CIS Tower Refurbishment Manchester

Noise Impact Assessment Report

27015/NIA1

29 January 2020

For:

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Hann Tucker Associates

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Document Control

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This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.

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1.0 Introduction

The proposals seek to refurbish the existing CIS Tower on Miller Street in Manchester. The description of the development is as follows:

"Planning Permission for the wholesale refurbishment of the CIS Tower, including the refurbishment of single glazed façade; replacement of solar panels on the service tower; creation of new entrances on Dantzic Street and on the eastern elevation of the building; provision of cycle storage, showers and refuse areas; alongside external plant and plant screen at roof level, together with construction of a 3-storey extension to the Podium for office accommodation (Use Class B1); and change of use to basement and ground floor from B1 office to mixed uses (A1, A3, B8, D1 and D2), and the provision of new landscaping and associated works"

Hann Tucker Associates has been commissioned to undertake a baseline environmental noise survey and assess the potential noise impacts on/from the proposed development.

This report presents our findings.

2.0 Objectives

To undertake a review of relevant national and local planning policies, guidelines and industry standards to establish requirements in relation to:-

- Replacing the existing curtain walling/ glazing
- Noise breakout from the operation of ground floor retail/leisure units.
- Internal noise transfer from the operation of the retail/leisure units.
- Noise emissions from new items of plant and equipment.

To establish, by means of fully automated environmental noise monitoring, sufficient baseline environmental noise levels to inform the above noise impact assessments, with measurements undertaken in accordance with BS 7445.

From the results of the survey, to set minimum specifications for the curtain walling/ glazing.

To set suitable noise emission limits for the development for new items of landlord/tenant plant.

To assess A1, A3, B8, D1 and D2 operational noise egress based on the intended use/operational hours of the commercial unit and comment upon the acceptability. To also assess noise transfer through separating floors.

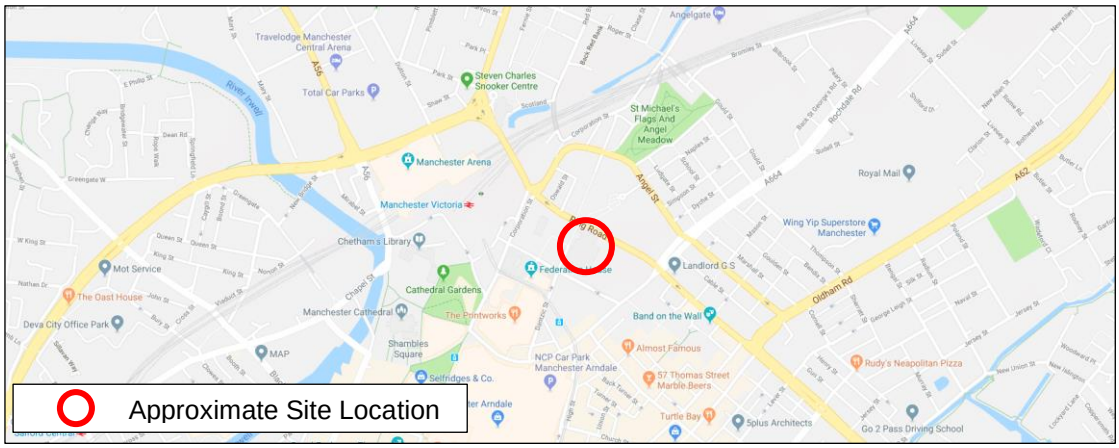
3.0 Acoustic Terminology

Please refer to Appendix A for an explanation of acoustic terminology used herein.

4.0 Site Description

4.1 Location

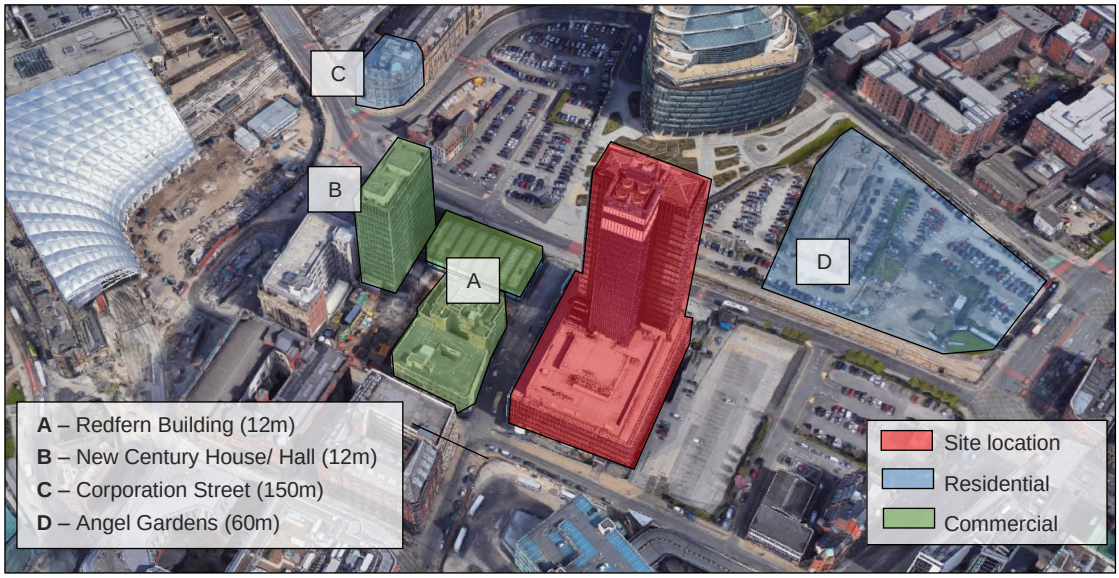
The proposed development is located on Miler Street in Manchester city centre, and falls under the jurisdiction of Manchester City Council. See site location below.



