

Freetrade Exchange Manchester

Environmental Noise Survey and Plant Noise Assessment Report

29443/PNA2

4 August 2023

For:
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Document Control

Rev	Date	Comment	Prepared by	Authorised by
2	04/08/2023	Revision to Plant Layout		
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1	21/07/2023	Update following Comments	Alex Jang Assistant Consultant BEng(Hons), AMIOA	Joe Sinker Associate BEng(Hons), MSc(Res), MIOA
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1.0 Introduction

A previous planning application for the installation of new plant on the Freetrade Exchange building in Manchester has previously been submitted. There are also proposals for a restaurant operator (Blacklock) to occupy the lower ground floor space. 2 pre-occupation conditions were attached to the planning approval which will require discharge. There are also proposals for additional plant to the roof of the site.

A new Plant Noise Assessment has been produced to account for the changes, and is presented herein.

2.0 Objectives

Based on the previously measured background noise levels at the site, to confirm noise emission limits from the development with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 to minimise the possibility of noise nuisance to neighbours.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

To advise on noise control measures if required with reference to the requirements of the Local Authority.

To present our methodology and findings in an update to our previously issued Environmental Noise Survey and Plant Noise Impact Assessment Report.

3.0 Site Description

3.1 Location

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



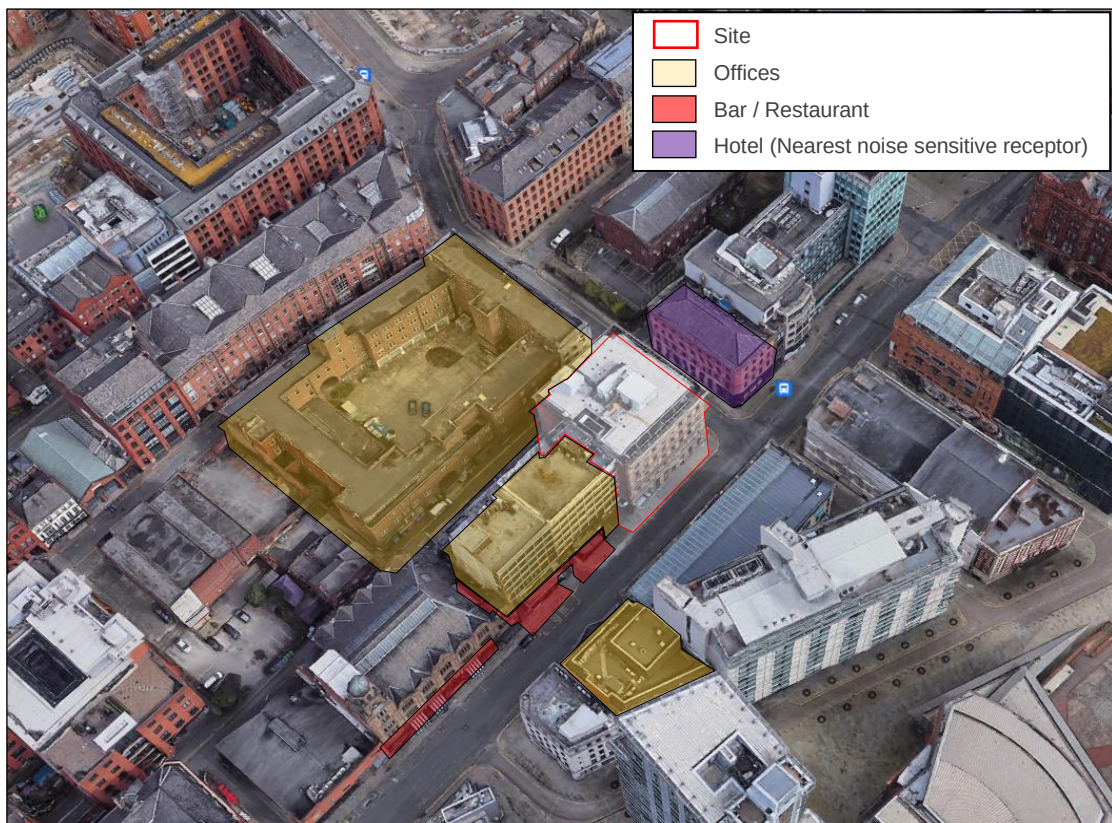
Location Map (Map Data ©2021 Google)

3.2 Description

The Freetrade Exchange is a 35,000 sqft, grade II listed building and has undergone refurbishment. The lower-ground floor will be converted to restaurant use and the upper floors will remain office spaces.

The site is situated within a popular commercial area of the city, with ground floor restaurants and bars in close proximity to the building. The neighbouring building highlighted in yellow and red has a ground floor Brewdog Bar and a Rudy's pizza establishment whilst the upper floors comprise of office spaces. The nearest noise sensitive receptor overlooking the roof is noted to be The Forty Seven Hotel, highlighted in purple below. It should be noted that the now consented St. Michaels scheme is currently under construction to the north of the site.

The site is shown in the Site Plan below.



