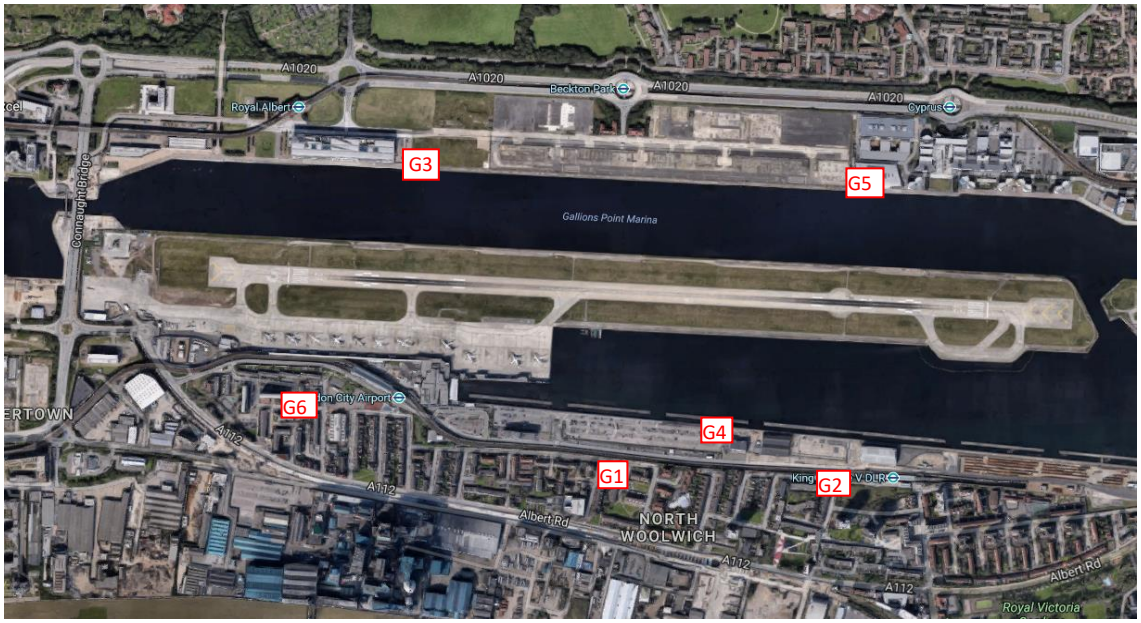


Figure 2: Measurement locations, G1 to G6

Position	Description	Measurement Date	Measurement Time	Operating Direction
G1	Corner of Kennard Street/Newland Street	13/11/2019	08:00 – 15:00	Westerly
G2	Brixham Street	15/11/2019	08:25 – 14:45	Both (Most Easterly)
G3	To the east of Building 1000 on dock edge	13/08/2019	13:00 – 19:45	Westerly
		23/08/2019	08:00 – 13:00	Both (Most Westerly)
G4	In airport car park on southern dock edge	13/09/2019	07:45 – 13:00	Both (Most Easterly)
		19/09/2019	13:00 – 19:45	Easterly
G5	On northern dock edge near the University of East London	13/09/2019	08:00 – 13:00	Both (Most Easterly)
		19/09/2019	13:00 – 19:45	Easterly
G6	Camel Road	12/11/2019	08:00 – 13:00	Westerly

Table 2 - Measurement locations and dates

Note 1: All measurements were taken between Monday and Friday.

Note 2: All measurements are free field (i.e. not materially affected by reflections from nearby buildings).

3.2.2 Measurements were undertaken between August and November 2019. UK airports are normally busiest during the summer months and this is therefore when ground noise levels are likely to be at their highest. At LCY, activity is generally fairly consistent throughout the year and so the measurement dates are considered representative of the worst case.

3.3 Methodology

3.3.1 In keeping with the methodology adopted for 2018 Ground Noise Study and the assessment of ground noise presented in the UES, the $L_{Aeq,16h}$ noise index has been used as the overall noise exposure level descriptor. This descriptor is commonly used for rating aircraft ground noise impacts in the UK.

3.3.2 For each measurement location (See Figure 2 above), continuous measurements of ambient noise were made over representative periods of the day. These measurements include noise from all noise sources. Notes were taken on site to clearly identify non-ground noise sources, such as aircraft departures or DLR pass-bys so they could be excluded from the results. This

approach has the advantage of permitting graphical representation of the overall noise environment by showing ground noise in the context of other noise sources.

3.3.3 For some key locations (G3, G4 and G5), measurements were made continuously during the key operational hours of the day to investigate the variation of ground noise throughout the day.. From these results, measurements at other locations were carried out over shorter periods, targeting where possible a period of high aircraft activity on the ground and also a period of relatively low activity. The measurement procedure adopted follows the general principles set out in BS 7445: Part 1:2003.[1] Details of the methodology and modelling assumptions are given in Appendix 3.

3.4 Equipment

3.4.1 Measurements were taken using a Norsonic 140 sound level meter, a Class 1 instrument suitable for the measurement of aircraft noise. This was calibrated using a Norsonic 1251 calibrator. Calibration was carried out before and after each survey and no significant drift was observed. Measurements were made under free field conditions and at a height of 1.5 m above local ground level. The weather conditions during the surveys were generally clear or partly cloudy with variable wind speeds. The meteorological conditions are shown in Table 3.

[1] Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

Pos.	Date	Measurement Time	Prevailing Wind Dir. (degrees)[2]	Avg. Wind speed (m/s)	Conditions
G1	13/11/2019	08:00 – 15:00	SSW – W (200 – 260)	2.1 – 4.6	Temperature 6°C - 10°C, relative humidity 62% - 87%
G2	15/11/2019	08:25 – 14:25	NNW – NE (340 – 030)	2.6 – 5.7	Temperature 7°C - 9°C, relative humidity 76% - 87%
G3	13/08/2019	13:00 – 19:45	WSW – WNW (240 – 290)	4.1 – 6.7	Temperature 20°C - 22°C, relative humidity 35% - 46%
	23/08/2019	08:00 – 13:00	SE – WSW (130 – 240)	0.5 – 3.1	Temperature 18°C - 25°C, relative humidity 54% - 78%
G4	13/09/2019	07:45 – 13:00	NNW – NE (330 – 050)	2.1 – 3.6	Temperature 15°C - 19°C, relative humidity 46% - 77%
	19/09/2019	13:00 – 19:45	E – ESE (090 – 120)	2.1 – 6.7	Temperature 16°C - 21°C, relative humidity 46% - 63%
G5	13/09/2019	08:00 – 13:00	NNW – NE (330 – 050)	2.1 – 3.6	Temperature 15°C - 19°C, relative humidity 46% - 77%
	19/09/2019	13:00 – 19:45	E – ESE (090 – 120)	2.1 – 6.7	Temperature 16°C - 21°C, relative humidity 46% - 63%
G6	12/11/2019	08:00 – 12:45	WSW (250)	6.2 – 8.2	Temperature 5°C - 9°C, relative humidity 57% - 75%

Table 3 – Meteorological conditions

Note 1: All measurements were taken between Monday and Friday.

Note 2: All measurements are free field (i.e. not materially affected by reflections from nearby buildings).

[2] 0 degrees is due north.

3.4.2 Measurement positions G3 (Building 1000), G4 (Airport Car Park) and G5 (UEL) are preferable locations to measure aircraft ground noise due to the direct line of sight and limited influence of other non-airport related ambient noise sources and sound reflections. Measurements to cover most of the daytime period were made at these positions. The other locations were less reliable for measuring aircraft ground noise. At these other locations, measurements were made over at least half a day to include one of the peak periods (AM or PM) as well as less busy times so as to be representative of the 16 hour average.

4.0 RESULTS

4.1 Location G1 – Kennard Street

4.1.1 Location G1 is at the corner of Kennard Street with Newland Street, close to the DLR line. Noise at this location was dominated by DLR and airborne aircraft noise. Distant road traffic and construction activity was also significant. Intermittent noise from local road traffic and pedestrians was also observed at this location. Aircraft ground noise was audible at this position at times when noise from other sources was low.

4.1.2 The runway and apron is not visible at this measurement location. This compromises the ability to identify all non-ground noise sources.

4.1.3 On the 13th November 2019 a survey was taken at this position at two different periods of the day, from 08:00 to 11:00 and from 12:00 to 15:00. Aircraft were operating in a westerly direction (i.e. using runway 27) for the duration of the survey. Table 4 shows the measurement results.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
08:00	11:00	55	SW-WSW (4.0)
12:00	15:00	52	SSW-WSW (3.2)
Logarithmic Average		54	

Table 4 - Measurement Results, G1 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

An average of 54 dB $L_{Aeq,T}$ was measured at this position, and this is assumed to be a representative value of the total ambient daytime noise level, $L_{Aeq,16h}$, excluding identifiable non-ground noise sources.

4.2 Location G2 – Brixham Street

4.2.1 Position G2 is situated on Brixham Street, near King George V DLR station. Noise at this location was dominated by DLR and airborne aircraft noise. Distant road traffic was also significant with intermittent noise from local road traffic and pedestrians being observed at this location. Aircraft ground noise was audible at this position at times when noise from other sources was low.

4.2.2 On the 15th November 2019 a survey was carried out at this location from 08:25 until 11:00 and from 12:05 to 14:25 hours. Aircraft were operating in an easterly direction (i.e. using runway 09) for the majority of the survey. Table 5 shows the measurement results.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
08:25	11:00	55	NNW-N (3.3)
12:05	14:25	55	N-NNE (4.9)
Average		55	

Table 5 - Measurement Results, G2 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

An average of 55 dB $L_{Aeq,T}$ was measured at this position, and this value is assumed to be representative of the total ambient daytime noise level, $L_{Aeq,16h}$, excluding identifiable non-ground noise sources.

4.3 Location G3 – Building 1000

4.3.1 Location G3 is on the dock edge, by Building 1000. There is a clear view of the runway and apron. Noise from aircraft both airborne and on the ground dominate at this position. Road traffic noise from the A1020, also contributes to the overall noise level.

4.3.2 On the 13th August a survey was performed at this position from 13:00 until 19:45 hours. On the 23rd August a survey was performed at the same position from 08:00 until 13:00. Aircraft were operating in a westerly direction (i.e. using runway 27) for the majority of the survey. Table 6 shows the measurement results obtained, including the hourly wind speed and direction.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
08:00	09:00	68	WSW (1.5)
09:00	10:00	63	- (0.8)
10:00	11:00	58	- (0.5)
11:00	12:00	63	SE (1.8)
12:00	13:00	61	SE (2.1)
13:00	14:00	60	W-WNW (5.4)
14:00	15:00	62	WSW-W (4.9)
15:00	16:00	65	WSW (5.4)
16:00	17:00	62	WSW-W (6.2)
17:00	18:00	65	WSW (4.6)
18:00	19:00	66	WSW-W (5.4)
19:00	19:45	65	W (4.6)
Average		64	

Table 6 - Measurement Results, G3 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

4.3.3 The ground/ambient noise levels measured at this location are highest from 08:00 until 09:00 and from 18:00 until 19:00 with levels of 68 dB $L_{Aeq,T}$ and 66 dB $L_{Aeq,T}$. Ground/ambient noise drops to its lowest level of 58 dB $L_{Aeq,T}$ between 10:00 and 11:00. An average level of 64 dB $L_{Aeq,T}$ dB was measured at this position, and this value is assumed to be representative of the total ambient daytime noise level, $L_{Aeq,16h}$, at this location excluding identifiable non-ground noise sources.

4.4 Location G4 – Airport car park

4.4.1 Location G4 is at the airport car park on the southern dock edge. There is a clear view over the runway which enhances the ability to record noise from aircraft departing and landing. The airport apron is partially screened from this point. Noise from aircraft both airborne and on the ground dominate at this position. Road traffic noise from the A1020 as well as occasional local traffic from cars parking and general construction activity also contribute to the overall noise level.

4.4.2 On the 13th September 2019 a survey was performed at this position from 07:45 until 08:50 and then from 10:20 until 13:00. On the 19th September 2019 a survey was performed at the same position from 13:00 until 19:45. Aircraft were operating in an easterly direction (i.e. using runway 09) for the majority of the survey. Table 7 shows the measurement results obtained, including the hourly wind speed and direction.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
07:45	08:50	64	NNW-N (2.6)
10:20	11:00	57	N-NNE (2.3)
11:00	12:00	57	NNW-NNE (3.1)
12:00	13:00	58	N (2.8)
13:00	14:00	55	ESE (2.8)
14:00	15:00	56	E (3.3)
15:00	16:00	53	E (4.4)
16:00	17:00	57	E (5.1)
17:00	18:00	57	E (6.4)
18:00	19:00	59	E-ESE (5.1)
19:00	19:45	58	E (4.1)
Average		58	

Table 7 - Measurement Results, G4 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

4.4.3 The ground/ambient noise levels measured at this location are higher from 07:45 until 08:50 with a level of 64 dB $L_{Aeq,T}$. Ground/ambient noise drops to its lowest level of 53 dB $L_{Aeq,T}$ between 15:00 and 16:00. An average level of 58 dB $L_{Aeq,T}$ was measured at this position, and this value is assumed to be representative of the total ambient daytime noise level, $L_{Aeq,16h}$, at this location excluding identifiable non-ground noise sources.

4.5 Location G5 - UEL

4.5.1 Position G5 is by the University of East London (UEL) campus on the dock edge. There is a clear view towards the airport runway and apron. Noise from aircraft both airborne and on the

ground dominate at this position. Road traffic noise from the A1020 as well as occasional noise from cars parking also contribute to the overall noise level.

4.5.2 On 13th September 2019 a survey was undertaken at this location from 08:00 to 13:00. On the 19th September a survey was performed at the same position from 13:00 until 19:45. Aircraft were operating in an easterly direction (i.e. using runway 09) for the majority of the survey. Table 8 shows the measurement results, including the hourly wind speed and direction.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
08:00	09:00	62	N (2.6)
09:00	10:00	59	NNW-N (3.1)
10:00	11:00	55	N-NNE (2.3)
11:00	12:00	56	NNW-NNE (3.1)
12:00	13:00	57	N (2.8)
13:00	14:00	56	ESE (2.8)
14:00	15:00	57	E (3.3)
15:00	16:00	55	E (4.4)
16:00	17:00	59	E (5.1)
17:00	18:00	56	E (6.4)
18:00	19:00	58	E-ESE (5.1)
19:00	19:45	60	E (4.1)
Average		58	

Table 8 - Measurement Results, G5 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

4.5.3 The highest ground/ambient noise levels obtained at this location were of 62 dB $L_{Aeq,T}$ between 08:00 and 09:00 and 60 dB $L_{Aeq,T}$ between 19:00 and 19:45. A low level was measured between 10:00 and 11:00 and between 15:00 and 16:00 of 55 dB $L_{Aeq,T}$. An average of 58 dB $L_{Aeq,T}$ was measured at this position, and this value is assumed to be representative of the total ambient daytime noise level, $L_{Aeq,16h}$, at this location excluding identifiable non-ground noise sources.