Site Location (© maps.google.co.uk)

4.2 Description

The CIS Tower is located on Miller Street with an external carpark to the east, Dantzic Street to the west and Hanover Street and Shudehill Bus Station to the south. The surrounding area is predominantly commercial (offices) and the nearest residential receptors are approximately 60m away from the proposed development across Miler Street. See site plan below.



Site Plan (© maps.google.co.uk)

5.0 Project Proposals

5.1 Overview

The description of development as stated on the application form for Listed Building Consent is as follows:

"Listed Building Consent for the wholesale internal and external refurbishment of the building for office accommodation on level 1-25 (Use Class B1), including refurbishment of single glazed façade and replacement of solar panels on the service tower; demolition of existing recreational space on the fifth floor and plant to facilitate the construction of a 3-storey extension to the Podium; external alterations to ground floor façade including an extension to the ground floor entrance lobby; creation of new entrances on Dantzic Street and the eastern elevation of the building; alternations to the existing public realm alongside the creation of a new rooftop plant and screen at level 8; removal of external signage and associated works"

5.2 Drawings and Information

All acoustic analyses reported herein have been based on the drawings received from SimpsonHaugh via Transmittal 00200 dated 24 January 2020.

5.3 Operational Activities

It is understood that the office floors are to be refurbished to CAT A standards for perspective tenants to fit out to their own CAT B specifications. No tenants have been secured for the retail/commercial units on the ground floor and basement levels, however, we understand that the final uses could comprise a mixture of A1, A3, B8, D1 and D2 uses.

5.4 Assumed Operational Hours

The operational hours for each of the proposed uses as part of the development, as used in our assessment, are shown below.

Description	Operational Hours	
Office	Monday to Friday	24 hours
Retail/Commercial Units	Monday to Sunday	07:00 – 01:00 hours

6.0 Acoustic Standards & Guidelines

6.1 Local Planning Requirements

Manchester City Council (MCC) requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (December 2015).

6.1.1 Fixed Plant Noise Emissions

Section 3.6.1.5.1 outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that:

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

6.1.2 Music Noise

Section 3.6.1.2 offers the following guidance regarding entertainment noise, which may be applicable for the retail/ commercial spaces within the proposed development.

"Noise from entertainment venues e.g. noise from recorded music, live bands, or karaoke, can be particularly annoying for local residents and businesses if it is not adequately contained within the venue. When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (L_{eq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq})."

The document then proposes the following assessment criteria for structurally connected uses, although this only makes reference to the impact on habitable rooms (not offices):

"Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}) respectively".

In relation to noise egress MCC state that planning applications should:

"demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

'Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location'."

6.1.3 Commercial Noise Breakout

Section 3.6.1.5 outlines that the noise assessment for commercial uses should be based on BS 4142:2014 and the design objective should be:

"The development should be designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

6.2 National Planning Policy Framework

The following paragraphs are from the NPPF (revised February 2019):

180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

- *"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

6.3 BS 4142:2014

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, "*on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident*".

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- *"a difference of around +10dB or more is likely to be an indication of a significant adverse impact";*
- *"a difference of around +5dB is of marginal significance is likely to be an indication of an adverse impact";*
- *"Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact".*

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq,\,T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90,\,T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00 hr) and 15-minutes for operations during night-time hours (23:00 to 07:00 hr).

BS 4142:2014 states that if a noise source contains an 'acoustic feature', such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

6.4 Other Design Guides for Office Accommodation

British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings'* provides guidance for typical noise levels in offices and suggests a design range of 45-50 dB $L_{Aeq,T}$ for open plan spaces (unoccupied and when privacy is important) and 35-40 dB $L_{Aeq,T}$ in cellular executive offices.

For A1/A3 units, guidance can be drawn from typical noise levels quoted for spaces requiring clear speech/telephone communications where 50-55 dB $L_{Aeq,T}$ is quoted.

With consideration for other relevant design guides, namely the British Council for Offices, and relevant BREEAM technical manuals, speculative office accommodation is often designed to achieve an internal ambient noise level of NR 38 L_{eq} (NR 35 L_{eq} for cellular offices or meeting rooms) from a combination of traffic noise intrusion and internal ventilation systems (typically ceiling void mounted FCUs). In A1/A3-use commercial units, NR45 L_{eq} should be considered a suitable shell design target for the majority of prospective tenants.

BS 8233 also presents guidance for assigning appropriate sound insulation targets for walls and floors separate rooms of different uses. Consideration needs to be given to the privacy, sensitivity and 'noisiness' of the rooms in order to assign an appropriate minimum recommended sound reduction performance. For an A3/A4 commercial unit to office adjacent ("very high" activity noise to a "sensitive" office), a minimum performance of 57 dB $D_{nT,w}$ is suggested.

7.0 Environmental Noise Survey

7.1 Procedure

A fully automated noise survey was undertaken from approximately 16:30 hours on Thursday 15 August 2019 to 17:00 hours on Monday 19 August 2019 in order to establish representative noise readings during typical weekday and weekend periods.

Measurements were taken of the A-weighted (dBA) L_{90}, L_{eq} and L_{Fmax} sound pressure levels over discrete periods. Measurements were undertaken in accordance with BS 7445-1:2003 Description and Measurement of Environmental Noise.

