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Kingsway House, London

Plant Noise Assessment Report

23 March 2016

For

Milieu Consult

90 Cannon Street

London

EC4N 6HA

Contents

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Report Produced by Nicholas Jones BEng(Hons) CEng MIOA

T: 07739 715411 E: njones@auricl.com

auricl Limited 107 Cheapside | London | EC2V 6DN
30 Hilfield | Yateley | GU46 6XP
www.auricl.com
hello@auricl.com

EXECUTIVE SUMMARY

New items of building services plant are proposed as part of the refurbishment of Kingsway House, which will be subject to noise limitations imposed by Camden Council.

A noise survey has been undertaken to determine ambient and background noise levels at positions representative of the nearest noise sensitive properties to the site.

A noise assessment has been undertaken to predict noise emissions associated with the main items of proposed plant.

The total noise level due to all normal plant operating simultaneously is predicted to be 6 dB less than the lowest daytime background noise level. The plant noise is not predicted to have any discrete continuous notes or distinct impulses, therefore the total predicted noise level achieves the Camden Council requirements for normally-operating plant.

For emergency plant, the noise level is predicted to be 6 dB less than the lowest daytime background noise level, therefore the predicted noise level achieves the Camden Council requirements for emergency plant.

1.0 Introduction

New building services plant items are proposed as part of the refurbishment of Kingsway House. Noise emissions from the new plant will be subject to limitations imposed by Camden Council.

This report presents the methodology and results of a noise survey to determine ambient and background noise levels at the nearest noise sensitive properties to the site. Calculations will also be presented, predicting noise emissions from the plant in relation to the Camden Council requirements.

2.0 Description of Site and Proposals

The site is located at 103 Kingsway in central London and is currently an office building with retail units at ground floor. Kingsway runs along the north east of the site, with Parker Street running along the north western site boundary and Great Queen Street running along the south east.

It is proposed to refurbish the building, which will involve removal of the existing sixth and seventh floors, to be replaced with a new double mansard and set back eighth floor level. A further set back louvred plant area is proposed at roof level.

The surrounding properties are predominantly offices, retail units and cafés. A small number of residential properties were noted in the vicinity of the site, the nearest being within the adjacent site to the south west, at third and fourth floor level.

Figure 2.1 shows the site extent in **red**, with the approximate location of the proposed roof level louvred plant area indicated in **green** and the nearest residential properties indicated in **blue**.

Figure 2.1 Site Extent and Surroundings

3.0 Camden Council Requirements

The proposed site lies within the boundary of Camden Council, whose typical requirements regarding plant noise are presented in Table E of Policy DP28 as follows:

Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	***Period***	***Time***	***Noise Level***
Noise at 1 metre external to a sensitive façade	*Day, evening and night*	*0000-2400*	*5dB(A) < L_{A90}*
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	*Day, evening and night*	*0000-2400*	*10dB(A) < L_{A90}*
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	*Day, evening and night*	*0000-2400*	*10dB(A) < L_{A90}*
Noise at 1 metre external to a sensitive façade where L_{A90}>60dB	*Day, evening and night*	*0000-2400*	*55 dB L_{Aeq}*

The above requirements apply to normal items of plant. For emergency plant items (e.g. generators), a relaxed standard is normally permitted, due to the infrequent use of the plant.

It is understood that a total noise level 10 dB in excess of the background L_{A90} noise level would be permitted by Camden Council for emergency plant items.

4.0 Noise Survey Methodology

An unmanned environmental noise survey was undertaken over approximately 48 hours between Monday 7 March 2016 and Wednesday 9 March 2016. This survey period was selected to determine typical background noise levels during the proposed operating period of the plant.