4.6 Location G6 – Camel Road

4.6.1 Location G6 is at ground floor level next to the Camel and Drew Road flats. It is situated behind the terminal pier so aircraft operating on the ground are not visible. Aircraft on departure rise above the terminal pier barrier and dominate noise levels at this position. Other sources of noise include arriving aircraft, road vehicles passing nearby and pedestrian activity. Aircraft ground noise was only audible at this position during brief periods times when noise from other sources was low.

4.6.2 On the 12th November 2019 a survey was undertaken at this location, from 08:00 until 12:45 to catch busy periods at the airport and periods during relative low aircraft activity. Measurements had to be stopped after this time due to poor weather conditions. Aircraft were operating in a westerly direction (i.e. using runway 27) for the duration of the survey. Table 9 shows the results obtained.

Measurement Period (hh:mm)		Noise Level,[1] dB $L_{Aeq,T}$	Wind direction and Wind speed (m/s)
From	To		
08:05	11:00	56	WSW (6.8)
12:00	12:45	56	WSW (8.0)
Average		56	

Table 9 - Measurement Results, G6 Location

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

An average of 56 dB $L_{Aeq,T}$ was measured at this position, and this value is assumed to be representative of the total ambient daytime noise level, $L_{Aeq,16h}$, excluding identifiable non-ground noise sources.

4.7 Overview

4.7.1 The measured ground noise levels at the different locations are summarised in Table 10.

Position	Description	2019 Noise Level,[1] dB $L_{Aeq,16h}$
G1	Corner of Kennard Street/Newland Street	54
G2	Brixham Street	55
G3	To the east of Building 1000 on dock edge	64
G4	In airport car park on southern dock edge	58
G5	On northern dock edge near the University of East London	58
G6	Camel Road	56

Table 10 - Measurement results, summary

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded.

4.7.2 The highest levels of ground/ambient noise were measured at the closest locations to the airport apron and runway where there was also a clear view of aircraft activity at the airport, i.e. positions G3, G4 and G5. The highest average level of 64 dB $L_{Aeq,16h}$ was measured at position G4, at the airport car park on the southern dock edge. There is a clear view over the runway and the airport apron is partially screened from this point.

4.7.3 At locations G1, G2 and G6, which are among nearby residential properties, there is no direct line of sight to the airport. This is blocked by the surrounding built infrastructure and topography of the land. Ground noise was only audible at times above other ambient noises and was not generally a dominant noise source. At these positions, a lower level of noise was measured, with levels in the range of 54 to 56 dB $L_{Aeq,16h}$.

5.0 COMPARISON WITH PREVIOUS GROUND NOISE STUDIES

5.1.1 Table 11 shows a comparison between the measurements obtained in 2013, 2016 and 2019. The total annual aircraft movements in each year were 73,640 (2013), 84,955 (2016) and 83,963 (2019). This change in movement numbers alone would result in differences of less than 1 dB $L_{Aeq,16h}$ between the different years.

Pos.	Description	Measured Noise Level, dB $L_{Aeq,16h}$ and operating direction			Noise Level Difference, dB $L_{Aeq,16h}$ 2019 vs 2016 (W) or 2013 (E)
		2013	2016	2019	
G1	Corner of Kennard Street/Newland Street	53 (E)	52 (W)	54 (W)	+2
G2	Brixham Street	49 (E)	49 (W)	55 (E)	+6
G3	To the east of Building 1000 on dock edge	65 (E)	59 (W)	64 (W)	+5
G4	In airport car park on southern dock edge	58 (E)	63 (W)	58 (E)	0
G5	On northern dock edge near the University of East London	57 (E)	62 (W)	58 (E)	+1
G6	Camel Road	56 (E)	56 (W)	56 (W)	0

Table 11 - Comparison between measurements in 2013, 2016 and 2019

5.1.2 A comparison has been made with both 2013 and 2016 measured results to show the effects of the change of mode of operation. In 2013, all the measurements were taken when the airport was operating in an easterly direction, whereas in 2016 the reverse was true. In 2019, the operating direction varied for different days of the survey. The mode of operation has a significant influence on ground noise levels at locations G3, G4 and G5, i.e. those closest to the airport apron and runway where there is a direct line of sight of aircraft activity. Locations G1, G2 and G6 are less affected by the mode of operation, as evidenced by the fact that similar measurements were obtained in 2013 and 2016, despite differing modes of operation.

5.1.3 Taking first the locations that are relatively independent of operating mode, the noise measurements in 2019 at locations G1 and G6 were similar to those measured in 2013 and 2016, however for location G2 an increase of 6 dB was measured in 2019. The dominant noise sources at this location excluding aircraft arrivals and departures and the DLR, which were

excluded, were ground noise, construction noise, and road traffic noise. Unusually, the wind during this survey was from the north, which will have significantly increased the measured noise levels as all of the major noise sources are to the north of the measurement position. Given that the noise sources are expected to be similar for all three locations, this seems likely to be the primary cause of the difference.

5.1.4 The noise measurements in 2019 at locations G4 and G5 were undertaken during predominantly easterly operations and can therefore be compared with those measured in 2013. Similar noise levels were measured in 2019 as in 2013.

5.1.5 The noise measurements in 2019 at location G3 were undertaken during predominantly westerly operations and can therefore be compared with those measured in 2016. The noise level in 2019 was 5 dB higher than in 2016, although still 1 dB lower than the level measured in 2013.

6.0 COMPARISON WITH CADP1 UES PREDICTIONS

6.1.1 The environmental noise software CadnaA, a recognised and commonly used noise modelling package in the UK, was used to predict ground noise levels around the airport for the CADP1 application. This predicted levels with the CADP1 in place for both westerly and easterly operations have been determined by using the same model as for the CADP1 application. Under CADP1, the forecast is to reach around 111,000 annual movements once complete.

6.1.2 Table 12 shows a comparison between the measured results obtained in 2019 and the predicted noise levels for the CADP1 programme.

Position	Description	Measured 2019 Ground Noise Level[1], dB $L_{Aeq,16h}$ and operating direction	Predicted CADP1 Ground Noise Level, dB $L_{Aeq,16}$	
			Westerly Operations	Easterly Operations
G1	Corner of Kennard Street/Newland Street	54 (W)	47	45
G2	Brixham Street (2013)	55 (E)	56	49
G3	To the east of Building 1000 on dock edge	64 (W)	64	63
G4	In airport car park on southern dock edge	58 (E)	57	54
G5	On northern dock edge near the University of East London	58 (E)	67	61
G6	Camel Road	56 (W)	50	49

Table 12 - Comparison of 2019 measurements with CADP1 in place

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded. The measured noise levels will include some contribution from non-ground noise sources which could not be identified and/or excluded.

6.1.3 The predicted CADP1 ground noise levels presented in Table 12 above include aircraft ground noise only. Irrespective of this, comparisons between ground noise levels now and those predicted using the same model as for the UES are considered to be reasonable, particularly for Positions G3, G4 and G5 for which aircraft ground noise is the dominant noise source. Differences will also arise as a result of the altered infrastructure.

6.1.4 Considering the positions with a direct line of sight to the apron, the measured noise was largely unaffected by other sources, other than those which could be easily excluded such as airborne aircraft events. At positions G3 the measurements are 1 dB $L_{Aeq,16h}$ louder than the CADP1 predictions for the corresponding operating direction. This level of difference is reasonable when comparing measurements with modelling results. At position G4 a direct line of sight currently exists from the taxiway to the receptor. Once CADP1 is complete, a lower noise level is predicted due to the existence of the new terminal pier that will form a barrier between the airport and G4 receptor. At position G5 the measurement is 3 dB $L_{Aeq,16h}$ quieter than the CADP1 predicted level. Noise levels are expected to increase once the CADP1 development is complete due to the new stands which form part of this development being further east, which is closer to this receptor than the existing stands.

6.1.5 Considering the positions without a direct line of sight to the apron, the measured noise levels may be affected by other sources such as road traffic or construction, which would not easily be excluded from the measurements. At positions G1, G2 and G6 the measured noise levels are higher than the ground noise levels predicted under CADP1. These differences are explained by other noise sources affecting the measurements and the infrastructure changes providing benefits for some locations under CADP1.

7.0 COMPARISON WITH CADNAA MODEL PREDICTIONS

7.1.1 Using the ground noise prediction model developed for the CADP1 UES, it is possible to compare the measured 2019 ground noise levels at the six receptors with those predicted at these positions based on the aircraft movements in 2019.

7.1.2 The ground noise levels generated by the model for 2019 are given in Table 13 based on a receptor height of 1.5 m.

Position	Description	Measured 2019 Ground Noise Level,[1] dB $L_{Aeq,16h}$ and operating direction	Predicted 2019 Ground Noise Level, dB $L_{Aeq,16h}$	
			Westerly Operations	Easterly Operations
G1	Corner of Kennard Street/Newland Street	54 (W)	49	47
G2	Brixham Street	55 (E)	49	48
G3	To the east of Building 1000 on dock edge	64 (W)	63	62
G4	In airport car park on southern dock edge	58 (E)	59	58
G5	On northern dock edge near the University of East London	58 (E)	62	60
G6	Camel Road	56 (W)	55	55

Table 13 - CadnaA ground noise predictions, 2019

[1] Total ambient noise level with clearly identifiable non-ground noise sources (airborne aircraft/local traffic/DLR) excluded. The measured noise levels will include some contribution from non-ground noise sources which could not be identified and/or excluded.

7.1.3 The predicted ground noise levels vary for each of the six locations compared to the measured ambient noise levels.

7.1.4 Considering the positions with a direct line of sight to the apron, i.e. G3, G4 and G5, the measured noise was largely unaffected by other sources, other than those which could be easily excluded such as airborne aircraft events. The measurements at these locations are all within 2 dB $L_{Aeq,16h}$ of the predictions. This level of difference is reasonable when comparing measurements with modelling results.

7.1.5 The measured noise values at locations G1, G2 and G6 are higher than those predicted. This can be explained by the fact that the measured results include the effects of other noise sources, such as road traffic and construction noise, in addition to aircraft ground noise. This is particularly noticeable at locations G1 and G2 which are closer to the CADP1 construction works which were ongoing at the time of the measurements.

7.1.6 In order to confirm that the 2021 ground noise effects are less than those measured in 2019, the prediction model has also been run using data from June 2021, which is the busiest month of 2021 to date. These results are compared with those for 2019 in Table 14.

Position	Description	Predicted 2019 Ground Noise Level, dB $L_{Aeq,16h}$		Predicted June 2021 Ground Noise Level, dB $L_{Aeq,16h}$	
		Westerly Operations	Easterly Operations	Westerly Operations	Easterly Operations
G1	Corner of Kennard Street/Newland Street	49	49	39	38
G2	Brixham Street	49	49	40	39
G3	To the east of Building 1000 on dock edge	63	63	53	52
G4	In airport car park on southern dock edge	59	59	50	50
G5	On northern dock edge near the University of East London	62	62	52	51
G6	Camel Road	55	55	43	44

Table 14 - CadnaA ground noise predictions, 2019 and 2021

7.1.7 The above results confirm that for all measurement locations, the June 2021 noise levels are lower than those for 2019 by between 9 and 12 dB $L_{Aeq,16h}$.

8.0 MITIGATION

8.1.1 Taking account of the findings of Sections 5.0 to 7.0, measured ground noise levels are largely in keeping with those predicted based on 2019 activity at the airport and in line with expectations relative to those predicted under CADP1, when accounting for altered infrastructure. In summary therefore, ground noise levels are currently in line with predictions as presented in the CADP1 UES. The results of measurements and predictions reported in this ground noise study support the findings concerning ground noise effects for CADP1 given in the UES.

8.1.2 The local residential communities are currently well protected from any significant effects of ground noise by the noise barrier provided by the airport terminal, associated pier structures and purpose built sound screens. The aircraft engine blast screen that is located between the western end of the fire station and the Jet Centre, as well as the DLR viaduct and retaining walls, also assist in reducing the effects of ground noise on housing locally. Dwellings around the airport are also protected by the airport's Sound Insulation Scheme.

8.1.3 The Camel Road Sound Screen, investigated in detail in previous studies, continues to offer protection to residents in Camel Road and no further study of the screen is considered warranted at this time, as there will be no significant change to any infrastructure in this area and the fact that previous survey work confirmed the dominant effect of road traffic along Hartmann Road in that area.

8.1.4 The ground noise levels along the northern edge of the Royal Albert Dock, particularly at Building 1000, remain relatively high due to its close proximity to the airport and the lack of any noise barriers. There are, however, no residential properties in this area and Building 1000 and The University of East London, which lie on the northern edge of the dock, were designed and insulated to take account of aircraft operations at LCY.

8.1.5 The impact of ground noise in 2019 therefore remains similar to that determined previously where it has been judged to be acceptable with respect to residential premises and Public Buildings. No additional mitigation measures are therefore considered necessary at this time.

9.0 SUMMARY

9.1.1 This report details a ground noise survey and assessment undertaken by Bickerdike Allen Partners LLP (BAP) to discharge the requirements for Condition 55 of the CADP1 planning permission.

9.1.2 Ground noise levels arising from aircraft operations on the ground in the immediate vicinity of the airport have been measured in 2019 and compared to the measurement results of 2016 as reported in the most recent Ground Noise Study in 2018. It is considered appropriate to use measurements taken in 2019 due to the significant reduction in the number of aircraft using the airport in 2020 and 2021 as a result of the Covid-19 pandemic. Any survey taking place in these later years would therefore not have been representative of the normal operation of the airport and would have underestimated the noise impacts.

9.1.3 In addition, the measured 2019 results have been compared against a predictive ground noise model developed to determine whether the magnitude of ground noise exposure levels exceed reasonable levels outside any nearby residential premises and Public Buildings.

9.1.4 The survey found a close correlation between noise exposure levels determined from measured results and those determined from the predictive noise model at one of the three dock edge locations in the immediate vicinity of the airport. This location is clearly affected by ground noise as it is the dominant source of noise at those positions. The other two locations were significantly quieter than the predictive noise model due to the change in mode of operation.

9.1.5 This indicates that the ground noise exposure levels for the CADP1 Works, as set out in the Construction Phasing Plan associated with planning condition 4 of the CADP1 planning permission are still valid and no additional mitigation measures are required at this time.