7.2 Weather Conditions

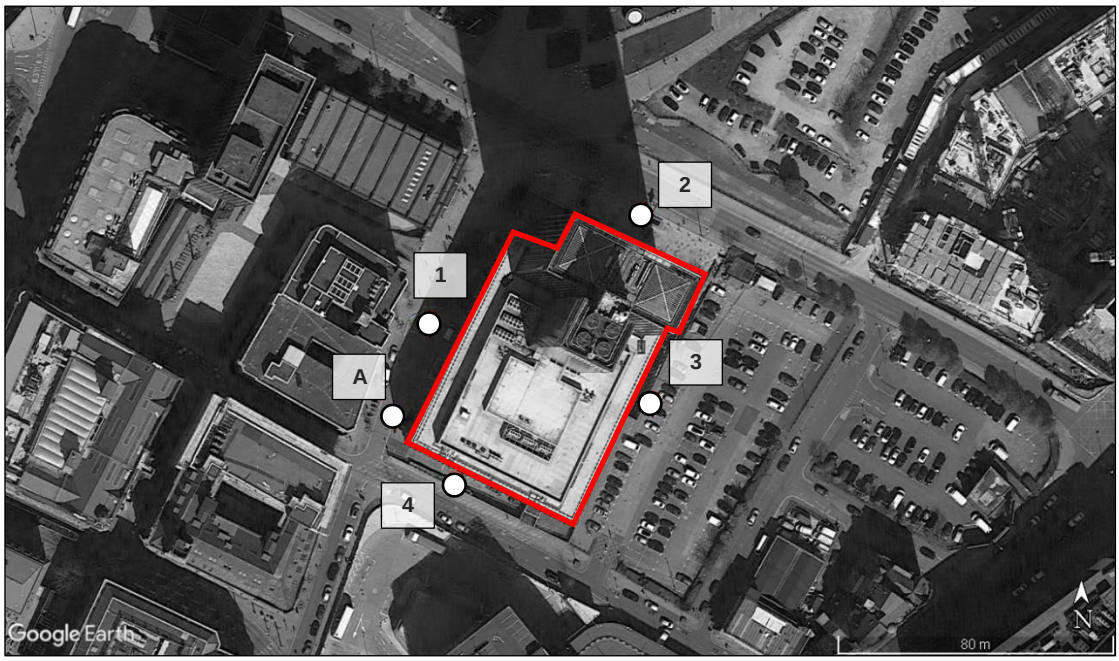
Due to nature of survey, i.e. unmanned, not possible to comment on conditions throughout the survey. However, based on weather reports and conditions experienced during set-out / collection, the weather conditions were calm and the sky was generally overcast.

These conditions are considered suitable for obtaining representative measurement results.

7.3 Measurement Positions

Free-field noise level measurements were undertaken at 5No. positions around the development site, as described/illustrated below.

Position	Description
A	Unmanned measurement position located on Dantzic Street approximately 2.5 meters above local ground level
1	Manned measurement position located on Dantzic Street approximately 1.5 meters above local ground level
2	Manned measurement position located on Miller Street approximately 1.5 meters above ground level at approximately 7 meters from the Miller Street itself
3	Manned measurement position located approximately 1.5 meters above ground level to the East of the CIS tower location on surface carpark
4	Manned measurement position located on Hanover Street across the street from Sandhill Bus Station. Measurement take at 1.5 meters above local ground level



Site Plan (© maps.google.co.uk)

7.4 Instrumentation

The instrumentation used during the survey is presented in the Table below.

Position	Description	Manufacturer	Type	Serial Number	Calibration
A	Type 1 Sound Level Meter	Larson Davis	LxT	5104	05/08/2019
	Type 1 Calibrator	Larson Davis	CAL200	3083	23/04/2019
1, 2, 3 & 4	Type 1 Sound Level Meter	Brüel and Kjær	2250	3025397	20/11/2018
	Type 1 Calibrator	Brüel and Kjær	4231	2271905	19/11/2018

At position A, the sound level meter was installed inside a small security box with the microphone protruding approximately 6 cm out of the box. The security box was fixed to a lamp post (on the side facing the road).

In all other positions the sound level meter was mounted on a tripod located at least 1.5 m above local ground level and at least 3 m from any other reflective surface.

7.5 Results

7.5.1 Unmanned Survey

A summary of the results from the unmanned environmental noise survey, as used to inform subsequent assessments against current guidelines, is presented in the tables below, all results are free-field levels.

Time history plot, 27015/TH1, showing the noise levels measured is enclosed along with the histogram plots used to establish the typical background noise levels are provided in Appendix C.

Position	Measured Ambient Sound Level, $L_{Aeq,T}$ (dB)		
	Daytime *07:00-23:00 hours*	Evening *19:00-23:00 hours*	Night-time *23:00-07:00 hours*
A	66	60	61

Position	Representative Background Sound Level, $L_{A90,15min}$ (dB)		
	Daytime *07:00-23:00 hours*	Evening *19:00-23:00 hours*	Night-time *23:00-07:00 hours*
A	55	55	49

The octave band background noise levels, L_{90} are presented below for use in entertainment noise breakout assessments.

Time	Background, L_{90}, Sound Pressure Level (dB) at Each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Daytime (07:00-23:00)	59	56	54	51	50	48	43	40
Night-time (23:00-07:00)	54	51	47	46	45	40	34	26

7.5.2 Manned Survey

A summary of the results from the manned environmental noise survey, as used to inform subsequent assessments against current guidelines, is presented in the table below, all results are free-field levels.

Position	Measurement Start Time	Measured Sound Pressure Levels (dB)	
		$L_{Aeq,15min}$	$L_{A90,15min}$
1	16:38	59	56
	17:24	61	56
2	16:50	68	60
	17:37	67	59
3	17:02	56	53
	17:49	56	54
4	17:13	64	56
	18:00	65	57

7.6 Discussion of Noise Climate

The predominant noise sources noted during the survey was road traffic noise from Miller Street, car park activity to the East and occasional traffic noise on all other adjacent roads. Building services noise was audible from existing roof top plant serving the adjacent office buildings.