Site Plan (Map Data ©2021 Google)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Acoustic Standards and Guidelines

5.1 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published July 2021):

185. 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.

187. 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 185 also references the Noise Policy Statement for England (NPSE). 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.”

5.2 BS 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 “*Methods for rating and assessing industrial and commercial sound*”.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: “*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs*”. An estimation of the



impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- *“Typically, the greater this difference, the greater the magnitude of the impact.”*
- *“A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”*
- *“A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”*
- *• “The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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, depending on the context.”*

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014+A1:2019. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to “No Observed Effect Level” as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of “low impact”.

5.3 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15\text{minutes})}$ at 1m from the nearest noise sensitive residential window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

5.4 Local Authority Requirements

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council’s Planning & Noise Technical Guidance document (October 2022).



5.4.1 Mixed Use Developments

Section 3.7.1.3 offers the following guidance regarding Mixed Use developments:

“Where a planning application includes a proposal to contain a potentially noisy development within the same building as a noise sensitive use or vice versa the noise survey should consider the transfer of noise between the noisy and noise sensitive uses. An example of where this should be considered would be a proposal for a bar or club within the same building as residential properties (see section 3.6.1.2).”

Consultants should demonstrate that the structure of the development will be sufficient to adequately contain the noise generated within the development. In doing so consultants should consider:

- *flanking noise;*
- *structure borne noise;*
- *the overall level of noise (L_{Aeq}) generated by the use in question and any tonal or impulsive characteristics that the noise may contain; and*
- *the acoustic properties of the development (including the construction of party floors and/or walls, windows and doors, ventilation systems, and structural columns.)”*

5.4.2 Plant Noise

Section 3.7.1.5 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.”

6.0 Survey Methodology

The survey was undertaken by Cameron Maskew, Assistant Engineer B.Eng (Hons).

6.1 Procedure

Fully automated environmental noise monitoring was undertaken by Cameron Maskew, Assistant Engineer B.Eng (Hons). from approximately 11:30 hours on Monday 6th December 2021 to 09:00 hours on Wednesday 8th December 2021.

During the periods we were on site the wind conditions were light. The sky was generally



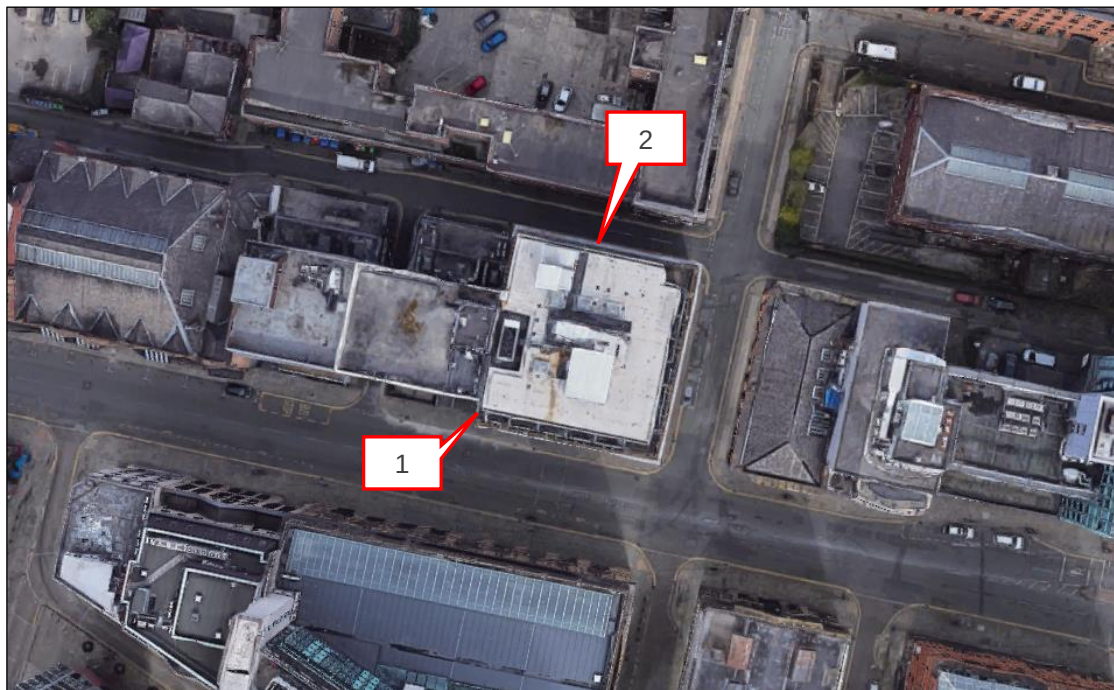
overcast with intermittent periods of light rainfall. We understand that generally throughout the survey period the weather conditions were stable. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15 and 5-minute periods.

6.2 Measurement Positions

The noise level measurements were undertaken at 2 positions as described in the table below.