9.1.6 The next Ground Noise Study will be undertaken within three years of the date of approval of this report, in accordance with the requirements of Condition 55.

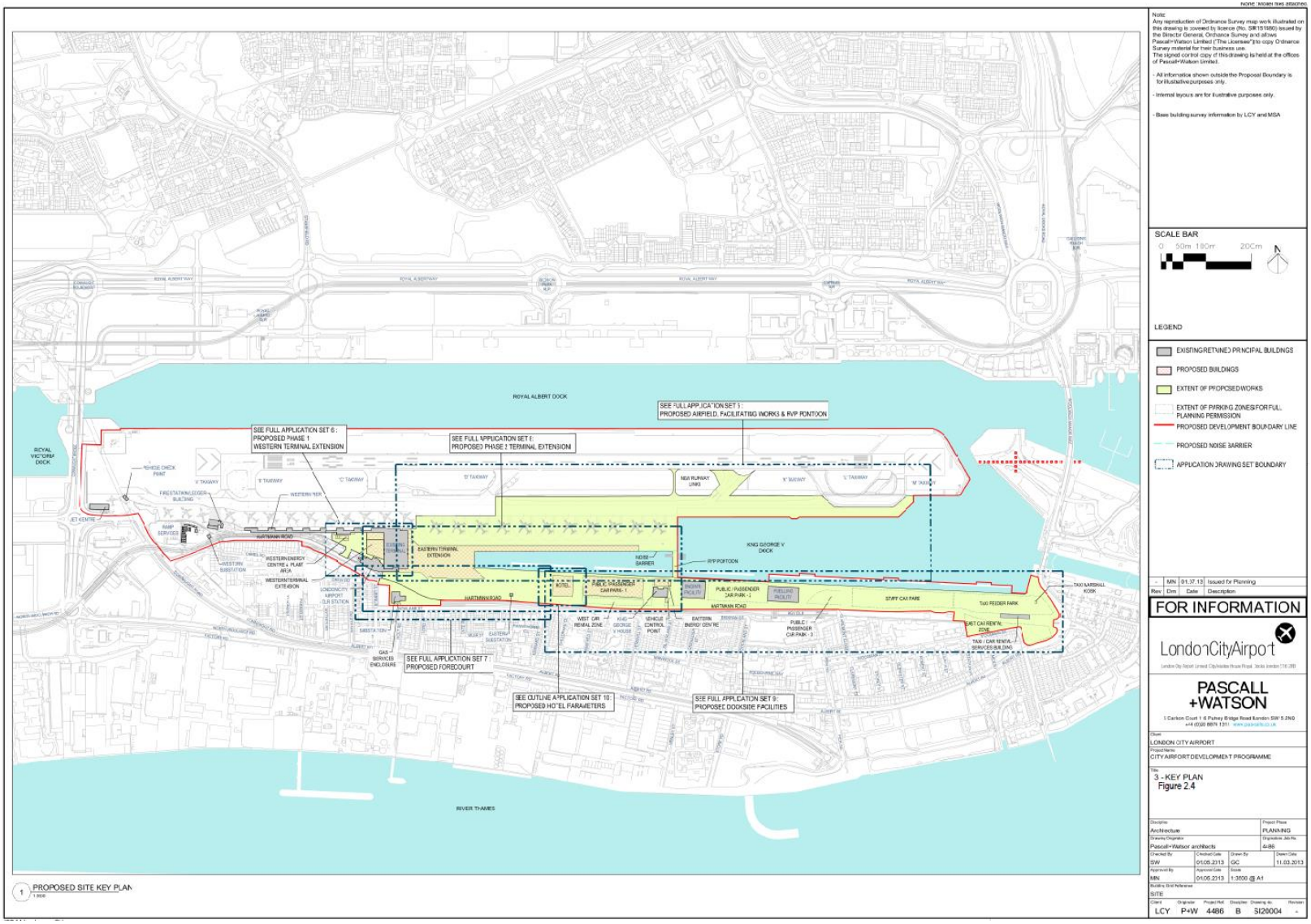
Nick Williams
for Bickerdike Allen Partners LLP

David Trew
Partner

APPENDIX 1

CADP1 WORKS

EXTENT OF INFRASTRUCTURE



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- All information shown outside the Proposal Boundary is for illustrative purposes only.

- Internal layouts are for illustrative purposes only.

- Base building survey information by LCY and MSA

SCALE BAR
0 50m 100m 200m

LEGEND

- EXISTING RETAINED PRINCIPAL BUILDINGS
- PROPOSED BUILDINGS
- EXTENT OF PROPOSED WORKS
- EXTENT OF PARKING ZONES FOR FULL PLANNING PERMISSION
- PROPOSED DEVELOPMENT BOUNDARY LINE
- PROPOSED NOISE BARRIER
- APPLICATION DRAWING SET BOUNDARY

Rev	Drn	Date	Description
-	MN	01.07.13	Issued for Planning

FOR INFORMATION

LondonCityAirport

PASCALL +WATSON

Client: LONDON CITY AIRPORT
Project Name: CITY AIRPORT DEVELOPMENT PROGRAMME
Title: 3 - KEY PLAN
Figure 2.4

Discipline: Architecture	Project Phase: PLANNING
Drawing Originator: Pascall+Watson architects	Originators Job No.: 4486

Checked By	Checked Date	Drawn By	Drawn Date
SW	01.05.2013	GC	11.03.2013

Approved By	Approval Date	Scale
MN	01.05.2013	1:3500 @ A1

Building Grid Reference: SITE

Client	Originator	Project No.	Discipline	Drawing no.	Revision
LCY	P+W	4486	B	SI20004	-

APPENDIX 2

GLOSSARY OF ACOUSTIC TERMINOLOGY

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 describes 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 x 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).

Noise Rating

The Noise Rating (NR) system is a set of octave band sound pressure level curves used for specifying limiting values for building services noise. The Noise Criteria (NC) and Preferred Noise Criteria (PNC) systems are similar.

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_{AE}	Where the overall noise level over a given period is made up of individual noise events, the $L_{Aeq,T}$ can be predicted by measuring the noise of the individual noise events using the sound exposure level, LAE (or SEL or LAX). It is defined as the level that, if maintained constant for a period of one second, would deliver the same A-weighted sound energy as the actual noise event.
L_{A01}	The level exceeded for 1% of the time is sometimes used to represent typical noise maxima.
L_{A10}	The level exceeded for 10% of the time is often used to describe road traffic noise.
L_{A90}	The level exceeded for 90% of the time is normally used to describe background noise.

Table 1: Commonly Used Environmental Noise Descriptors

Perceived Noise Level, PNL

The perceived noise level is the sound pressure level corrected such that a given sound is numerically equal to the sound pressure level of a reference sound that is judged by listeners to have the same perceived noisiness as the given sound. The calculation procedure gives an approximation to the perceived noise level which is measured in dB and given the unit PNdB.

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.

APPENDIX 3

GROUND NOISE MODELLING METHODOLOGY

MODELLING METHODOLOGY

This section of the report gives an overview of the CadnaA ground noise model developed for the CADP1 application. This section supplements the information presented in the report.

Input Data

The input data for the model is based on the annual movement and aircraft mix data provided to BAP. Reference noise levels and information on the duration of activities were determined by reference to previous studies at LCY and from survey measurements. The modelling assumptions section below sets out the durations of activities observed at LCY, and also the reference noise levels used.

Software

A computer model of the airfield and surroundings has been prepared using the environmental noise calculation software Cadna A. Incorporating buildings and barriers, the software calculates the propagation of noise from noise sources to receptors using the methodology set out in ISO 9613-2 “Attenuation of sound during propagation outdoors – General method of calculation”. As a worst case, the ground, and buildings and barriers are modelled to be reflective.

Methodology

The airfield is simplified into a number of noise source locations. These locations represent segments of an aircraft’s taxi route. By assigning a noise level to each source representing the ground activity at that location (i.e. taxiing, manoeuvring, APU, engine start-up, hold), the noise at a given receiver is calculated from the contribution of all these sources taking into account propagation and any noise barriers and reflectors. Sources representing Stands 12 to 14 have been included in all ground noise calculations.

Specifically, for each source at a given location, a sound power level is determined based on the associated sound level, L_{Aeq}, at the reference distance of 152 m. Each source has an associated duration of activity applicable to the source location under consideration. The source sound power level is weighted according to this duration, and also according to the overall assessment period, for example 16 hours. A further weighting is applied to account for the times the source event will occur in the period of interest, based on the number of aircraft movements. This weighting takes account of the number of westerly and easterly operations whose taxi routes pass through the source location. This information is then fed into the CadnaA model to derive by receiver location the overall $L_{Aeq,T}$ ground noise levels, based on the duration of interest (e.g. 16 hours or peak hour).

MODELLING ASSUMPTIONS

The following general assumptions have been used to apply to an overall generic type of aircraft. These assumptions have been used in Environmental Statements examined at Public Inquiries on airport developments elsewhere, without serious challenge. On-site observations at LCY, whilst indicating considerable variation between individual aircraft operations have shown that assumptions regarding the duration of different Airport operations are generally appropriate.

Aircraft movement numbers and aircraft mix are given in the tables below.

Type	Number of Movements Summer 2019	Number of Movements June 2021
Total	20932	751
Scheduled	19872	661
Corporate	1060	90

Number of aircraft movements

Type	%
Turbo-fan	77
Turbo-prop	18
Corporate jets	5

Aircraft mix (%)

Details of departure and arrival activities are given in the tables below.

Activity		Details
Auxiliary Power Unit (APU)		10 min for all rotations
Engine start-up (idle)		60 s
Manoeuvres	90 degrees 180 degrees	10 s 20 s
Hold at edge of runway (prior to getting onto runway)		60 s
Taxiing speed (used in conjunction with model sector length to determine sector duration)	on apron on runway	10 m/s 10 m/s
Hold at start of roll		60 s

Durations of departure activities

Activity		Details
Manoeuvres	90 degrees 180 degrees	10 s 20 s
Taxiing speed (used in conjunction with model sector length to determine sector duration)	on apron on runway	10 m/s 10 m/s
Engine running on stand		60 s

Durations of arrival activities

Modal split

The modal split of aircraft operations at LCY are 67 % movements on Runway 27 and 33 % movements on Runway 09.

Reference noise levels

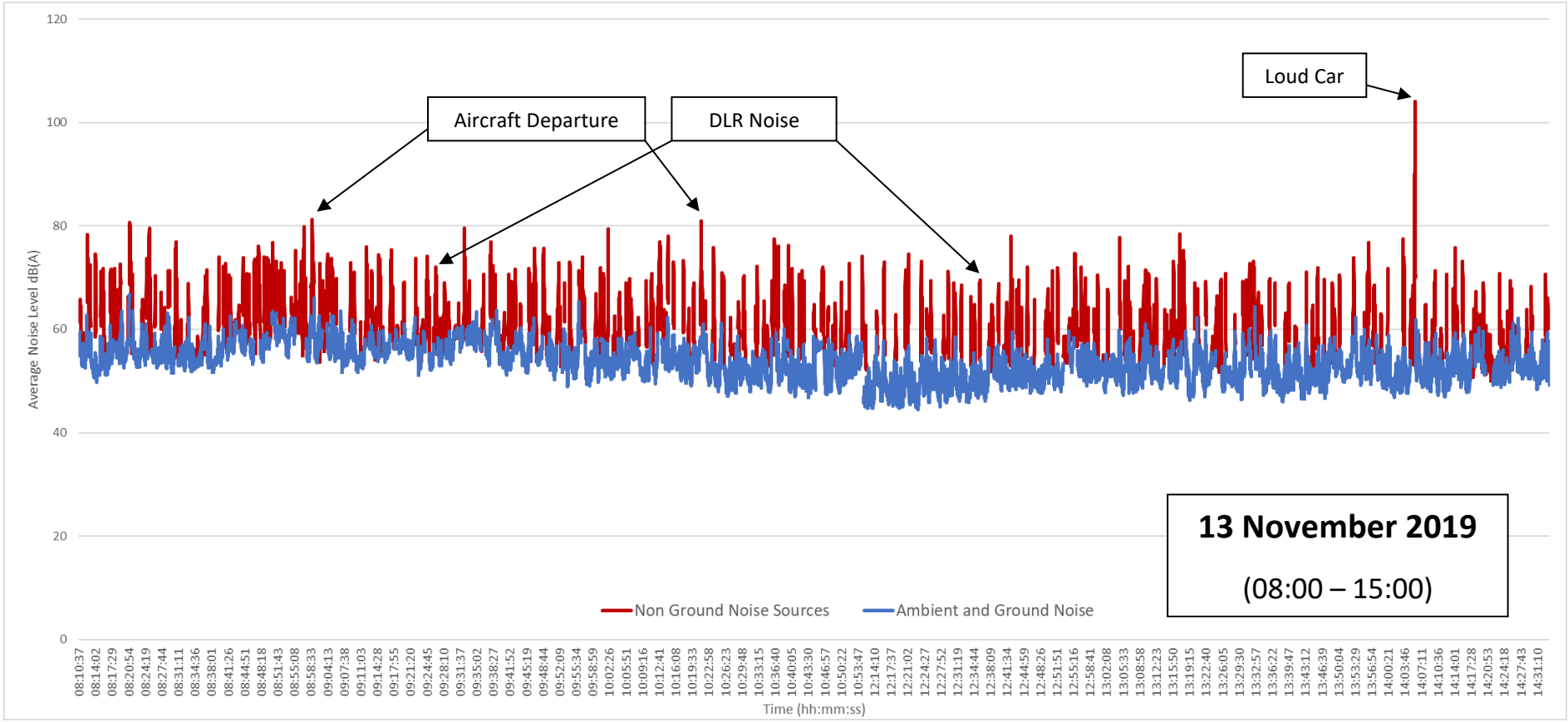
Activity	Level , dB(A)		
	Turbo-fans	Turbo-props	Corporate Jets
Taxi	71	74	69
Manoeuvre	71	74	69
Start-up	65	71	65
APU	67	67	67