Noise from busses entering, exiting and idling in the adjacent bus station was also audible to the rear of the tower, in position 4.

8.0 Noise Impact Assessments (Overview)

The following sections present our assessment of the various potential noise impacts associated with the development proposals, covering:

- **CIS Tower Environmental Noise Break-in**: Provide preliminary guidance on new/replacement façade elements to combat external noise.
- **Commercial Units Noise Transfer (Internal)**: The control of noise from the operation of commercial units to the office spaces above via the floor
- **Commercial Units Noise Transfer (External)**: The control of noise from the operation of commercial units to nearby receptors via the frontage.
- **Plant Noise Emissions**: Setting limits for new items of fixed plant against MCC guidance and BREEAM 2014 Pol05.

To inform our assessment of the commercial units, we have drawn upon previously measured noise levels within a restaurant during busy evening service with background music playing (A3) and a front of house retail shop during a busy lunchtime period. These typical highest 1-hour noise levels are presented below.

NB: Given the variance of potential operations that fall under B8/D1/D2 use, it would not be possible to present a robust assessment at this stage until further details are known on the proposed B8/D1/D2 operation. Therefore, a specific assessment for D1/D2 use has not been presented, but would be undertaken on a case-by-case basis should B8/D1/D2 use be brought forward as part of the scheme.

Description	Reverberant Noise Level (dB $L_{eq,1hr}$) at Octave Band Centre Frequency (Hz)							dBA
	63	125	250	500	1k	2k	4k	
Front of House Retail Shop during busy lunch-time (A1 use)	58	60	61	60	62	57	57	66
Typical restaurant with background music (A3 use)	60	67	69	71	70	66	60	74

9.0 Internal Ambient Noise Assessment

9.1 Overview

This section assesses external noise intrusion into the office spaces to determine preliminary acoustic performance specifications for the critical façade elements, namely windows.

In relation to the refurbishment aspect of the project, the design proposals allow for the existing single glazing curtain walling to be replaced, however, the framing system is to be retained. All facades are to be fully sealed with all spaces mechanically ventilated.

A new build podium level allows for a new fully glazed curtain walling system, again with a sealed façade and relying on mechanical ventilation.

Our calculations follow BS 8233 procedures and consider typical room dimensions and window sizes as per the latest design drawings (at the time of writing), and the intent is to ensure internal ambient noise levels in office spaces are commensurate with BS8233, BREEAM and BCO.

9.2 External Noise Levels

From the results of the environmental noise survey, we have calculated the façade noise levels across the tower. The results indicate that the noise levels would be in the region of 66 dB $L_{Aeq,12h}$ on the lower floors, reducing to 60 dB $L_{Aeq,12h}$, on the upper levels of the tower.

9.3 Preliminary Guidance on Façade Acoustics

Based on the above, our preliminary calculations indicate new and replacement facade elements are likely to be assigned a minimum acoustic performance specification of circa 27 to 32 dB $R_w + C_{tr}$. The exact rating will vary depending on the façade and floor level. Detailed performance specifications and façade zoning will be developed through design.

However, 27-32 dB $R_w + C_{tr}$ is not an onerous specification and can usually be achieved with conventional laminated double glazing configurations used in multi-storey offices (e.g. 6.4mm acoustic lam. / 6-16mm cavity / 6mm float).

For commercial units and other areas (e.g. entrance lobbies and the ground floor retail/ commercial units), acoustic requirements are likely to be in the region of 27 dB R_w+C_{tr} which, again, can typically be achieved with conventional glazing configurations such as a 6 mm. / 6-16mm cavity / 6mm configuration.

10.0 Ground Floor Units Transfer Via Slab

10.1 Criteria

In the absence of specific MCC criteria for noise transfer from commercial spaces to office spaces, it is recommended that to prevent loss of amenity to the offices/meeting rooms directly above the ground floor units, the aim should be to achieve maintain an internal noise level 10 dB below the standard BS 8233:2014 internal ambient noise level criteria.

Based on the above, and with consideration to (a) the need for spectral noise control in octave bands between 63 Hz and 4 kHz, and (b) the fact that the offices will generally not be occupied when the commercial units are in full operation, we would propose that reverberant noise levels from the commercial units within the office/meeting room spaces directly above should be controlled so as to not exceed NR 30 (~35 dB L_{Aeq}).

10.2 Assessment

Baseline acoustic testing was carried out on site on 15 August 2019 to establish the levels of sound insulation provided between the proposed retail/ commercial spaces on the ground floor and the office spaces above. The measured levels of sound insulation are provided below for use in the assessment of noise transfer.

For full details please refer to Hann Tucker Memo *27015-PTM1-Rev0-JH* dated 30 August 2019.

Source Room	Receive Room	Measured Level Difference, D (dB) at Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
GF Open Plan Office	L1 Open Plan Office	33	48	52	54	55	58	60
GF Post Room	L1 Cellular Office	45	51	55	62	67	71	75
Mezzanine Carpark	L1 Open Plan Office	30	40	46	50	54	60	66

The measured of the level difference between the Mezzanine Carpark and the L1 open plan office are considered representative of the future separating floor construction should an additional suspended ceiling **not** be installed: This is considered representative of the unit 'shell'. As such, the sound insulation performances measured between these areas have been used to information the assessment.

We have assessed noise transfer based on representative source noise levels presented in Section 8.0. An assessment has been carried out for A1 and A3 uses and the results are summarised below.