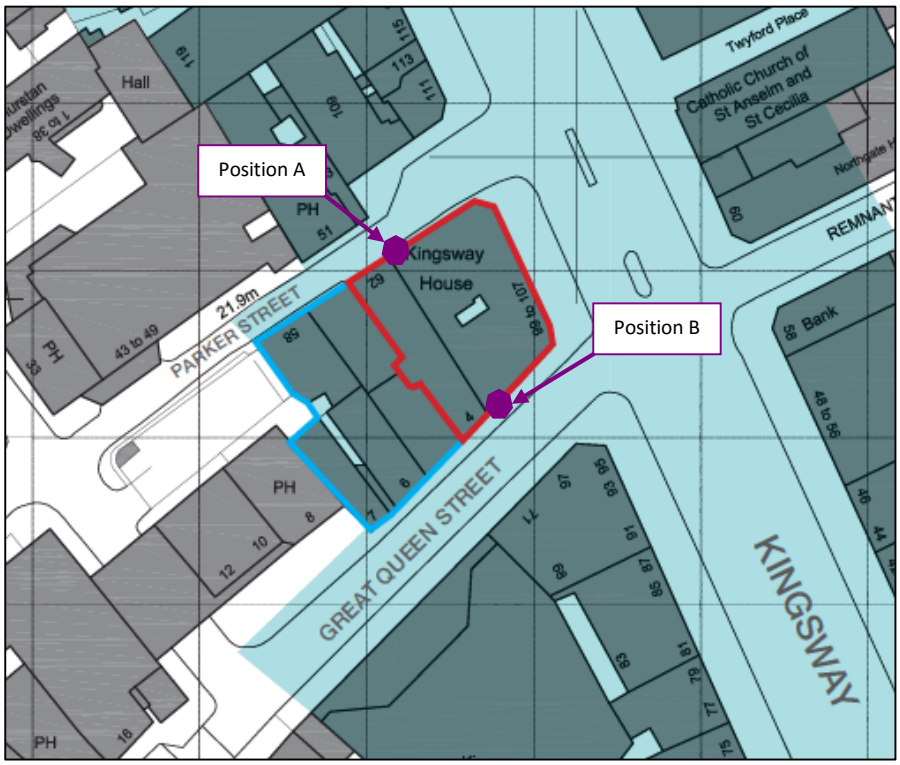
L_{Aeq} and L_{A90} noise levels were measured throughout the noise survey over contiguous 1 second intervals.

The measurement positions are described in Table 4.1 and indicated in **purple** on Figure 4.1.

Table 4.1 Description of Measurement Positions

Position	Description
A	Fixed to a railing at roof level at the north western corner of the site, with the measurement microphone protruding from the roof edge over Parker Street
B	Fixed to a railing at roof level at the south western corner of the site, with the measurement microphone protruding from the roof edge over Great Queen Street

Figure 4.1 Site Plan Showing Approximate Measurement Positions



The measurement positions were selected as being representative of background noise levels at the nearest noise sensitive properties.

The equipment used for the noise survey is summarised in Table 4.2.

Table 4.2 Description of Equipment used for Noise Survey

Measurement Position	Item	Make & Model	Serial Number
A	Type 1 automated logging sound level meter	01 dB Duo	10522
	Type 1 ½" external microphone	GRAS 40CD	136978
	Calibrator	01 dB CAL 21	01120237
B	Type 1 automated logging sound level meter	01 dB Cube	10619
	Type 1 ½" external microphone	GRAS 40CD	207246
	Calibrator	01 dB CAL 21	35183004

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period. However, at the beginning and end of the survey

period, there was noted to be no rainfall, a clear sky and only light wind. These conditions are understood to be representative of the survey period and are considered appropriate for undertaking environmental noise measurements.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found. Equipment calibration certificates can be provided upon request.

5.0 Noise Survey Results

Appendix B presents time history graphs showing the L_{Aeq} and L_{A90} noise levels measured throughout the noise survey at the measurement positions.

We would consider the noise levels measured to be reasonable, considering the location of the measurement positions and the dominant nearby noise sources.

The lowest background $L_{A90\,(15\,min)}$ noise levels at the measurement positions, during daytime and night-time periods, are presented in Table 5.1 below.

Table 5.1 Lowest Measured Background $L_{A90\,(15\,min)}$ Noise Levels

Measurement Position	Lowest Measured $L_{A90\,(15\,min)}$ Background Noise Level (dB)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
A	58	52
B	57	51

Due to the nature of the unmanned noise survey we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period the daytime noise climate was noted to be affected by noise from road traffic in the general vicinity, particularly along Kingsway. We anticipate that this would also be true of night-time periods.

6.0 Plant Noise Assessment

This section presents our assessment and calculations of noise emissions from the proposed building services plant at roof level, in relation to the proposed noise limits.