Sound Levels ($L_{Aeq,T}$) at 152 m

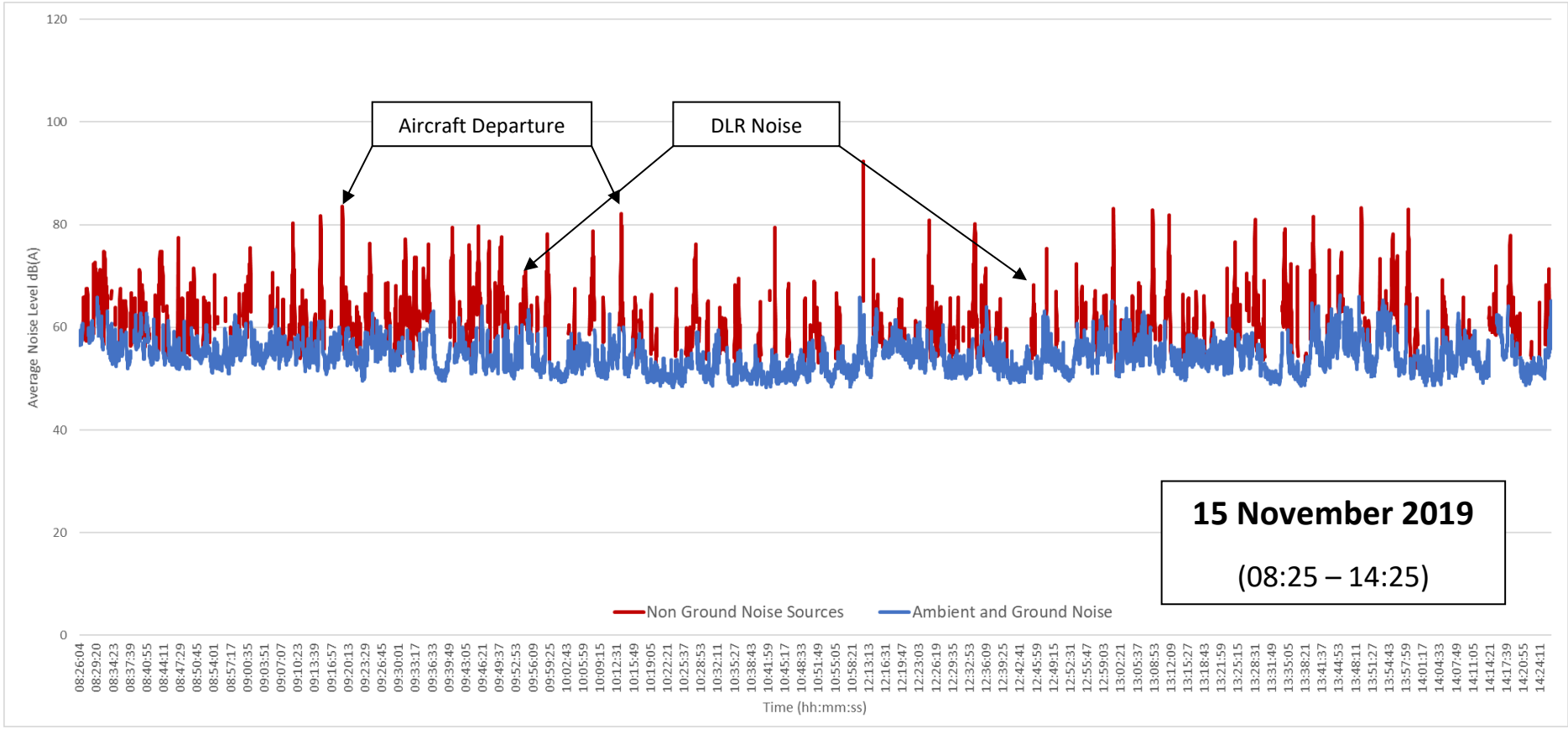
APPENDIX 4

DETAILED SURVEY RESULTS

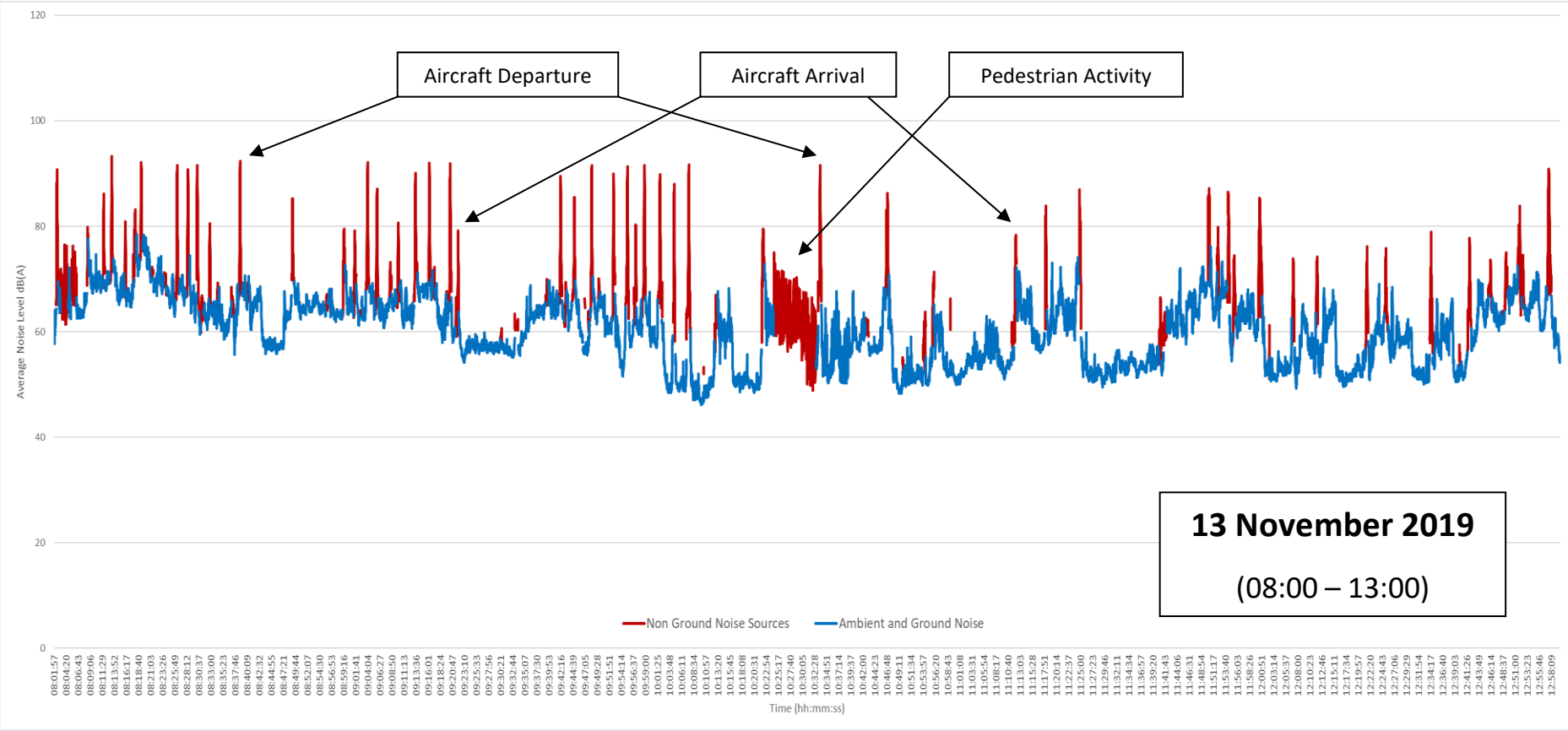
Location G1


Loud Car
Aircraft Departure
DLR Noise
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
13 November 2019
(08:00 – 15:00)
Time (hh:mm:ss)

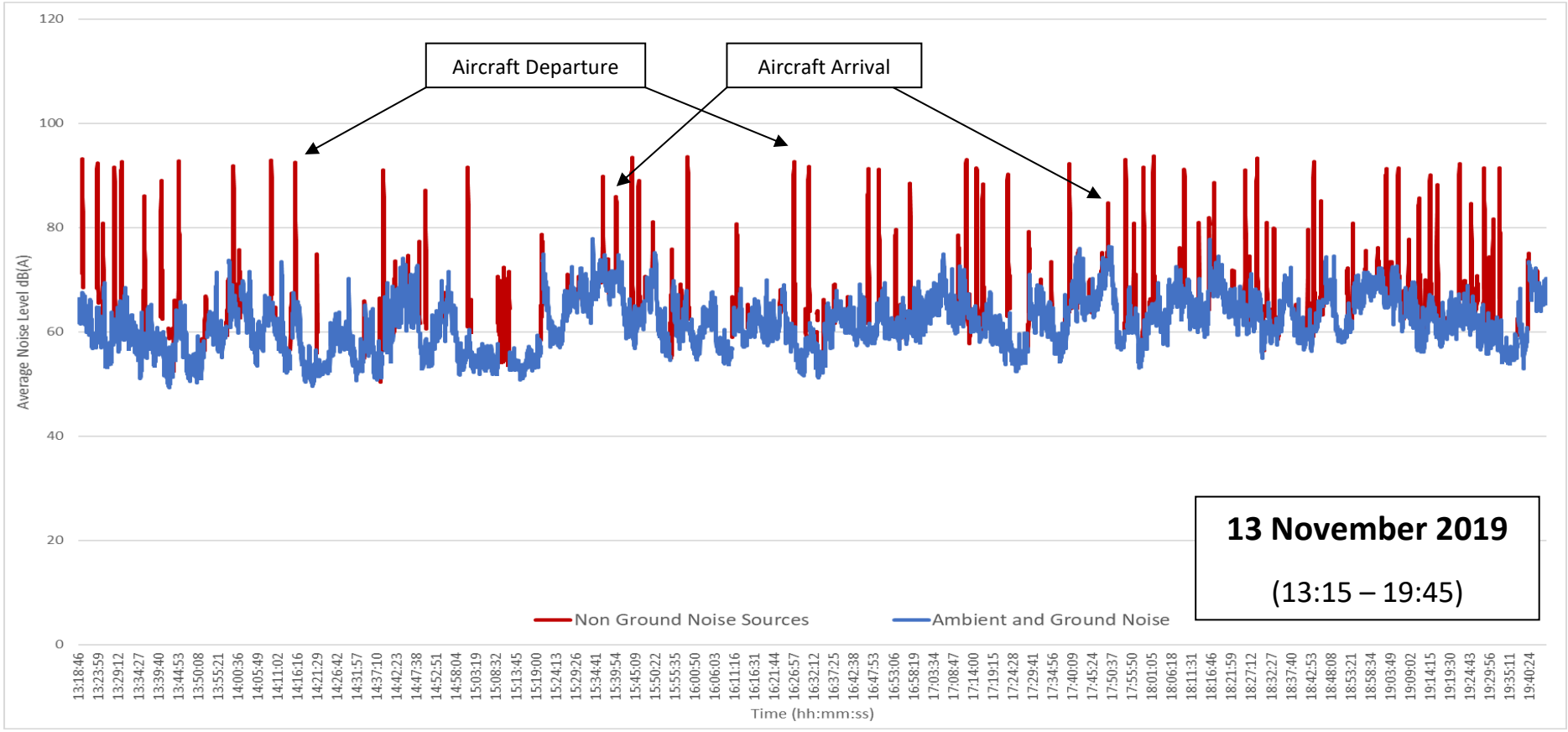
Location G2


Aircraft Departure
DLR Noise
15 November 2019
(08:25 – 14:25)
Non Ground Noise Sources
Ambient and Ground Noise
Average Noise Level dB(A)
Time (hh:mm:ss)

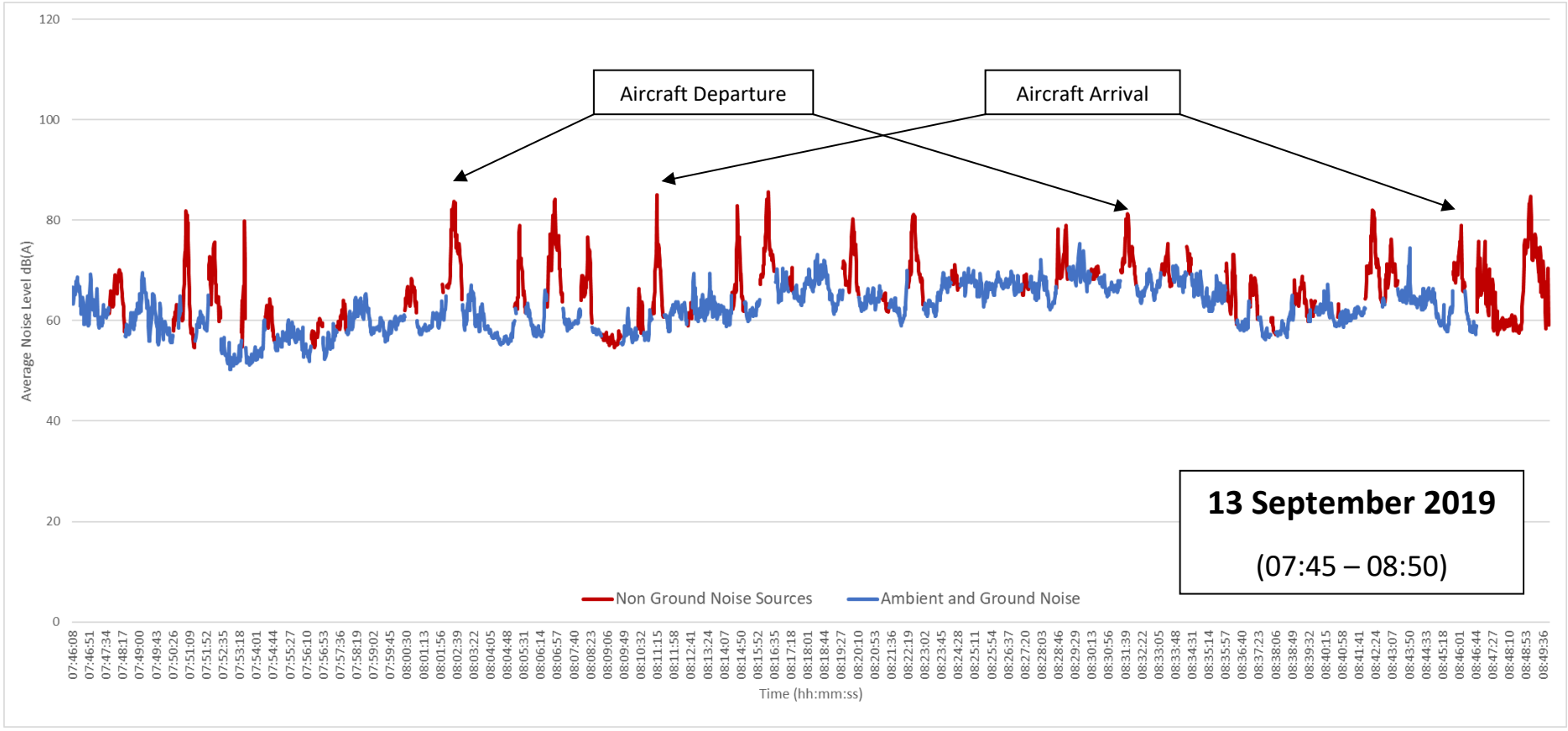
Location G3


Aircraft Departure
Aircraft Arrival
Pedestrian Activity
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
Time (hh:mm:ss)
13 November 2019
(08:00 – 13:00)