A1 Unit	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Source reverberant noise level (dB L_{eq})	58	60	61	60	62	57	57
Level difference of existing floor (dB *D*)	30	40	46	50	54	60	66
Predicted noise level within offices (dB L_{eq})	28	20	15	10	8	≤0	≤0
Criteria (NR 30)	59	48	40	34	30	27	25
Compliance note	✓	✓	✓	✓	✓	✓	✓

A3 Unit	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Source reverberant noise level (dB L_{eq})	60	67	69	71	70	66	60
Level difference of existing floor (dB *D*)	30	40	46	50	54	60	66
Predicted noise level within offices (dB L_{eq})	30	27	23	21	16	6	≤0
Criteria (NR 30)	59	48	40	34	30	27	25
Compliance note	✓	✓	✓	✓	✓	✓	✓

Our calculations indicate the current floor should be capable of controlling noise transfer from the operation of the ground floor commercial units to the design target proposed above, thus indicating that no further acoustic enhancements of the separating floor should be considered necessary.

However, it is also recommended that the future tenants of the units should also be provided with a tenant's handbook which stipulates that it is the responsibility of the tenant to not exceed the proposed maximum noise level criteria in the first floor office spaces. If the operation of the units are to have music above the levels assessed or have any other noisy activity it should be the responsibility of the tenant to provide suitable additional sound insulation treatment. Hann Tucker Associates will gladly assist with suitable wording for this upon request.

11.0 External Noise Breakout

11.1 Criteria

MCC recommends that noise (L_{eq}) breaking out through the building frontage of an venue with any amplified music should not exceed 10 dB below the background noise level (L_{90}) at all octave band frequencies at the nearest noise sensitive windows. For this development, the nearest residential receptor is over 60 m away and the nearest office receptor is around 12m away.

We therefore propose the following noise limits when measured at 1m from nearby noise sensitive windows. These limits are 10 dB below the typical lowest background noise levels at each octave band during the operational hours and are subject to the final approval of MCC.

Period	Operational Noise Breakout Sound Level Limit (dB $L_{eq,15min}$) at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Day time (07:00-23:00)	49	46	44	41	40	38	33
Night-time (23:00-01:00)	47	41	37	36	35	30	24

11.2 Ground Floor Unit Assessment

11.2.1 Proposed Building Fabric

We understand that the ground floor glazing is to be replaced during the refurbishment. Based on a minimum performance of 27 dB $R_w + C_{tr}$ being used (ie standard thermal double glazing), the sound reduction provided by the glazing should achieve the performance asset out below.

Description	Estimated Sound Reduction Index (dB *R*) at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Standard Thermal Double Glazing (6/6-16/6)	15	20	22	25	28	30	30

11.2.2 Assessment

We have assessed noise breakout to the nearest receptors based on standard calculation procedures for reverberant noise breakout and A3 source noise levels in Section 8.0. The resultant external noise level has been calculated using the following equation.

$$SPL_{out} = SPL_{in} - SRI + 10log_{10}\left(\frac{S}{r^2}\right) - 14$$

Where:
SRI *estimated sound reduction performance of façade element*
r *distance from radiating element to receptors*
S *approximate area of radiating element*

Assessment to Residential Receptor	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Internal noise level (dB L_{eq}) *SPL_{in}*	60	67	69	71	70	66	60
Building fabric composite sound reduction (dB *R*) *SRI*	15	20	22	25	28	30	30
Distance & radiating area propagation correction (dB) $10log_{10}\left(\frac{S}{r^2}\right)$	-18	-18	-18	-18	-18	-18	-18
Internal diffuse field to external free-field hemispherical radiation correction (dB) *-14*	-14	-14	-14	-14	-14	-14	-14
Screening Loss (dB)	-10	-10	-10	-10	-10	-10	-10
External noise level (dB L_{eq}) ***SPL_{out}***	**3**	**5**	**5**	**4**	**≤0**	**≤0**	**≤0**
Daytime Criteria (dB L_{eq})	**49**	**46**	**44**	**41**	**40**	**38**	**33**
Daytime Compliance Note	✓	✓	✓	✓	✓	✓	✓
Night-time Criteria (dB L_{eq})	**47**	**41**	**37**	**36**	**35**	**30**	**24**
Night-time Compliance Note	✓	✓	✓	✓	✓	✓	✓

Assessment to Office Receptor	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Internal noise level (dB L_{eq}) *SPL_{in}*	60	67	69	71	70	66	60
Building fabric composite sound reduction (dB *R*) *SRI*	15	20	22	25	28	30	30
Distance & radiating area propagation correction (dB) $10log_{10}\left(\frac{S}{r^2}\right)$	-4	-4	-4	-4	-4	-4	-4
Internal diffuse field to external free-field hemispherical radiation correction (dB) *-14*	-14	-14	-14	-14	-14	-14	-14
Screening Loss (dB)	0	0	0	0	0	0	0
External noise level (dB L_{eq}) ***SPL_{out}***	**27**	**29**	**29**	**28**	**24**	**18**	**12**
Daytime Criteria (dB L_{eq})	**49**	**46**	**44**	**41**	**40**	**38**	**33**
Daytime Compliance Note	✓	✓	✓	✓	✓	✓	✓
Night-time Criteria (dB L_{eq})	**47**	**41**	**37**	**36**	**35**	**30**	**24**
Night-time Compliance Note	✓	✓	✓	✓	✓	✓	✓

Based on the above, our pessimistic calculations indicate noise breakout from use of the ground for retail units for A3 use should be capable of achieving the design criteria at both the nearest residential and office receptor. However, the above is based on typical source noise levels and the tenants of the units will ultimately be responsible for controlling levels of noise break-out and introducing any measures to mitigate noise levels higher than those assessed.