6.1 Proposed Plant

The main proposed roof plant items and associated noise levels are as follows:

- Twelve condenser units, each operating at a sound power level of 84 dB L_{wA}
- A supply and extract air handling unit (AHU), operating at the sound power levels shown in Table 6.1

Table 6.1 AHU Sound Power Levels

Source	In-Duct Sound Power Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Supply Intake	87	88	85	83	83	81	81	79
Extract Discharge	90	98	86	85	92	92	87	86

In addition, the casing radiated sound pressure level associated with the AHU is 52 dBA at 3m.

A generator is also proposed, which will only operate in emergency (life safety) scenarios, operating at a sound pressure level of 75 dBA at 1m.

An acoustic screen is to be installed around the perimeter of the roof plant area.

6.2 Proposed Plant Location and Nearest Noise Sensitive Property

The approximate locations of the proposed plant and the nearest residential properties are indicated on Figure 2.1. However, we understand Camden Council also includes office properties within their list of noise sensitive properties, the nearest being to the north and south of the site at a distance of approximately 20m from the proposed roof plant area in each case.

6.3 Plant Noise Predictions – Normal Plant

Our calculations to predict the noise level at the nearest noise sensitive property for normal operating plant are shown in Tables 6.2 to 6.6.

Table 6.2 Condenser Unit Noise Emission Calculations

Element	Level
Single Condenser Unit Sound Power Level (dB)	84
Quantity Correction for 12 Units (dB)	+11
Distance Attenuation Loss (dB) to 20m	-35
Screening Losses (dB)	-9
Total Predicted Noise Level at Receiver (dB)	**51**

Table 6.3 AHU Supply Intake Noise Emission Calculations

Element	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Supply Intake In-Duct Sound Power Level (dB)	87	88	85	83	83	81	81	79	
End Reflection Loss due to Grille (dB)	-3	-1	0	0	0	0	0	0	
Distance Attenuation Loss (dB)	-31	-31	-31	-31	-31	-31	-31	-31	
Directivity Loss at 90° (dB)	-5	-6	-6	-6	-6	-6	-6	-6	
Screening Losses (dB)	-7	-8	-10	-12	-14	-17	-20	-23	**dBA**
Predicted Noise Level at Receiver (dB)	41	42	38	34	32	27	24	19	37

Table 6.4 AHU Extract Discharge Noise Emission Calculations

Element	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
Extract Discharge In-Duct Sound Power Level (dB)	90	98	86	85	92	92	87	86	
Insertion Loss due to Attenuator (dB)	-1	-2	-7	-10	-11	-9	-8	-7	
End Reflection Loss due to Grille (dB)	-3	-1	0	0	0	0	0	0	
Distance Attenuation Loss (dB)	-31	-31	-31	-31	-31	-31	-31	-31	
Directivity Loss at 90° (dB)	-5	-6	-6	-6	-6	-6	-6	-6	
Screening Losses (dB)	-7	-8	-10	-12	-14	-17	-20	-23	dBA
Predicted Noise Level at Receiver (dB)	43	50	32	26	30	29	22	19	37

Table 6.5 AHU Casing Radiated Noise Emission Calculations

Element	Level
AHU Radiated Sound Pressure Level (dBA at 3m)	52
Distance Attenuation Loss (dB) to 20m	-16
Screening Losses (dB)	-10
Total Predicted Noise Level at Receiver (dB)	**26**

Table 6.6 Calculation of Total Noise Level due to All Plant

Plant	Predicted Noise Level at Receiver (dB)
Condenser Units	51
AHU Supply Intake	37
AHU Extract Discharge	37
AHU Casing	26
Total Predicted Noise Level at Receiver (dB)	**51**
Lowest Measured Daytime Background Noise Level (dB)	**57**
Difference (dB)	**-6**

It can be seen that the total noise level due to all normal plant operating simultaneously is predicted to be 6 dB less than the lowest daytime background noise level.

The plant noise is not predicted to have any discrete continuous notes or distinct impulses, therefore the total predicted noise level achieves the Camden Council requirements for normal operating plant presented in Section 3.

6.4 Plant Noise Predictions – Emergency Plant

Our calculations to predict the noise level at the nearest noise sensitive property for emergency plant are shown in Table 6.7.