Position No	Type	Description
1	Unattended	To the south of the site, overlooking Peter Street. Microphone in free-field conditions approx. 15m above ground. Sound level meter was mounted to a pole and suspended over balcony edge. Sound level meter was secured in locked security box.
2	Unattended	To the north of the site, overlooking Bootle Street. Microphone in free-field conditions approx. 15m above ground. Sound level meter was mounted to a pole and suspended over balcony edge. Sound level meter was secured in locked security box.



Plan Showing Measurement Positions (Map Data ©2021 Google)



6.3 Instrumentation

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

Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Larson Davis	824	5111	15/07/2021
2	Type 1 Data Logging Sound Level Meter	Larson Davis	824	5104	15/07/2021
All	Type 1 Calibrator	Larson Davis	CAL200	3083	06/05/2021

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3 dB).

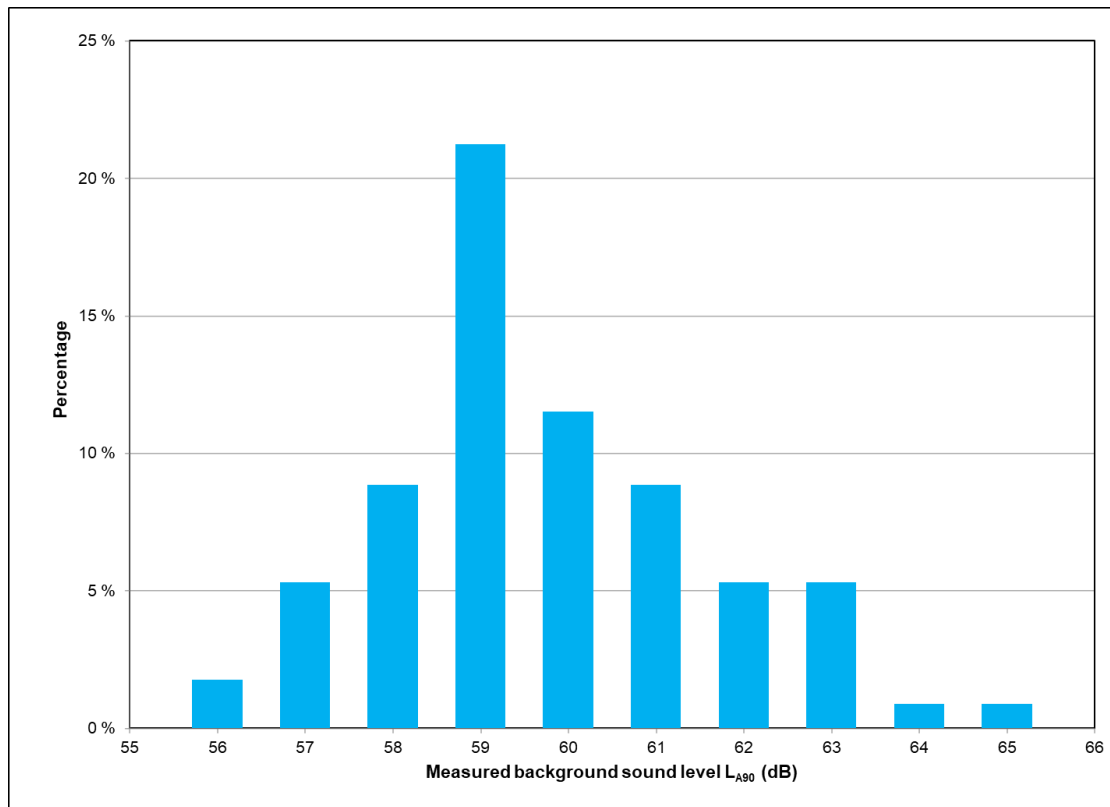
Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable.

Each microphone was fitted with a windshield.