12.0 Fixed Plant Noise Emissions

On the basis of the Manchester City Council's guidance and the results of the environmental noise survey, we propose that the following cumulative plant noise rating level, $L_{Ar,Tr}$, be achieved at 1 metre from the nearest noise sensitive windows. These limits are more onerous than required for BREEAM Pol05. As, such, should the limits below be achieved, the BREEAM requirements will also be achieved.

These limits have been calculated from the background noise levels provided in Section 7.5.1

Period	Plant Noise Rating Level Limit, $L_{Ar,Tr}$
Daytime *07:00 – 23:00 hours*	50 dB
Night-time *23:00 – 07:00 hours*	44 dB

For design purposes, any plant which could emit noise of a tonal, irregular or intermittent nature should be subject to an "acoustic feature" penalty in accordance with BS 4142:2014. The above limits shall be subject to the final approval of Manchester City Council.

12.1 Noise Mitigation Measures

As part of the fit-out new plant items are likely to be installed including large plant items associated with the office areas in addition to any smaller tenant plant.

As such, provisions shall be made for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures as deemed necessary.

The tenant handbook for the retail units should specify that new plant items should not exceed the limits presented above when assessed in line with BS 4142: 2014.

13.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the prevailing noise climate at the development site.

Based on the results of the noise survey we have established the minimum facade requirements in order to achieve acceptable internal ambient noise levels for both the office areas and the retail/ commercial units on the ground floor. In general typical glazing configurations would be acceptable with slightly elevated performances on the noisier facades.

Based on the above and a review of national/local guidelines relating to noise control from A1/ A3 uses, we have assessed noise breakout from the operation of the ground floor retail units.

Our assessment indicates noise from the retail units is unlikely to significantly impact on the nearby offices or residential receptors (based on typical noise levels) and thus no further acoustic mitigation measures are considered necessary.

Noise emission limits have been set for new items of fixed plant related to the development and outline advice in terms of mitigation measures have been proposed.

Appendix A – Acoustic Glossary

The acoustic terms used in this report are defined as follows:

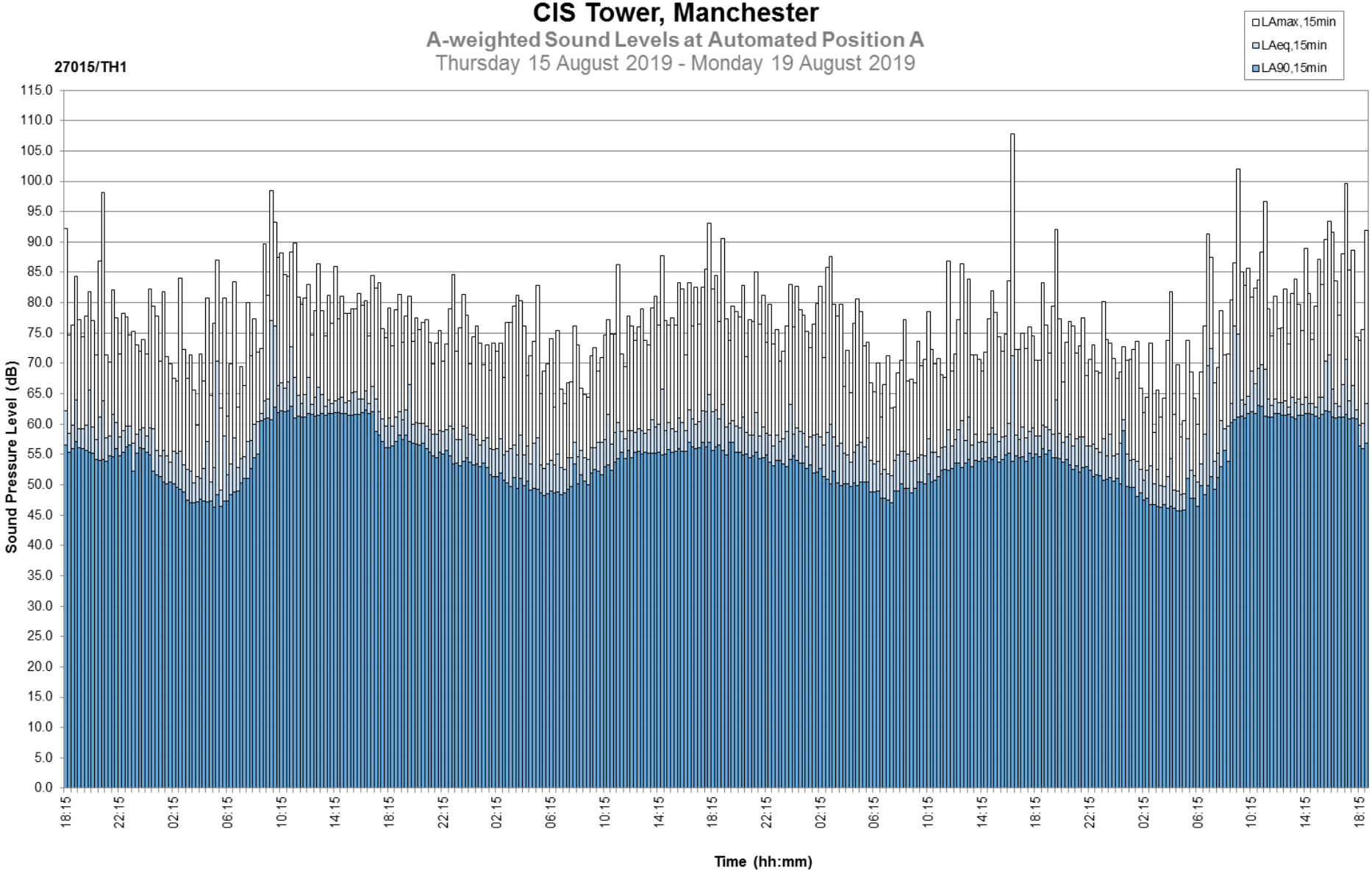
dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
$L_{eq,T}$	$L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.
L_{max}	L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
L_p	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
L_w	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