Table 6.7 Generator Noise Emission Calculations

Element	Level
Generator Overall Sound Pressure Level (dBA at 1m)	75
Distance Attenuation Loss (dB) to 20m	-14
Screening Losses (dB)	-10
Total Predicted Noise Level at Receiver (dB)	**51**
Lowest Measured Daytime Background Noise Level (dB)	**57**
Difference (dB)	**-6**

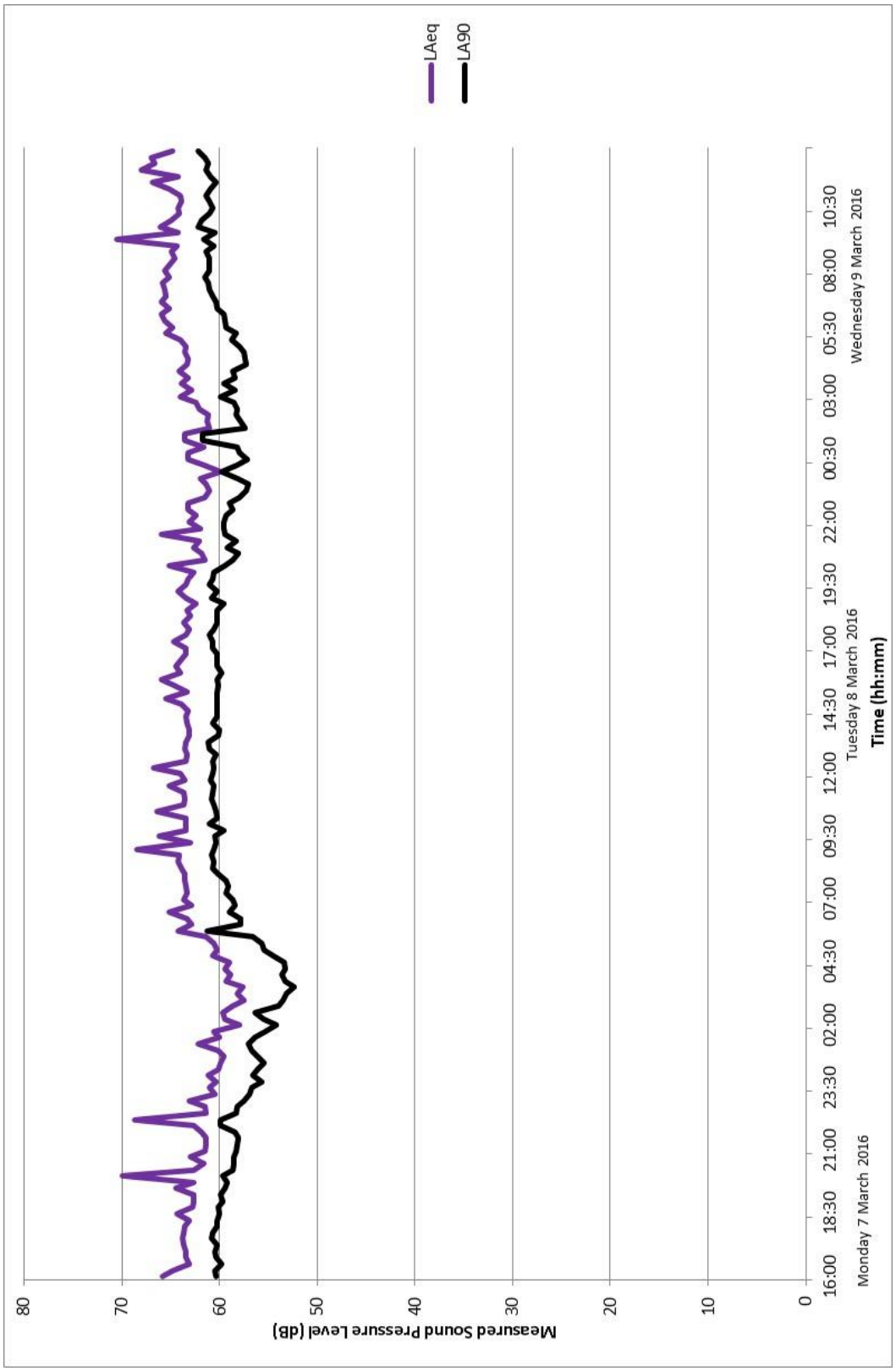
It can be seen that the noise level for emergency plant is predicted to be 6 dB less than the lowest daytime background noise level, therefore the predicted noise level achieves the Camden Council requirements for emergency plant presented in Section 3.