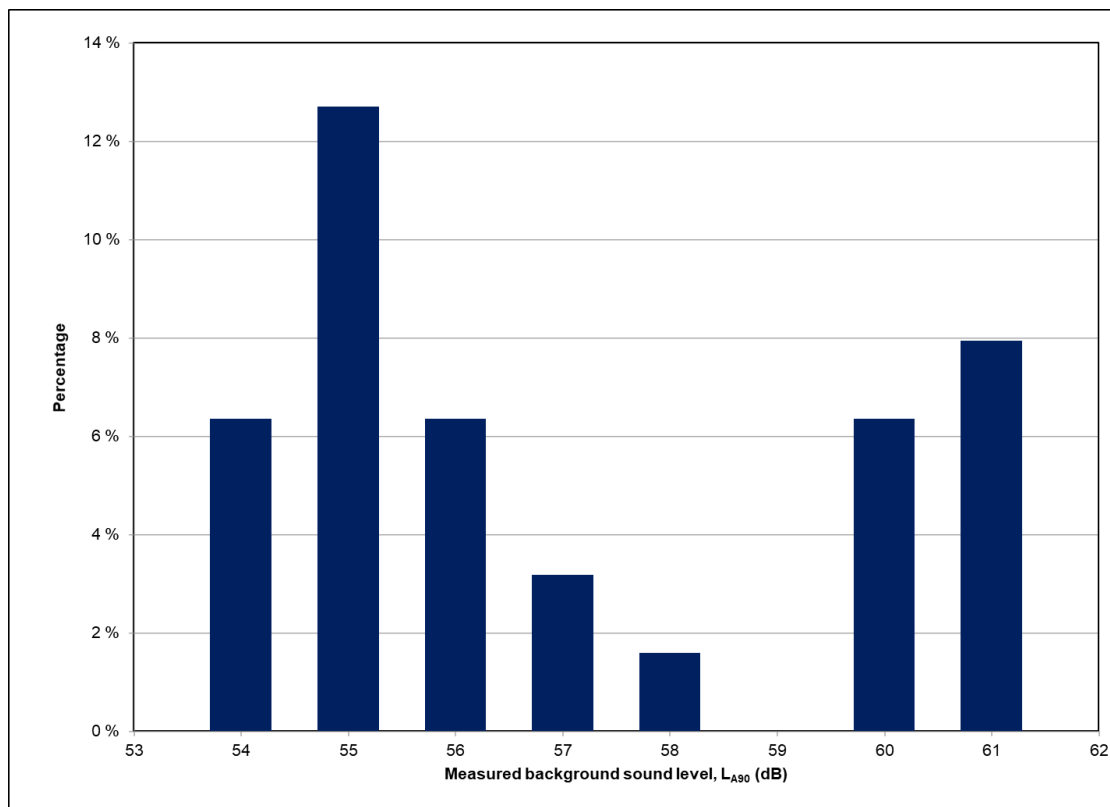
7.0 Results

The results of the unattended survey have been plotted on Time History Graphs TH1 and TH2 enclosed. These graphs present the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at Position 1 and 2 throughout the duration of the survey.

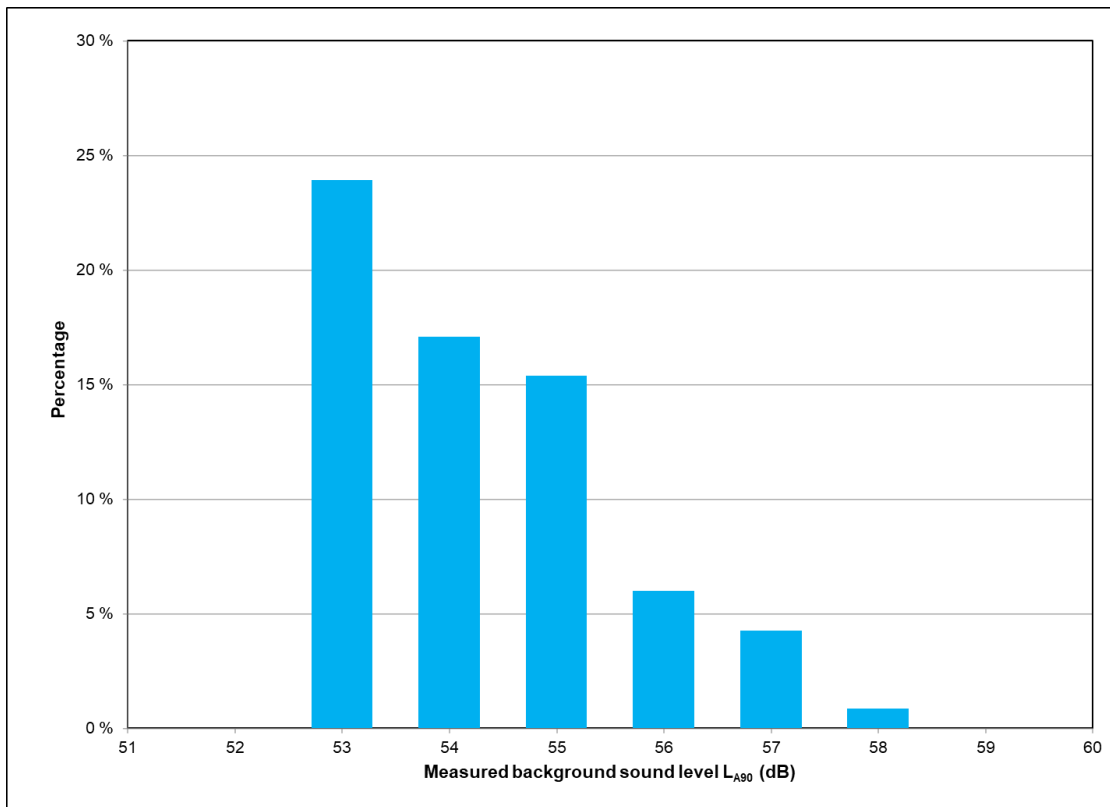
A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the 'representative lowest' levels determined through statistical analysis of the 15-minute readings, in line with BS4142. L_{Amax} values are the 10th highest 5-minute value. All results are free-field levels.