CIS Tower, Manchester

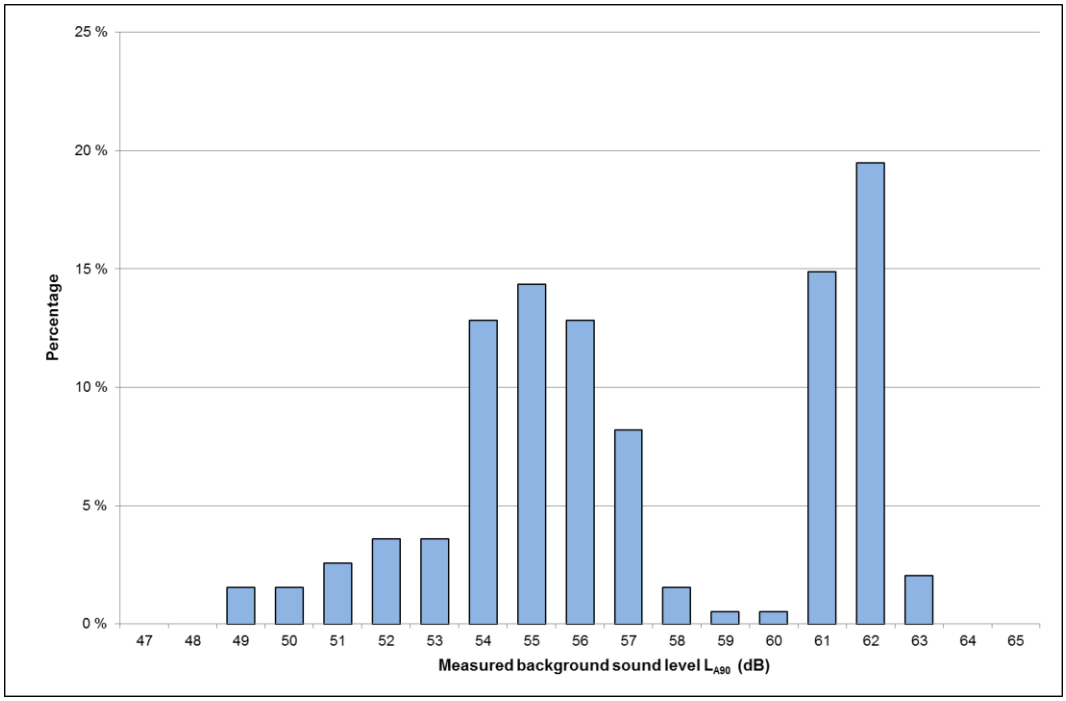
A-weighted Sound Levels at Automated Position A