Appendix A – Acoustic Terminology

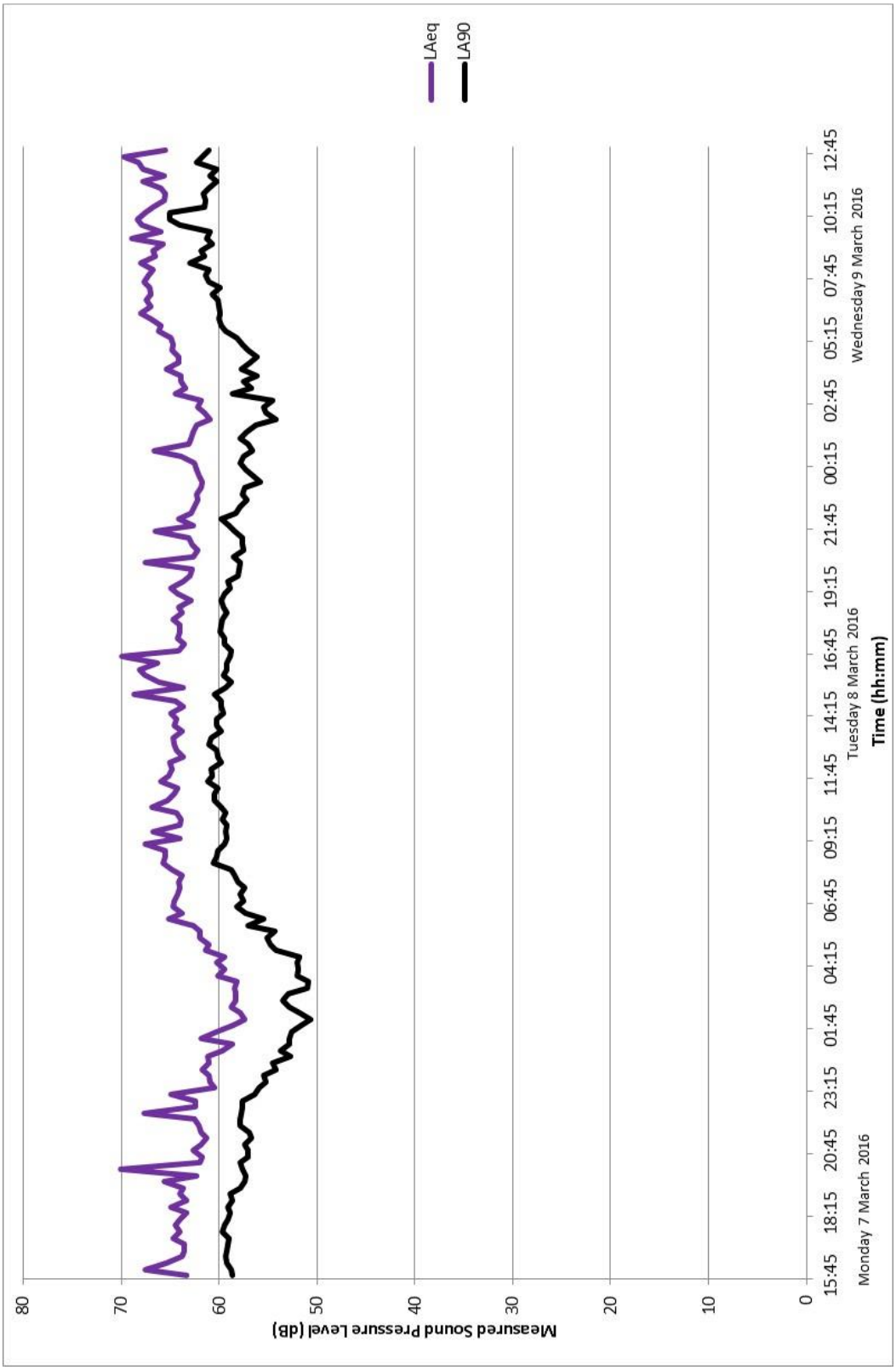
Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{A90\ (15\ min)}$	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15 minute period

Appendix B – Time History Graphs

Position A



Position B


LAeq
LA90
Measured Sound Pressure Level (dB)
80
70
60
50
40
30
20
10
0
15:45
18:15
20:45
23:15
01:45
04:15
06:45
09:15
11:45
14:15
16:45
19:15
21:45
00:15
02:45
05:15
07:45
10:15
12:45
Monday 7 March 2016
Tuesday 8 March 2016
Wednesday 9 March 2016
Time (hh:mm)