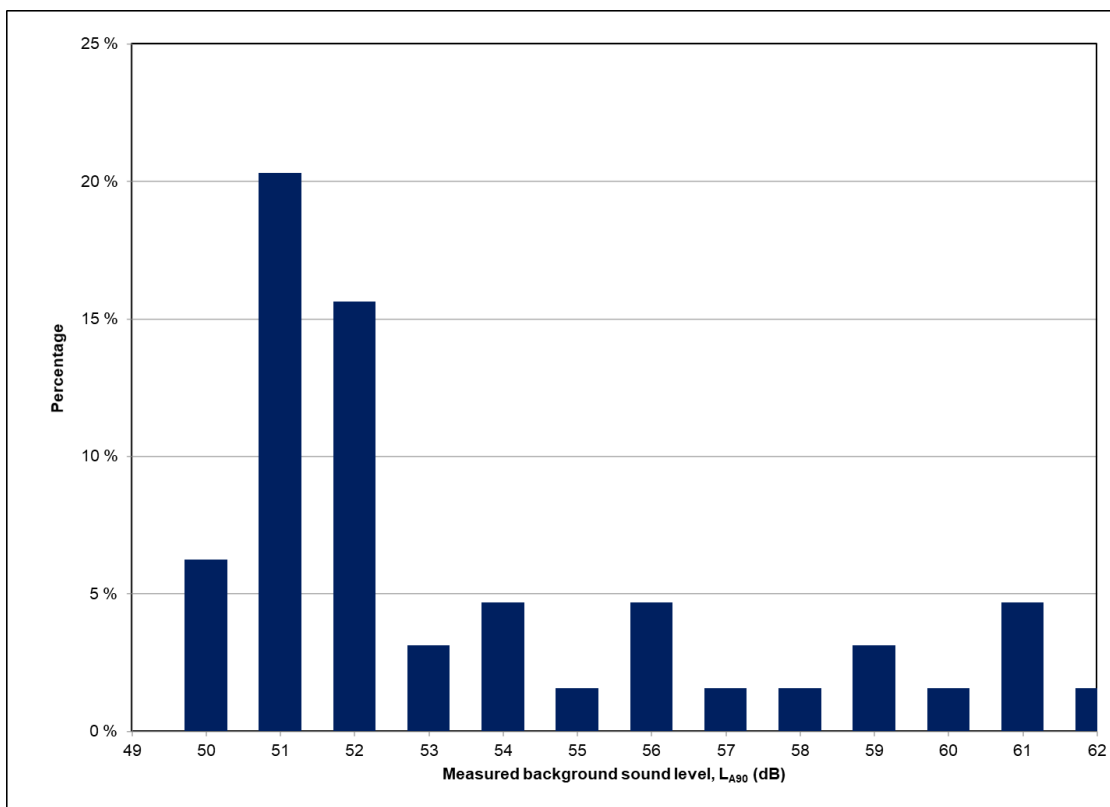
[MP1] Statistical Analysis of Daytime Background Noise Levels (07:00-23:00)



[MP1] Statistical Analysis of Night-time Background Noise Levels (23:00-07:00)



[MP2] Statistical Analysis of Daytime Background Noise Levels (07:00-23:00)



[MP2] Statistical Analysis of Night-time Background Noise Levels (23:00-07:00)



Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	L _{Aeq,16hr}	L _{A90}	L _{Aeq,8hr}	L _{A90}	L _{Amax}
1	66	59	64	55	81
2	56	53	54	51	70

8.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e., unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by road traffic noise emitted by Peter Street. This road remains busy until the early hours of the morning due to the bars and restaurants located in close proximity to site. Peter Street facilitates a busy taxi rank with people regularly picked up and dropped off. During the periods that were surveyed, the bars closed at 1am but later into the week and over the weekend extended hours of operation are noted.

Bootle Street is a small backstreet where a minor amount of traffic flow can be observed. The dominant noise source is still noted to be Peter Street at the rear of the site.

Plant can be observed in the site plan on top of the adjacent buildings. During our time on-site this was determined to be inaudible when compared with the levels emitted by traffic flow on Peter Street.

9.0 Noise Impact Assessments (Overview)

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

- **Restaurant Operational Noise Transfer via Floor:** The sound insulation performance of the floor will be used to establish the maximum permissible noise level in the restaurant based only on noise transfer via the floor to offices above.
- **Restaurant Operational Noise Break-out via Façade:** The sound insulation performance of the façade will be used to establish the maximum permissible noise level in the restaurant based on noise break-out via façade to external receptors.
- **Plant Noise Emissions:** Setting limits for new items of fixed plant against MCC guidance.



To inform our assessment of the commercial units, we have drawn upon previously measured noise levels for a typical restaurant, as set out below, to be considered as typical highest 1-hour noise levels during reasonable operation.