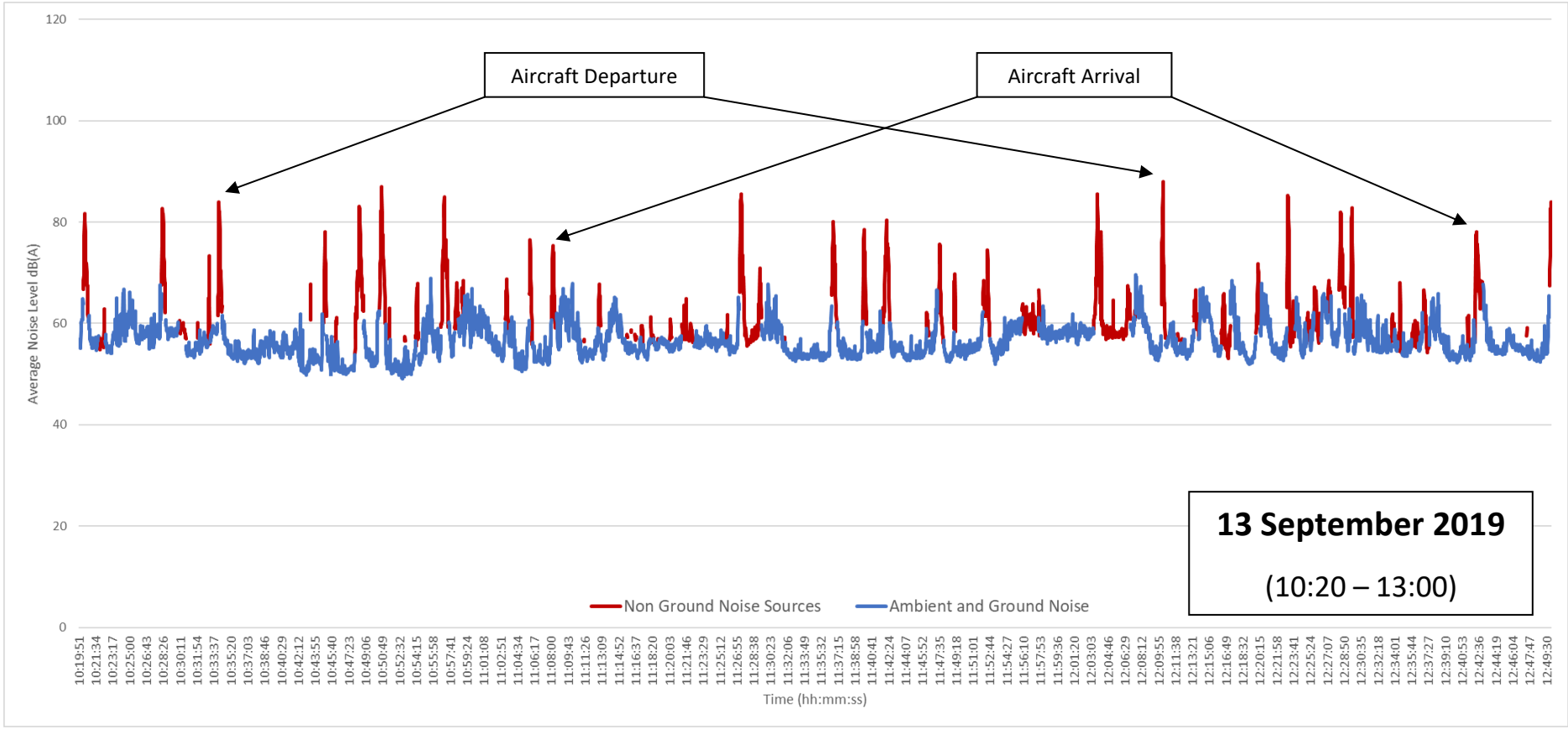
Location G3


Aircraft Departure
Aircraft Arrival
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
13 November 2019
(13:15 – 19:45)
Time (hh:mm:ss)

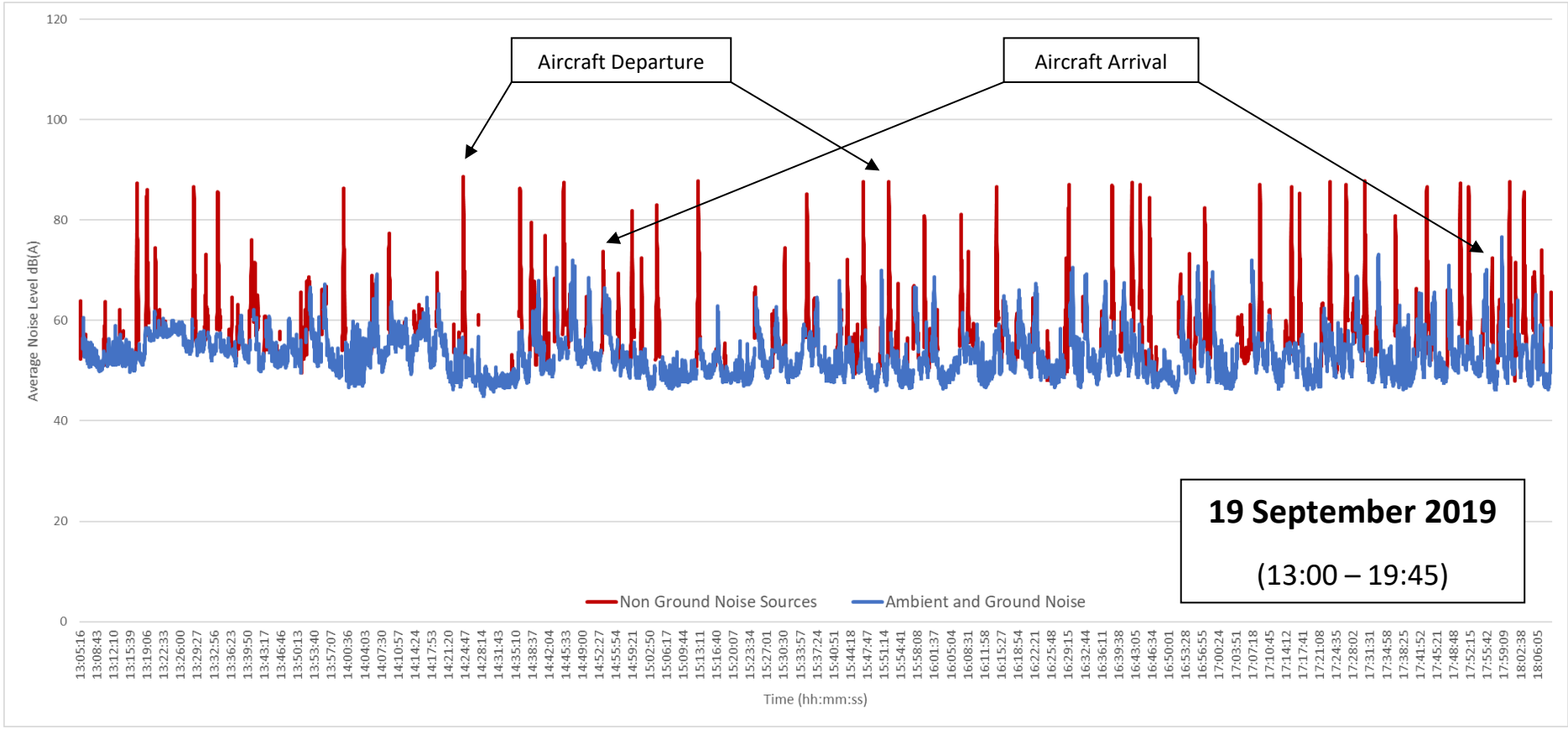
Location G4


Aircraft Departure
Aircraft Arrival
13 September 2019
(07:45 – 08:50)
Non Ground Noise Sources
Ambient and Ground Noise
Average Noise Level dB(A)
Time (hh:mm:ss)
120
100
80
60
40
20
0

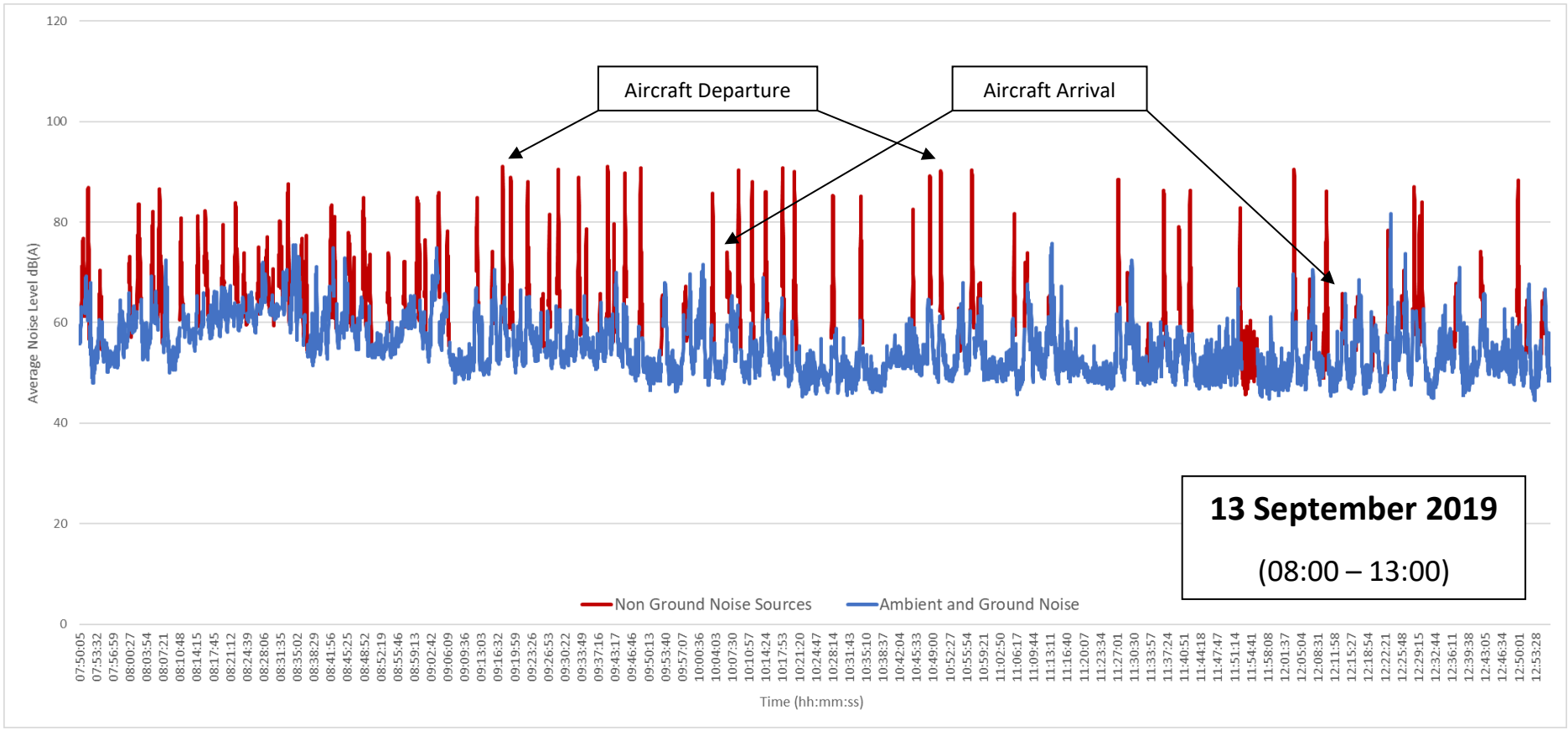
Location G4


Aircraft Departure
Aircraft Arrival
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
13 September 2019
(10:20 – 13:00)
Time (hh:mm:ss)

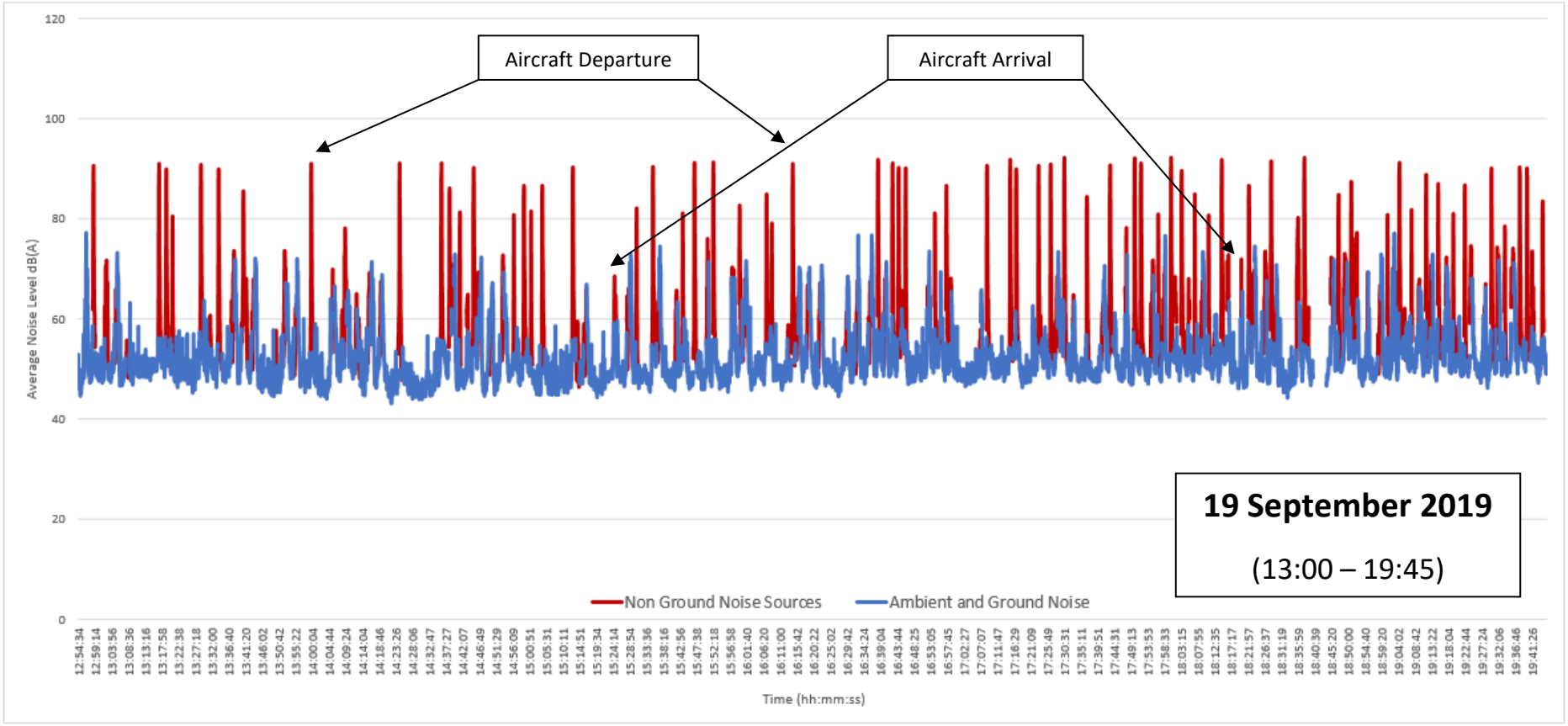
Location G4


Aircraft Departure
Aircraft Arrival
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
19 September 2019
(13:00 – 19:45)
Time (hh:mm:ss)