Thursday 15 August 2019 - Monday 19 August 2019

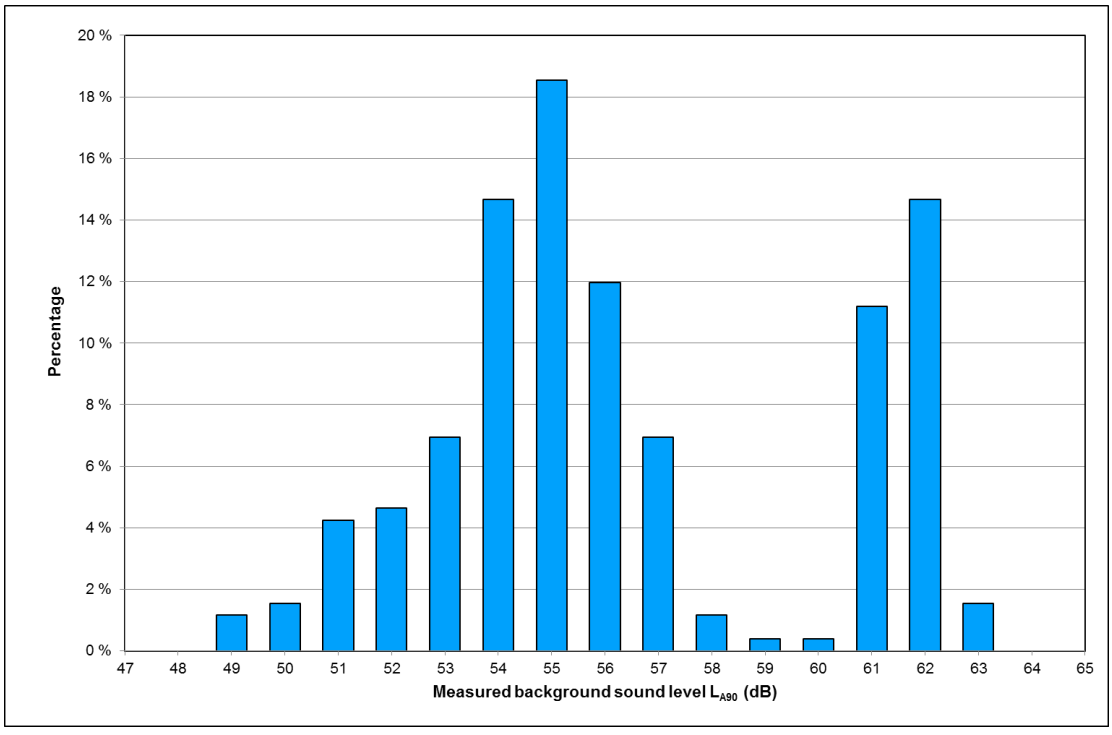
27015/TH1



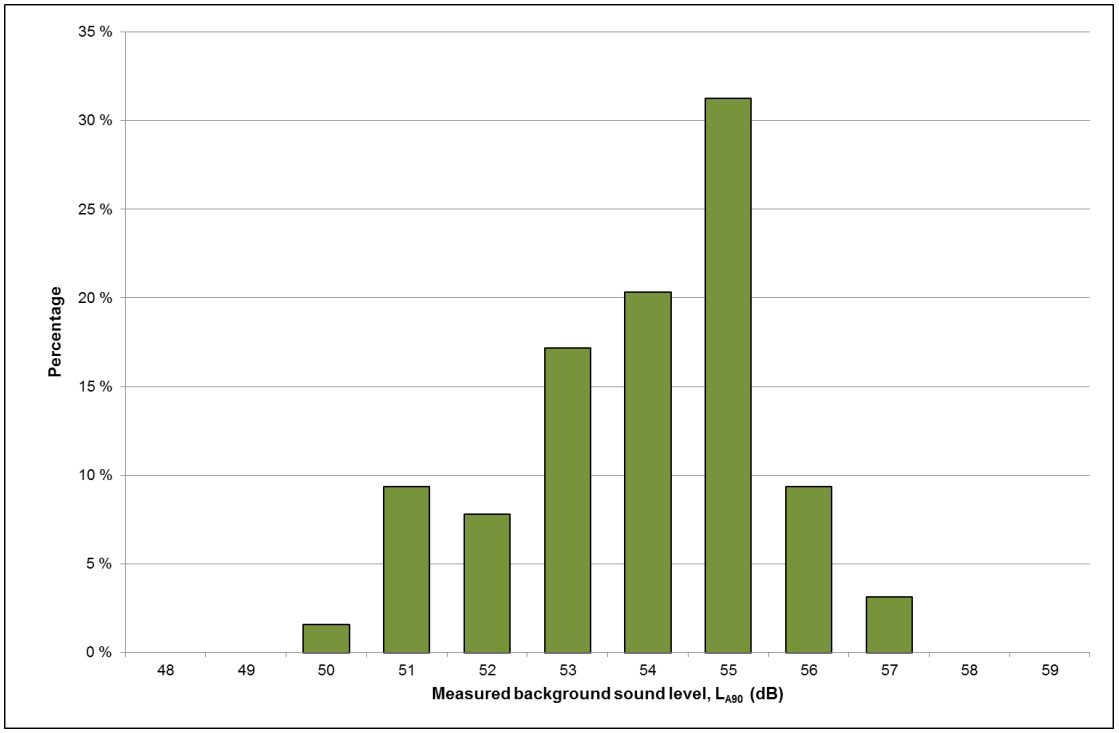
Appendix C – Background Noise Level Graphs



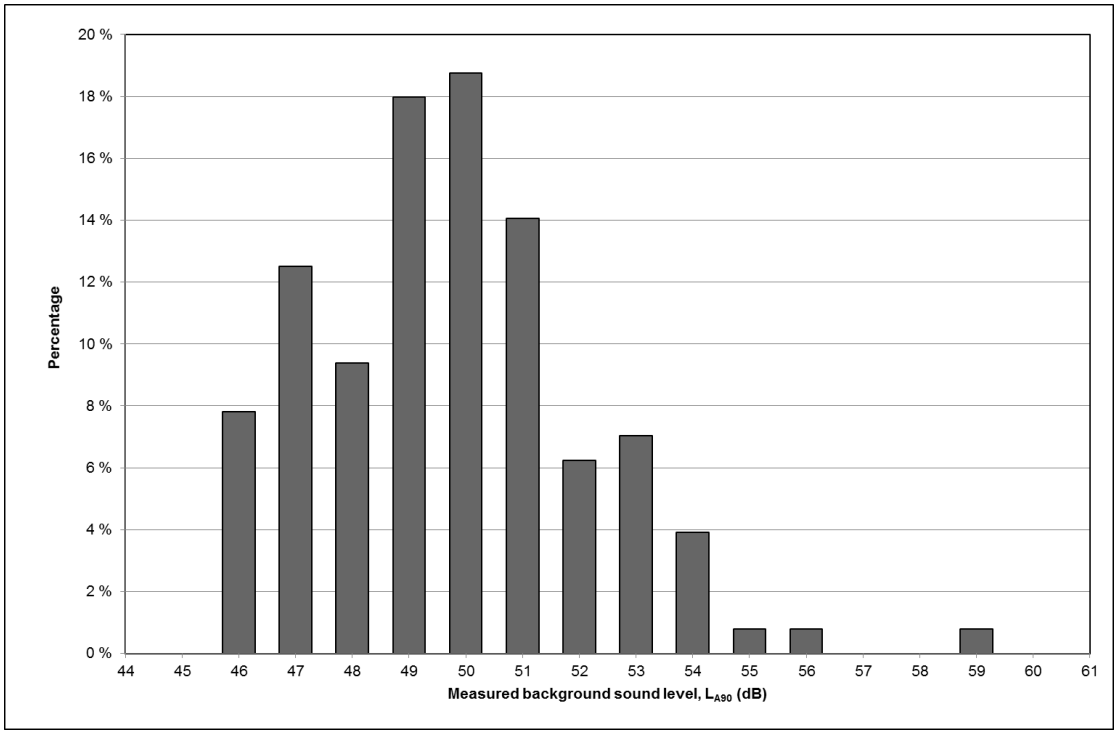
Measured Background Noise Levels, L_{A90} (dB) – (07:00 – 19:00)



Measured Background Noise Levels, L_{A90} (dB) – (07:00 – 23:00)



Measured Background Noise Levels, L_{A90} (dB) – (19:00 – 23:00)



Measured Background Noise Levels, L_{A90} (dB) – (23:00 – 07:00)