Description	Reverberant Noise Level (dB L _{eq,1hr}) at Octave Band Centre Frequency (Hz)							dBA
	63	125	250	500	1k	2k	4k	
Restaurant <i>Typical restaurant with low background music)</i>	60	67	69	71	70	66	60	74

With reference to the above, it is not possible to account for every possible scenario within a typical restaurant setting, however the above is intended to provide a reasonable baseline against which the general use can be assessed for feasibility with regards to planning permission. There is of course a wide range of noise levels that could be produced by any particular operation, and it would be sensible for future tenants that may have the capacity to introduce high levels of noise to review their anticipated noise levels against the relevant noise emission criteria. MCC may wish to secure this through a suitably worded condition of planning.

10.0 Restaurant Operational Noise Assessment

10.1 Operational Noise Transfer via Floor

10.1.1 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 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 restaurant is in full 'high noise' operation, we would propose that reverberant noise levels from the commercial unit within the office spaces above should be controlled so as to not exceed NR 30 L_{eq,T} in upper floor offices and ground floor retail/reception.

10.1.2 Internal Building Fabric

The restaurant will be located on the lower ground floor, above which will be an office. The construction is understood to be as follows:

- Existing timber floorboards sat upon timber joists;
- MF system with mineral wool in cavity;
- 3No. layers of Glasroc F Multiboard 10mm.



It should be noted that the mineral wool insulation is still subject to guidance. Therefore, we propose a minimum 50mm mineral wool (10-30kg/m²). The expected performance of the floor construction as currently proposed is as follows.

Element	Anticipated Sound Level Difference, <i>D</i> (dB) at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Floor	20	37	39	53	61	65	65

10.1.3 Assessment

We have assessed noise transfer based on the criteria set out above to establish the internal sound level limit within retail unit based on noise transfer via the floor.

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Criteria in Office/Retail/Reception (NR 30)	57	46	38	32	28	25	23
Room to Room Level difference (dB <i>D</i>)	20	37	39	53	61	65	65
Internal noise level limit in retail unit (dB <i>L</i>_{eq})	77	83	77	85	89	90	88

The following table compares the tenant noise limits calculated above, which are based on the currently proposed floor construction (ie limited enhancements aside from fire protection), with typical noise levels for a restaurant.

Description	Octave Band Centre Frequency (Hz)							Compliance
	63	125	250	500	1k	2k	4k	
Tenant Noise Limit (dB <i>L</i>_{eq})	77	83	77	85	89	95	79	-
Restaurant <i>Typical restaurant noise levels with low background music</i>	60	67	69	71	70	66	60	✓

In comparison with typical *L*_{eq,1hr} noise levels inside a busy restaurant with low background music, the above limits are comparable and is likely to be compliant with the noise transfer criteria.

10.2 Operational Noise Break-out via Façade

10.2.1 Criteria

MCC recommends that noise (*L*_{eq}) breaking out through the building facade of an entertainment venue should not exceed 10 dB below the background noise level (*L*₉₀) at all octave band frequencies at the nearest noise sensitive windows.



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.

Description		External Entertainment Noise Level Limit (dB L _{90,15min}) at Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
Position 1	Daytime (07:00 – 23:00)	54	48	45	45	46	42	34
	Night-time (23:00 – 07:00)	49	43	40	41	42	37	30
Position 2	Daytime (07:00 – 23:00)	56	48	42	39	38	35	28
	Night-time (23:00 – 07:00)	58	48	41	38	36	31	25

10.2.2 External Building Fabric

We understand the restaurant establishment incorporates existing glazed windows set within solid masonry walls. We have performed our calculations using conventional double glazing (ie 4mm/16mm/4mm glazing) to demonstrate the ability to comply with the aforementioned criteria, and our assessment is therefore considered to be worst-case and robust.

The expected composite sound reduction performance (ie accounting for 50% glass and 50% solid masonry wall) is as follows:

Description	Estimated Sound Reduction Index (dB R) at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Composite SRI	23	23	22	31	41	37	41

10.2.3 Assessment

We have assessed noise breakout to the nearest receptors based on standard calculation procedures for reverberant noise breakout and noise levels presented in Section 10.2.1. The resultant external noise level has been calculated using the following equation.

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

Where:

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

The tables presented below outline summary calculations for the different operational noise levels. Daytime and night-time criteria have been used as it is assumed that the drinking



establishment will operate during both instances, however only residential external receptors would be considered sensitive during the night-time.

Noise break-out assessment – Nearest office (daytime) – adjacent offices on Southmill Street

Assessment to Residential Receptor	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Internal noise level (dB L _{eq}) <i>Typical restaurant with low background music</i>	60	67	69	71	70	66	60
External noise level (dB L _{eq}) <i>SPL_{out}</i>	28	35	38	31	20	20	10
Criteria (dB L _{eq})	56	48	42	39	38	35	28
Compliance Note	✓						

Noise break-out assessment – Nearest residential (night-time) – The Forty Seven Hotel

Assessment to Residential Receptor	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Internal noise level (dB L _{eq}) <i>Typical restaurant with low background music</i>	60	67	69	71	70	66	60
External noise level (dB L _{eq}) <i>SPL_{out}</i>	28	35	38	31	20	20	10
Criteria (dB L _{eq})	49	43	40	41	42	37	30
Compliance Note	✓						

The above summary tables indicate that noise break-out via the building façade should be capable of achieving external noise limits at the worst affected noise sensitive receptors (ie office during the daytime and residential during the night-time) due to operational noise from a typical restaurant with low background music.