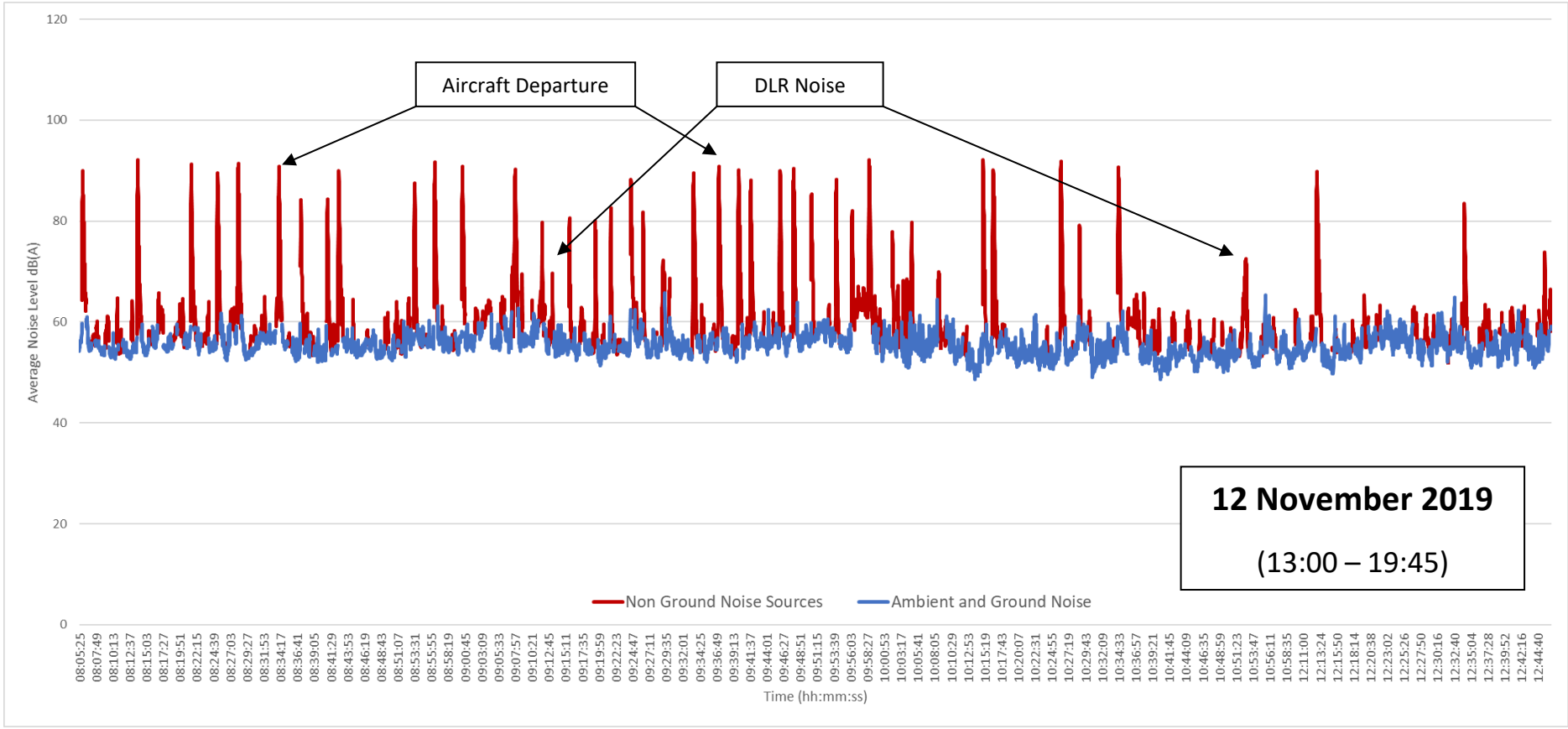
Location G5


Aircraft Departure
Aircraft Arrival
13 September 2019
(08:00 – 13:00)
Non Ground Noise Sources
Ambient and Ground Noise
Average Noise Level dB(A)
Time (hh:mm:ss)

Location G5


Aircraft Departure
Aircraft Arrival
Average Noise Level dB(A)
120
100
80
60
40
20
0
Non Ground Noise Sources
Ambient and Ground Noise
Time (hh:mm:ss)
19 September 2019
(13:00 – 19:45)

Location G6


Aircraft Departure
DLR Noise
Average Noise Level dB(A)
120
100
80
60
40
20
0
12 November 2019
(13:00 – 19:45)
Non Ground Noise Sources
Ambient and Ground Noise
Time (hh:mm:ss)

APPENDIX 5

SCHEDULE OF FLIGHT INFORMATION ON GROUND NOISE SURVEY DAYS

Date	Time	Aircraft Code	Operation	Runway
13/08/2019	12:55	BCS1	D	27
13/08/2019	12:57	E190	A	27
13/08/2019	13:04	E190	A	27
13/08/2019	13:19	E190	D	27
13/08/2019	13:23	E190	D	27
13/08/2019	13:25	DH8D	D	27
13/08/2019	13:28	E190	D	27
13/08/2019	13:30	E190	D	27
13/08/2019	13:36	RJ85	D	27
13/08/2019	13:40	E170	D	27
13/08/2019	13:43	E190	A	27
13/08/2019	13:45	E190	D	27
13/08/2019	13:51	B462	A	27
13/08/2019	13:57	E190	A	27
13/08/2019	13:59	E190	D	27
13/08/2019	14:01	SB20	A	27
13/08/2019	14:09	E190	D	27
13/08/2019	14:14	E190	A	27
13/08/2019	14:15	E190	D	27
13/08/2019	14:33	E170	A	27
13/08/2019	14:38	E190	D	27
13/08/2019	14:41	RJ85	A	27
13/08/2019	14:45	DH8D	A	27
13/08/2019	14:48	SB20	D	27
13/08/2019	14:49	B462	D	27
13/08/2019	14:54	E190	A	27
13/08/2019	15:01	E190	D	27
13/08/2019	15:20	DH8D	A	27
13/08/2019	15:27	E190	A	27
13/08/2019	15:29	E170	A	27
13/08/2019	15:36	E170	D	27
13/08/2019	15:38	E190	A	27
13/08/2019	15:40	RJ85	D	27
13/08/2019	15:44	E190	D	27
13/08/2019	15:46	E170	D	27
13/08/2019	15:47	E190	A	27

Date	Time	Aircraft Code	Operation	Runway
13/08/2019	15:49	DH8D	D	27
13/08/2019	15:54	DH8D	A	27
13/08/2019	15:56	E190	A	27
13/08/2019	15:58	E190	D	27
13/08/2019	16:10	E190	A	27
13/08/2019	16:11	DH8D	D	27
13/08/2019	16:14	E190	A	27
13/08/2019	16:23	E190	A	27
13/08/2019	16:26	E190	D	27
13/08/2019	16:30	E190	D	27
13/08/2019	16:34	E190	A	27
13/08/2019	16:37	E190	A	27
13/08/2019	16:40	E190	A	27
13/08/2019	16:46	E190	D	27
13/08/2019	16:49	E190	D	27
13/08/2019	16:53	DH8D	D	27
13/08/2019	16:54	RJ85	A	27
13/08/2019	16:57	FA7X	D	27
13/08/2019	17:04	E190	A	27
13/08/2019	17:10	DH8D	A	27
13/08/2019	17:12	E190	D	27
13/08/2019	17:13	E190	A	27
13/08/2019	17:14	E190	D	27
13/08/2019	17:16	E170	D	27
13/08/2019	17:20	E170	A	27
13/08/2019	17:23	E190	D	27
13/08/2019	17:28	DH8D	A	27
13/08/2019	17:31	E190	A	27
13/08/2019	17:34	BCS1	A	27
13/08/2019	17:37	E190	A	27
13/08/2019	17:39	E190	D	27
13/08/2019	17:41	DH8D	A	27
13/08/2019	17:44	E190	A	27
13/08/2019	17:47	SB20	A	27
13/08/2019	17:49	RJ85	D	27
13/08/2019	17:54	E190	D	27

Date	Time	Aircraft Code	Operation	Runway
13/08/2019	17:56	DH8D	D	27
13/08/2019	17:58	E190	D	27
13/08/2019	18:00	E190	A	27
13/08/2019	18:01	E190	D	27
13/08/2019	18:04	E170	A	27
13/08/2019	18:08	DH8D	A	27
13/08/2019	18:09	E190	D	27
13/08/2019	18:12	E190	A	27
13/08/2019	18:15	AT72	A	27
13/08/2019	18:17	E170	D	27
13/08/2019	18:19	E190	A	27
13/08/2019	18:22	B462	A	27
13/08/2019	18:25	E190	D	27
13/08/2019	18:26	DH8D	A	27
13/08/2019	18:28	E190	D	27
13/08/2019	18:30	J328	A	27
13/08/2019	18:31	DH8D	D	27
13/08/2019	18:33	DH8D	D	27
13/08/2019	18:34	E170	A	27
13/08/2019	18:38	E190	A	27
13/08/2019	18:42	SB20	D	27
13/08/2019	18:43	E190	D	27
13/08/2019	18:45	BCS1	D	27
13/08/2019	18:46	E190	A	27
13/08/2019	18:52	BCS1	A	27
13/08/2019	18:53	DH8D	D	27
13/08/2019	18:57	E190	A	27
13/08/2019	19:00	E190	A	27
13/08/2019	19:02	E190	D	27
13/08/2019	19:03	DH8D	A	27
13/08/2019	19:05	E190	D	27
13/08/2019	19:07	E190	A	27
13/08/2019	19:08	AT72	D	27
13/08/2019	19:11	J328	D	27
13/08/2019	19:12	E190	A	27
13/08/2019	19:14	E170	D	27

Date	Time	Aircraft Code	Operation	Runway
13/08/2019	19:16	E170	D	27
13/08/2019	19:18	RJ85	A	27
13/08/2019	19:21	E190	D	27
13/08/2019	19:23	E190	A	27
13/08/2019	19:25	B462	D	27
13/08/2019	19:26	E190	A	27
13/08/2019	19:28	E190	D	27
13/08/2019	19:29	BCS1	A	27
13/08/2019	19:30	DH8D	D	27
13/08/2019	19:32	E190	D	27
13/08/2019	19:36	E170	A	27
13/08/2019	19:39	DH8D	A	27
13/08/2019	19:42	E190	A	27
13/08/2019	19:46	E190	A	27
13/08/2019	19:49	E190	A	27
13/08/2019	19:52	E190	D	27
13/08/2019	19:53	E190	A	27
13/08/2019	19:55	E190	D	27
13/08/2019	19:56	E190	A	27
13/08/2019	19:59	BCS1	D	27
13/08/2019	20:00	DH8D	D	27
23/08/2019	07:45	E190	D	27
23/08/2019	07:46	BCS1	A	27
23/08/2019	07:51	RJ85	A	27
23/08/2019	07:54	E190	D	27
23/08/2019	07:56	SB20	A	27
23/08/2019	08:02	E170	D	27
23/08/2019	08:08	DH8D	A	27
23/08/2019	08:11	BCS1	D	27
23/08/2019	08:13	E190	D	27
23/08/2019	08:16	DH8D	D	27
23/08/2019	08:17	AT72	A	27
23/08/2019	08:19	E190	D	27
23/08/2019	08:20	E170	A	27
23/08/2019	08:23	E190	A	27
23/08/2019	08:26	E190	D	27

Date	Time	Aircraft Code	Operation	Runway
23/08/2019	08:27	E190	A	27
23/08/2019	08:28	E190	D	27
23/08/2019	08:30	E190	D	27
23/08/2019	08:31	E190	A	27
23/08/2019	08:32	DH8D	D	27
23/08/2019	08:34	E190	A	27
23/08/2019	08:36	E190	A	27
23/08/2019	08:38	E190	D	27
23/08/2019	08:40	E190	A	27
23/08/2019	08:47	RJ85	A	27
23/08/2019	08:49	RJ85	D	27
23/08/2019	08:55	E170	A	27
23/08/2019	08:59	DH8D	A	27
23/08/2019	09:01	SB20	D	27
23/08/2019	09:02	J328	A	27
23/08/2019	09:04	E190	D	27
23/08/2019	09:05	BCS1	D	27
23/08/2019	09:08	E190	A	27
23/08/2019	09:10	DH8D	D	27
23/08/2019	09:13	E170	D	27
23/08/2019	09:16	E190	D	27
23/08/2019	09:17	E190	A	27
23/08/2019	09:20	E190	D	27
23/08/2019	09:22	AT72	D	27
23/08/2019	09:39	E190	A	27
23/08/2019	09:42	E190	D	27
23/08/2019	09:43	E190	A	27
23/08/2019	09:44	RJ85	D	27
23/08/2019	09:48	E190	D	27
23/08/2019	09:49	C56X	A	27
23/08/2019	09:52	E170	D	27
23/08/2019	09:55	E190	D	27
23/08/2019	09:57	DH8D	D	27
23/08/2019	09:58	E190	D	27
23/08/2019	10:01	E190	D	27
23/08/2019	10:04	J328	D	27