11.0 Plant Noise Assessment

11.1 Project Proposals

11.2 Proposed Plant

We have reviewed the following documents for the assessment:

Plant Description	Location	Qty	Plant Make	Model Number
VRF AC Condenser	Roof	1	Toshiba	MMY-MUP1201HT8P-E
AHU	Roof	1	Systemair	MUB 062 630D4 Multibox
Kitchen Extract Fan	Roof	1	Systemair	MUB/T100 630D4 -K2-L
Catering Condensers	Roof	2	TBC	TBC



11.3 Operating Hours

At the time of writing, we have not received confirmation of the operating hours of the proposed plant units, therefore we have assessed to both daytime and night-time limits to ensure compliance is met in a worst-case scenario.

11.4 Drawings

Our acoustic analysis is based on the following drawing provided by Chapman Ventilation.

Reference	Title	Dated
001-1056-02 Rev F	Proposed Roof HVAC Plan	18/03/23

12.0 Plant Noise Emission Criteria

Hann Tucker Associates have undertaken an assessment of atmospheric plant noise emissions of the proposed condenser systems based on manufacturer noise level data with a view to calculating the noise level at the surrounding receptors.

The calculations take into account distance propagation losses, any screening provided by the site geometry, as well as any noise mitigation measures included within the installation.

As noted in Section 3.2, the worst affected noise sensitive receptors are considered to be The Forty Seven Hotel and the consented office development St Michaels for the plant on the roof.

Based on the typical background sound pressure determined in section 7.0, the following plant noise emission limits are considered applicable for the consented development. These limits are presented as free-field limits.

Description	Cumulative Plant Rating Level, $L_{Ar,Tr}$ (dBA)
Daytime 07:00-23:00 hrs	48
Night-time 23:00-07:00 hrs	46

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

It should be noted that the above are subject to the final approval of the Manchester City Council.



13.0 Plant Noise Impact Assessment

We understand the proposed plant comprises of the following units shown below.

Plant Description	Location	Qty	Plant Make	Model Number
VRF AC Condenser	Roof	1	Toshiba	MMY-MUP1201HT8P-E
AHU	Roof	1	Systemair	MUB 062 630D4 Multibox
Kitchen Extract Fan	Roof	1	Systemair	MUB/T100 630D4 -K2-L
Catering Condensers	Roof	2	TBC	TBC

13.1 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
VRF AC Condenser (Cooling)	58	68	61	55	52	42	35	24	58
VRF AC Condenser (Heating)	66	74	64	60	56	46	42	32	62

AHU Component	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Inlet	64	76	76	80	81	77	73	67	86
Outlet	65	77	78	81	82	79	75	68	87
Surrounding	-	-	-	-	-	-	-	-	61

Kitchen Extract Fan Component	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Outlet	63	75	78	82	82	79	74	67	87
Surrounding	45	65	62	53	54	53	45	34	67