Date	Time	Aircraft Code	Operation	Runway
23/08/2019	10:07	E190	D	27
23/08/2019	10:12	E190	A	27
23/08/2019	10:22	DH8D	A	27
23/08/2019	10:33	E190	D	27
23/08/2019	10:47	E190	D	27
23/08/2019	10:55	E190	A	27
23/08/2019	11:12	DH8D	A	27
23/08/2019	11:18	C56X	D	27
23/08/2019	11:25	DH8D	D	09
23/08/2019	11:50	E190	D	09
23/08/2019	11:52	BCS1	A	09
23/08/2019	11:54	DH8D	D	09
23/08/2019	11:55	E190	A	09
23/08/2019	12:00	E190	D	09
23/08/2019	12:07	E190	A	09
23/08/2019	12:12	E170	A	09
23/08/2019	12:22	E190	A	09
23/08/2019	12:28	E170	A	09
23/08/2019	12:34	E190	A	09
23/08/2019	12:42	E190	A	09
23/08/2019	12:46	RJ85	A	09
23/08/2019	12:49	E190	A	09
23/08/2019	12:52	E190	A	09
23/08/2019	12:52	BCS1	D	09
23/08/2019	12:58	E190	D	09
23/08/2019	13:01	E190	A	09
13/09/2019	07:31	F50	A	27
13/09/2019	07:35	DH8D	A	27
13/09/2019	07:38	E170	A	27
13/09/2019	07:41	CL60	A	27
13/09/2019	07:42	E190	D	27
13/09/2019	07:44	DH8D	A	27
13/09/2019	07:45	C25A	D	27
13/09/2019	07:48	E190	A	27
13/09/2019	07:51	BCS1	A	27
13/09/2019	07:52	DH8D	D	27

Date	Time	Aircraft Code	Operation	Runway
13/09/2019	07:54	RJ85	A	27
13/09/2019	08:00	E190	A	27
13/09/2019	08:02	E190	D	27
13/09/2019	08:05	DH8D	A	27
13/09/2019	08:06	E190	D	27
13/09/2019	08:08	E190	A	27
13/09/2019	08:11	SB20	A	27
13/09/2019	08:14	DH8D	A	27
13/09/2019	08:16	E190	D	27
13/09/2019	08:20	C550	D	27
13/09/2019	08:22	E190	D	27
13/09/2019	08:24	E190	A	27
13/09/2019	08:27	E190	A	27
13/09/2019	08:29	BCS1	D	27
13/09/2019	08:30	E170	A	27
13/09/2019	08:31	E170	D	27
13/09/2019	08:33	DH8D	D	27
13/09/2019	08:36	F50	D	27
13/09/2019	08:37	E190	A	27
13/09/2019	08:42	E190	D	27
13/09/2019	08:42	AT72	A	27
13/09/2019	08:46	E190	A	27
13/09/2019	08:46	BCS1	D	27
13/09/2019	08:49	E190	D	27
13/09/2019	08:50	E190	A	27
13/09/2019	08:54	E190	A	27
13/09/2019	08:57	E190	A	27
13/09/2019	09:00	E190	D	27
13/09/2019	09:01	E190	A	27
13/09/2019	09:04	DH8D	D	27
13/09/2019	09:06	SB20	D	27
13/09/2019	09:12	RJ85	D	09
13/09/2019	09:15	E190	A	09
13/09/2019	09:17	E190	D	09
13/09/2019	09:19	E190	D	09
13/09/2019	09:20	C68A	A	09

Date	Time	Aircraft Code	Operation	Runway
13/09/2019	09:22	E170	D	09
13/09/2019	09:24	J328	A	09
13/09/2019	09:27	DH8D	D	09
13/09/2019	09:29	E190	D	09
13/09/2019	09:31	RJ85	A	09
13/09/2019	09:33	E190	D	09
13/09/2019	09:34	AT72	D	09
13/09/2019	09:37	E190	A	09
13/09/2019	09:40	E190	D	09
13/09/2019	09:41	E190	D	09
13/09/2019	09:43	E190	A	09
13/09/2019	09:45	E190	D	09
13/09/2019	09:48	E190	D	09
13/09/2019	09:52	E190	A	09
13/09/2019	09:57	E190	A	09
13/09/2019	10:00	E190	A	09
13/09/2019	10:03	J328	D	09
13/09/2019	10:06	DH8D	A	09
13/09/2019	10:08	E190	D	09
13/09/2019	10:11	FA7X	D	09
13/09/2019	10:14	RJ85	D	09
13/09/2019	10:18	E190	D	09
13/09/2019	10:20	E190	D	09
13/09/2019	10:28	C68A	D	09
13/09/2019	10:34	C68A	D	09
13/09/2019	10:45	DH8D	D	09
13/09/2019	10:48	E190	D	09
13/09/2019	10:50	E190	D	09
13/09/2019	10:54	E170	A	09
13/09/2019	10:57	E190	D	09
13/09/2019	10:58	E170	A	09
13/09/2019	11:05	DH8D	D	09
13/09/2019	11:08	DH8D	A	09
13/09/2019	11:12	E190	A	09
13/09/2019	11:27	E190	D	09
13/09/2019	11:29	E190	A	09

Date	Time	Aircraft Code	Operation	Runway
13/09/2019	11:36	E170	D	09
13/09/2019	11:39	C510	D	09
13/09/2019	11:42	E170	D	09
13/09/2019	11:52	DH8D	D	09
13/09/2019	12:03	E190	D	09
13/09/2019	12:06	E190	A	09
13/09/2019	12:13	E190	A	09
13/09/2019	12:16	E190	A	09
13/09/2019	12:19	E170	A	09
13/09/2019	12:23	BCS1	A	09
13/09/2019	12:25	E190	A	09
13/09/2019	12:28	E190	D	09
13/09/2019	12:29	BCS1	A	09
13/09/2019	12:36	E190	A	09
13/09/2019	12:42	DH8D	A	09
13/09/2019	12:49	A318	D	09
13/09/2019	12:51	RJ85	A	09
13/09/2019	12:54	E170	A	09
13/09/2019	13:04	E190	D	09
13/09/2019	13:08	E190	A	09
19/09/2019	12:50	E190	A	09
19/09/2019	12:56	RJ85	A	09
19/09/2019	12:59	E190	D	09
19/09/2019	13:04	E190	A	09
19/09/2019	13:17	E190	D	09
19/09/2019	13:19	E190	D	09
19/09/2019	13:20	DH8D	D	09
19/09/2019	13:28	E190	D	09
19/09/2019	13:33	E190	D	09
19/09/2019	13:37	E190	A	09
19/09/2019	13:40	RJ85	D	09
19/09/2019	13:43	E190	A	09
19/09/2019	13:52	DH8D	A	09
19/09/2019	13:55	E190	A	09
19/09/2019	13:59	E190	D	09
19/09/2019	14:05	F50	A	09

Date	Time	Aircraft Code	Operation	Runway
19/09/2019	14:09	SB20	A	09
19/09/2019	14:12	C56X	A	09
19/09/2019	14:15	E190	A	09
19/09/2019	14:19	E170	A	09
19/09/2019	14:24	E190	D	09
19/09/2019	14:36	E190	D	09
19/09/2019	14:38	E190	A	09
19/09/2019	14:38	E170	D	09
19/09/2019	14:41	DH8D	D	09
19/09/2019	14:43	DH8D	A	09
19/09/2019	14:45	E190	A	09
19/09/2019	14:49	E190	A	09
19/09/2019	14:53	DH8D	A	09
19/09/2019	14:56	SB20	D	09
19/09/2019	14:59	E170	D	09
19/09/2019	15:01	F50	D	09
19/09/2019	15:04	E170	D	09
19/09/2019	15:12	E190	D	09
19/09/2019	15:16	RJ85	A	09
19/09/2019	15:24	DH8D	A	09
19/09/2019	15:28	E190	A	09
19/09/2019	15:30	DH8D	D	09
19/09/2019	15:35	E190	D	09
19/09/2019	15:36	E190	A	09
19/09/2019	15:41	H25B	A	09
19/09/2019	15:43	DH8D	D	09
19/09/2019	15:47	E190	D	09
19/09/2019	15:50	E55P	A	09
19/09/2019	15:52	E190	D	09
19/09/2019	15:57	DH8D	A	09
19/09/2019	16:00	E190	A	09
19/09/2019	16:00	C56X	D	09
19/09/2019	16:07	RJ85	D	09
19/09/2019	16:08	DH8D	D	09
19/09/2019	16:12	C510	A	09
19/09/2019	16:14	E190	D	09

Date	Time	Aircraft Code	Operation	Runway
19/09/2019	16:15	E190	A	09
19/09/2019	16:18	E190	A	09
19/09/2019	16:21	E190	A	09
19/09/2019	16:29	E190	A	09
19/09/2019	16:32	E190	A	09
19/09/2019	16:35	E190	A	09
19/09/2019	16:38	E190	D	09
19/09/2019	16:39	E190	A	09
19/09/2019	16:42	E190	D	09
19/09/2019	16:44	E190	D	09
19/09/2019	16:46	GL5T	D	27
19/09/2019	16:52	DH8D	A	09
19/09/2019	16:54	DH8D	D	09
19/09/2019	16:55	E190	A	09
19/09/2019	16:57	E55P	D	09
19/09/2019	16:58	DH8D	A	09
19/09/2019	17:06	E190	A	09
19/09/2019	17:08	E190	D	09
19/09/2019	17:15	E190	D	09
19/09/2019	17:17	E190	D	09
19/09/2019	17:21	DH8D	A	09
19/09/2019	17:23	E190	D	09
19/09/2019	17:24	RJ85	A	09
19/09/2019	17:26	E190	D	09
19/09/2019	17:27	E190	A	09
19/09/2019	17:30	E190	D	09
19/09/2019	17:32	C56X	A	09
19/09/2019	17:40	E190	A	09
19/09/2019	17:43	E190	D	09
19/09/2019	17:44	E190	A	09
19/09/2019	17:47	BCS1	A	09
19/09/2019	17:50	E190	D	09
19/09/2019	17:51	E190	D	09
19/09/2019	17:54	E190	A	09
19/09/2019	17:56	DH8D	D	09
19/09/2019	17:58	E170	A	09

Date	Time	Aircraft Code	Operation	Runway
19/09/2019	18:00	E190	D	09
19/09/2019	18:01	SB20	A	09
19/09/2019	18:03	E190	D	09
19/09/2019	18:05	DH8D	A	09
19/09/2019	18:07	DH8D	D	09
19/09/2019	18:08	E190	A	09
19/09/2019	18:10	DH8D	D	09
19/09/2019	18:12	E170	A	09
19/09/2019	18:14	E190	D	09
19/09/2019	18:16	F50	A	09
19/09/2019	18:19	E55P	A	09
19/09/2019	18:22	RJ85	D	09
19/09/2019	18:23	E190	A	09
19/09/2019	18:26	E190	A	09
19/09/2019	18:28	E190	D	09
19/09/2019	18:29	J328	A	09
19/09/2019	18:35	AT72	A	09
19/09/2019	18:37	E190	D	09
19/09/2019	18:42	E190	A	09
19/09/2019	18:45	DH8D	A	09
19/09/2019	18:47	BCS1	D	09
19/09/2019	18:48	DH8D	A	09
19/09/2019	18:50	E170	D	09
19/09/2019	18:51	BCS1	A	09
19/09/2019	18:55	E190	A	09
19/09/2019	18:58	E190	A	09
19/09/2019	19:01	SB20	D	09
19/09/2019	19:02	E190	A	09
19/09/2019	19:04	E190	D	09
19/09/2019	19:05	E190	A	09
19/09/2019	19:07	DH8D	D	09
19/09/2019	19:09	E170	A	09
19/09/2019	19:11	E190	D	09
19/09/2019	19:11	E190	D	09
19/09/2019	19:12	E190	A	09
19/09/2019	19:15	E170	D	09

Date	Time	Aircraft Code	Operation	Runway
19/09/2019	19:16	E190	A	09
19/09/2019	19:19	F50	D	09
19/09/2019	19:20	E190	A	09
19/09/2019	19:22	J328	D	09
19/09/2019	19:23	DH8D	A	09
19/09/2019	19:27	E190	A	09
19/09/2019	19:31	E190	A	09
19/09/2019	19:33	AT72	D	09
19/09/2019	19:35	DH8D	A	09
19/09/2019	19:38	E190	D	09
19/09/2019	19:40	E190	D	09
19/09/2019	19:41	BCS1	A	09
19/09/2019	19:44	BCS1	D	09
19/09/2019	19:46	E190	D	09
19/09/2019	19:48	E190	A	09
19/09/2019	19:51	E190	D	09
19/09/2019	19:52	RJ85	A	09
19/09/2019	19:54	DH8D	D	09
19/09/2019	19:56	DH8D	D	09
19/09/2019	19:59	E190	A	09
12/11/2019	07:46	BCS1	A	27
12/11/2019	07:48	F50	D	27
12/11/2019	07:50	BCS1	A	27
12/11/2019	07:53	E190	A	27
12/11/2019	07:56	DH8D	D	27
12/11/2019	07:57	E190	A	27
12/11/2019	07:59	E170	D	27
12/11/2019	08:00	RJ85	A	27
12/11/2019	08:03	E190	D	27
12/11/2019	08:04	E190	A	27
12/11/2019	08:05	FA50	D	27
12/11/2019	08:07	SB20	A	27
12/11/2019	08:11	DH8D	A	27
12/11/2019	08:13	E190	D	27
12/11/2019	08:15	DH8D	A	27
12/11/2019	08:19	E170	A	27

Date	Time	Aircraft Code	Operation	Runway
12/11/2019	08:21	E190	D	27
12/11/2019	08:22	DH8D	A	27
12/11/2019	08:25	E190	D	27
12/11/2019	08:26	DH8D	A	27
12/11/2019	08:28	E190	D	27
12/11/2019	08:31	E190	A	27
12/11/2019	08:34	E190	D	27
12/11/2019	08:35	E190	A	27
12/11/2019	08:37	BCS1	D	27
12/11/2019	08:40	BCS1	D	27
12/11/2019	08:42	E190	D	27
12/11/2019	08:43	E190	A	27
12/11/2019	08:46	E190	A	27
12/11/2019	08:50	E190	A	27
12/11/2019	08:53	RJ85	D	27
12/11/2019	08:54	E170	A	27
12/11/2019	08:56	E190	D	27
12/11/2019	08:58	E190	A	27
12/11/2019	09:00	E190	D	27
12/11/2019	09:02	AT72	A	27
12/11/2019	09:05	E190	A	27
12/11/2019	09:07	E190	D	27
12/11/2019	09:09	DH8D	A	27
12/11/2019	09:11	SB20	D	27
12/11/2019	09:12	RJ85	A	27
12/11/2019	09:15	DH8D	D	27
12/11/2019	09:17	J328	A	27
12/11/2019	09:19	DH8D	D	27
12/11/2019	09:21	DH8D	D	27
12/11/2019	09:23	E190	A	27
12/11/2019	09:24	E170	D	27
12/11/2019	09:27	E190	A	27
12/11/2019	09:31	DH8D	A	27
12/11/2019	09:33	E190	D	27
12/11/2019	09:35	E190	A	27
12/11/2019	09:37	E190	D	27

Date	Time	Aircraft Code	Operation	Runway
12/11/2019	09:39	E190	D	27
12/11/2019	09:41	E170	D	27
12/11/2019	09:42	E190	A	27
12/11/2019	09:45	E190	D	27
12/11/2019	09:47	E190	D	27
12/11/2019	09:50	J328	D	27
12/11/2019	09:53	A318	D	27
12/11/2019	09:56	RJ85	D	27
12/11/2019	09:58	E190	D	27
12/11/2019	10:00	E190	A	27
12/11/2019	10:02	AT72	D	27
12/11/2019	10:04	DH8D	D	27
12/11/2019	10:09	E190	A	27
12/11/2019	10:12	E190	A	27
12/11/2019	10:15	E190	D	27
12/11/2019	10:16	E190	D	27
12/11/2019	10:19	E170	A	27
12/11/2019	10:24	E190	A	27
12/11/2019	10:26	E190	D	27
12/11/2019	10:27	E170	A	27
12/11/2019	10:28	DH8D	D	27
12/11/2019	10:34	E190	D	27
12/11/2019	10:41	E190	A	27
12/11/2019	10:45	E190	A	27
12/11/2019	11:02	DH8D	A	27
12/11/2019	11:04	C25A	D	27
12/11/2019	11:05	E170	A	27
12/11/2019	11:07	E190	D	27
12/11/2019	11:11	E190	D	27
12/11/2019	11:13	E190	D	27
12/11/2019	11:15	E170	D	27
12/11/2019	11:26	E170	D	27
12/11/2019	11:28	E190	D	27
12/11/2019	11:30	E190	A	27
12/11/2019	11:34	E190	A	27
12/11/2019	11:37	E190	A	27

Date	Time	Aircraft Code	Operation	Runway
12/11/2019	11:42	DH8D	D	27
12/11/2019	11:49	E190	D	27
12/11/2019	11:54	E190	A	27
12/11/2019	11:56	E190	D	27
12/11/2019	11:59	E190	A	27
12/11/2019	12:11	RJ85	A	27
12/11/2019	12:12	E190	D	27
12/11/2019	12:26	E190	A	27
12/11/2019	12:32	E170	A	27
12/11/2019	12:34	P180	D	27
12/11/2019	12:53	C56X	A	27
12/11/2019	13:00	E190	A	27
13/11/2019	07:46	BCS1	A	27
13/11/2019	07:49	C510	D	27
13/11/2019	07:50	BCS1	A	27
13/11/2019	07:53	E190	A	27
13/11/2019	07:55	F50	D	27
13/11/2019	07:57	DH8D	A	27
13/11/2019	08:03	E170	D	27
13/11/2019	08:05	RJ85	A	27
13/11/2019	08:07	E190	D	27
13/11/2019	08:07	E190	A	27
13/11/2019	08:10	E190	D	27
13/11/2019	08:10	E190	A	27
13/11/2019	08:12	E190	D	27
13/11/2019	08:15	DH8D	A	27
13/11/2019	08:17	E190	D	27
13/11/2019	08:19	SB20	A	27
13/11/2019	08:21	E190	D	27
13/11/2019	08:23	DH8D	A	27
13/11/2019	08:25	E190	D	27
13/11/2019	08:27	E190	A	27
13/11/2019	08:30	E190	D	27
13/11/2019	08:33	DH8D	D	27
13/11/2019	08:34	E190	A	27
13/11/2019	08:40	E170	A	27

Date	Time	Aircraft Code	Operation	Runway
13/11/2019	08:41	BCS1	D	27
13/11/2019	08:41	E190	A	27
13/11/2019	08:45	DH8D	D	27
13/11/2019	08:45	E170	A	27
13/11/2019	08:47	E190	D	27
13/11/2019	08:49	AT72	A	27
13/11/2019	08:50	E190	D	27
13/11/2019	08:54	RJ85	D	27
13/11/2019	08:56	BCS1	D	27
13/11/2019	08:57	E190	A	27
13/11/2019	08:59	E190	D	27
13/11/2019	09:01	E190	A	27
13/11/2019	09:04	RJ85	A	27
13/11/2019	09:07	E190	A	27
13/11/2019	09:09	DH8D	D	27
13/11/2019	09:10	J328	A	27
13/11/2019	09:12	E190	D	27
13/11/2019	09:15	C56X	D	27
13/11/2019	09:17	E190	D	27
13/11/2019	09:18	E190	A	27
13/11/2019	09:19	SB20	D	27
13/11/2019	09:21	E190	A	27
13/11/2019	09:24	E190	D	27
13/11/2019	09:26	E170	D	27
13/11/2019	09:28	DH8D	D	27
13/11/2019	09:30	E190	A	27
13/11/2019	09:32	E190	D	27
13/11/2019	09:35	DH8D	A	27
13/11/2019	09:38	E170	D	27
13/11/2019	09:40	AT72	D	27
13/11/2019	09:44	E190	A	27
13/11/2019	09:47	E190	D	27
13/11/2019	09:48	E190	D	27
13/11/2019	09:51	A318	D	27
13/11/2019	09:54	J328	D	27
13/11/2019	09:56	E190	D	27

Date	Time	Aircraft Code	Operation	Runway
13/11/2019	10:00	E190	A	27
13/11/2019	10:04	RJ85	D	27
13/11/2019	10:06	E170	A	27
13/11/2019	10:11	E190	D	27
13/11/2019	10:12	E190	D	27
13/11/2019	10:13	E190	A	27
13/11/2019	10:16	E170	A	27
13/11/2019	10:20	E190	A	27
13/11/2019	10:21	E190	D	27
13/11/2019	10:22	E190	A	27
13/11/2019	10:25	DH8D	D	27
13/11/2019	10:30	E170	A	27
13/11/2019	10:34	E190	A	27
13/11/2019	10:36	E190	D	27
13/11/2019	10:56	DH8D	A	27
13/11/2019	10:58	E190	D	27
13/11/2019	11:00	E190	A	27
13/11/2019	11:02	E190	D	27
13/11/2019	11:05	E190	D	27
13/11/2019	11:10	E170	A	27
13/11/2019	11:13	E170	D	27
13/11/2019	11:20	E190	A	27
13/11/2019	11:25	E170	D	27
13/11/2019	11:29	E190	D	27
13/11/2019	11:40	DH8D	D	27
13/11/2019	11:59	E190	A	27
13/11/2019	12:01	E170	D	27
13/11/2019	12:03	E190	A	27
13/11/2019	12:06	E190	A	27
13/11/2019	12:08	E190	D	27
13/11/2019	12:21	E170	A	27
13/11/2019	12:25	BCS1	A	27
13/11/2019	12:28	RJ85	A	27
13/11/2019	12:38	E190	A	27
13/11/2019	12:45	E190	A	27
13/11/2019	12:55	E190	D	27

Date	Time	Aircraft Code	Operation	Runway
13/11/2019	12:57	E190	A	27
13/11/2019	13:08	E190	A	27
13/11/2019	13:10	E190	D	27
13/11/2019	13:14	RJ85	D	27
13/11/2019	13:18	E190	D	27
13/11/2019	13:21	BCS1	D	27
13/11/2019	13:31	E170	D	27
13/11/2019	13:32	E190	D	27
13/11/2019	13:35	E190	A	27
13/11/2019	13:39	E190	A	27
13/11/2019	13:53	E190	D	27
13/11/2019	13:55	E190	A	27
13/11/2019	13:57	E190	D	27
13/11/2019	14:06	F50	A	27
13/11/2019	14:23	DH8D	A	27
13/11/2019	14:28	SB20	A	27
13/11/2019	14:30	E170	A	27
13/11/2019	14:33	RJ85	A	27
13/11/2019	14:36	E170	A	27
13/11/2019	14:36	E190	D	27
13/11/2019	14:38	E190	D	27
13/11/2019	14:40	E190	D	27
13/11/2019	14:43	E190	D	27
13/11/2019	14:47	E190	A	27
13/11/2019	14:52	E170	D	27
13/11/2019	14:55	F50	D	27
13/11/2019	14:58	E170	A	27
13/11/2019	15:14	SB20	D	27
15/11/2019	08:10	E190	D	27
15/11/2019	08:11	SB20	A	27
15/11/2019	08:13	E190	D	27
15/11/2019	08:14	E190	A	27
15/11/2019	08:16	DH8D	D	27
15/11/2019	08:17	E190	A	27
15/11/2019	08:20	E190	A	27
15/11/2019	08:22	E170	D	27

Date	Time	Aircraft Code	Operation	Runway
15/11/2019	08:23	E170	A	27
15/11/2019	08:26	E170	A	27
15/11/2019	08:29	AT72	A	27
15/11/2019	08:29	E190	D	27
15/11/2019	08:31	E190	D	27
15/11/2019	08:33	E190	D	27
15/11/2019	08:33	RJ85	A	27
15/11/2019	08:36	E190	A	27
15/11/2019	08:38	BCS1	D	27
15/11/2019	08:39	E190	A	27
15/11/2019	08:43	E190	D	09
15/11/2019	08:58	E190	A	09
15/11/2019	09:01	E190	D	09
15/11/2019	09:03	RJ85	A	09
15/11/2019	09:06	DH8D	D	09
15/11/2019	09:07	J328	A	09
15/11/2019	09:09	E170	D	09
15/11/2019	09:11	DH8D	D	09
15/11/2019	09:12	E190	A	09
15/11/2019	09:14	E190	D	09
15/11/2019	09:16	E190	A	09
15/11/2019	09:19	E190	D	09
15/11/2019	09:20	DH8D	D	09
15/11/2019	09:22	SB20	D	09
15/11/2019	09:24	E170	D	09
15/11/2019	09:25	E190	A	09
15/11/2019	09:28	AT72	D	09
15/11/2019	09:31	E190	D	09
15/11/2019	09:33	E190	D	09
15/11/2019	09:35	RJ85	D	09
15/11/2019	09:40	E190	D	09
15/11/2019	09:42	E190	A	09
15/11/2019	09:43	C56X	D	09
15/11/2019	09:45	E190	D	09
15/11/2019	09:47	J328	D	09
15/11/2019	09:49	E190	D	09

Date	Time	Aircraft Code	Operation	Runway
15/11/2019	09:54	RJ85	D	09
15/11/2019	09:58	E190	D	09
15/11/2019	10:05	E190	A	09
15/11/2019	10:07	E190	D	09
15/11/2019	10:11	E170	A	09
15/11/2019	10:13	E190	D	09
15/11/2019	10:15	E190	A	09
15/11/2019	10:27	E190	D	09
15/11/2019	10:31	E170	A	09
15/11/2019	10:50	DH8D	A	09
15/11/2019	10:55	C68A	A	09
15/11/2019	11:00	E170	A	09
15/11/2019	11:04	E190	A	09
15/11/2019	11:07	E190	D	09
15/11/2019	11:08	E170	D	09
15/11/2019	11:24	E170	D	09
15/11/2019	11:39	E190	A	09
15/11/2019	11:41	E170	D	09
15/11/2019	11:43	DH8D	D	09
15/11/2019	11:45	DH8D	A	09
15/11/2019	11:48	E190	D	09
15/11/2019	11:50	E190	A	09
15/11/2019	11:52	C56X	D	09
15/11/2019	11:54	E190	D	09
15/11/2019	11:56	C25A	A	09
15/11/2019	12:00	E190	A	09
15/11/2019	12:04	E190	A	09
15/11/2019	12:10	E190	A	09
15/11/2019	12:14	E190	A	09
15/11/2019	12:18	E170	A	09
15/11/2019	12:22	E190	A	09
15/11/2019	12:25	A318	D	09
15/11/2019	12:26	E190	A	09
15/11/2019	12:34	E190	D	09
15/11/2019	12:36	BCS1	A	09
15/11/2019	12:44	RJ85	A	09

Date	Time	Aircraft Code	Operation	Runway
15/11/2019	12:47	E190	A	09
15/11/2019	12:54	E190	A	09
15/11/2019	12:57	DH8D	D	09
15/11/2019	12:58	E190	A	09
15/11/2019	13:01	E190	D	09
15/11/2019	13:02	E190	A	09
15/11/2019	13:06	E190	A	09
15/11/2019	13:08	E190	D	09
15/11/2019	13:11	E190	D	09
15/11/2019	13:24	BCS1	D	09
15/11/2019	13:28	E190	D	09
15/11/2019	13:34	E190	D	09
15/11/2019	13:40	E170	D	09
15/11/2019	13:42	E170	A	09
15/11/2019	13:45	RJ85	D	09
15/11/2019	13:46	E170	A	09
15/11/2019	13:49	E190	D	09
15/11/2019	13:52	F50	A	09
15/11/2019	13:55	E190	D	09
15/11/2019	13:58	E190	D	09
15/11/2019	14:08	E190	A	09
15/11/2019	14:15	CL30	A	09
15/11/2019	14:18	E190	D	09
15/11/2019	14:26	E170	A	09
15/11/2019	14:30	E190	A	09
15/11/2019	14:37	SB20	A	09
15/11/2019	14:39	E190	D	09

APPENDIX 6

GROUND NOISE CONTOURS

Ground Noise LAeq,16h dB(A)
Receiver height 1.5m
Grid spacing 5 x 5 m

Not to scale

A1125.57 v1.0 20.02.2020

A1125.57 - London City Airport - Ground Noise

>= 30.0 dB(A)
>= 35.0 dB(A)
>= 40.0 dB(A)
>= 45.0 dB(A)
>= 50.0 dB(A)
>= 55.0 dB(A)
>= 60.0 dB(A)
>= 65.0 dB(A)
>= 70.0 dB(A)

London City Airport - 2019 Baseline
Westerly

CadnaA Aircraft ground noise contours

Ground Noise LAeq,16h dB(A)
Receiver height 1.5m
Grid spacing 5 x 5 m

Not to scale

A1125.57 v1.0 20.02.2020

A1125.57 - London City Airport - Ground Noise

>= 30.0 dB(A)
>= 35.0 dB(A)
>= 40.0 dB(A)
>= 45.0 dB(A)
>= 50.0 dB(A)
>= 55.0 dB(A)
>= 60.0 dB(A)
>= 65.0 dB(A)
>= 70.0 dB(A)

London City Airport - 2019 Baseline
Easterly

CadnaA Aircraft ground noise contours