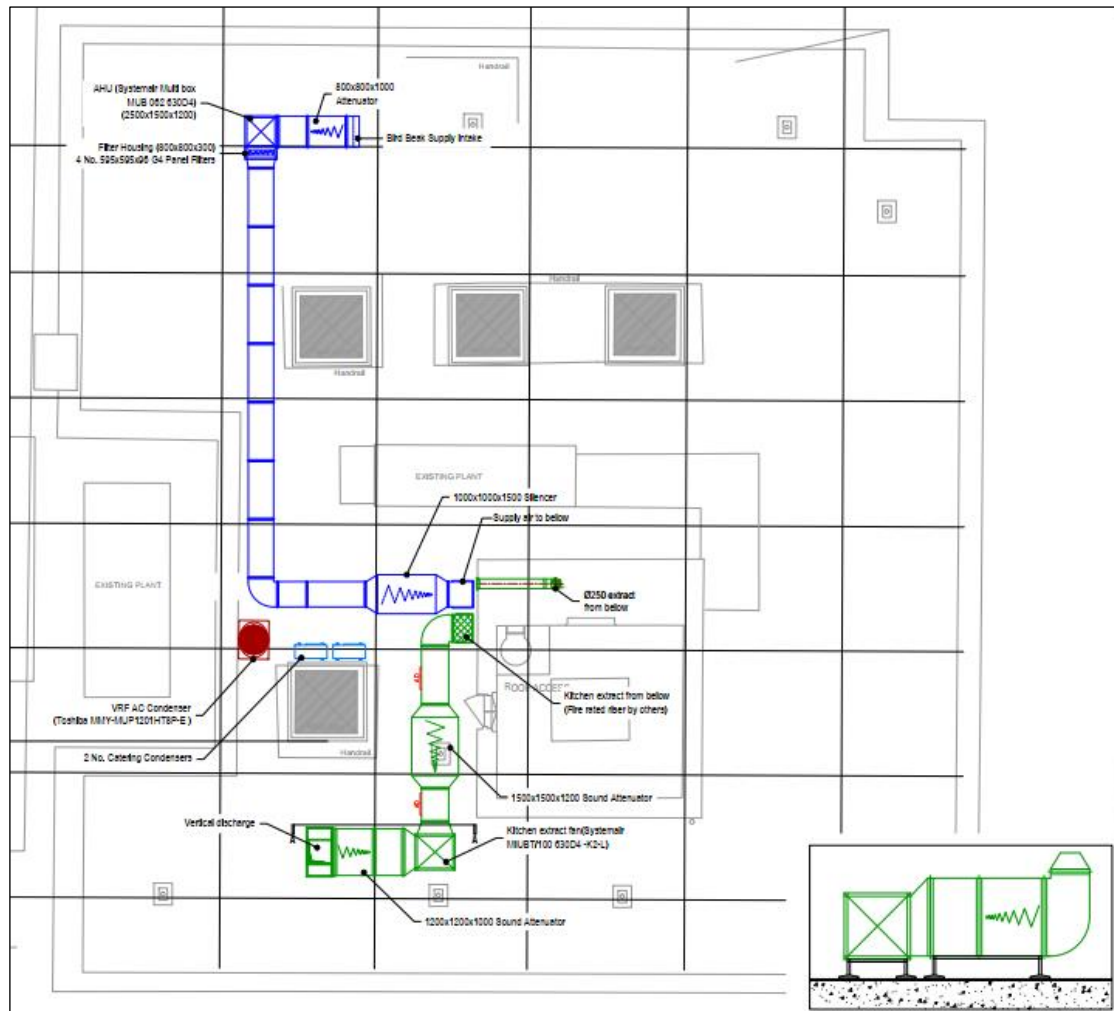
We have been informed that there are atmospheric attenuators proposed to be installed onto the AHU and Kitchen Extract Fan units. While we haven't been given specific performance data of these attenuators, we have advised that they will be 50% free area at the length stated in the layout drawing shown in Section 13.2. We have assumed the following insertion losses based on historical attenuator data.



Attenuator Location	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
AHU	2	4	9	15	17	14	10	8
Kitchen Extract Fan	2	6	11	20	23	19	12	9

13.2 Location of Plant

The plan below highlights the roof area where the proposed units will be installed.



Proposed Plant Location on Roof

The nearest noise sensitive receptors are The Forty Seven Hotel located approximately 30m to the east (purple highlight below), and the consented office development St Michaels approximately 20m to the north (yellow highlight below). This is detailed in the plan below.



Nearest Noise Sensitive Receptors for Roof Level Plant

13.3 Plant Noise Impact Assessment

At the time of writing, we have not received confirmation of the operating hours of the proposed plant units, therefore we have assumed the proposed plant will run during both daytime and night-time hours to ensure compliance is met in a worst-case scenario.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3dB feature correction as advised in BS 4142:2014 has been applied for the possible present of “... *characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment* ...”.

A feature correction has not been applied to the daytime assessment as the receptor is an office development with a sealed façade. As such, any features of the proposed plant would not be readily distinctive over the internal noise levels within the office.

The following table summarises our predictions of atmospheric noise emissions from the proposed plant locations to the nearest noise sensitive receptors as detailed in section 13.2 above.



	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Sound Pressure Level MMY-MUP1201HT8P-E	62 @ 1m	
Distance Correction	-22 (20m)	-26 (32m)
BS 4142 Penalty	0	+3
Calculated Noise Level at Receptor	40	39
Sound Power Level MUB 062 630D4 Inlet	86	
AHU Attenuator	-6	
Distance Correction	-34 (10m)	-44 (32m)
BS 4142 Penalty	0	+3
Calculated Noise Level at Receptor	46	39
Sound Power Level MUB 062 630D4 Surrounding	61	
Distance Correction	-34 (10m)	-44 (32m)
BS 4142 Penalty	0	+3
Calculated Noise Level at Receptor	27	20
Sound Power Level MIUBT/100 630D4 -K2-L Outlet	87	
Kitchen Extract Fan Attenuator	-15	
Distance Correction	-43 (30m)	-44 (32m)
BS 4142 Penalty	0	+3
Calculated Noise Level at Receptor	26	31
Sound Power Level MIUBT/100 630D4 -K2-L Surrounding	67	
Distance Correction	-43 (30m)	-44 (32m)
BS 4142 Penalty	0	+3
Calculated Noise Level at Receptor	24	26
Sound Pressure Level Proposed Catering Condenser	59 @ 1m	
Distance Correction	-22 (20m)	-26 (32m)
BS 4142 Penalty	+3	+6
Calculated Noise Level at Receptor	40	39
Cumulative Calculated Noise Level at Receptor	48	44
Criteria	48	46
Exceedance	0	-2



As plant selections for the proposed catering condensers are yet to be determined, we have set plant noise limits for these units to emit a sound pressure level of 59dBA @ 1m so as to not cause a cumulative change in plant noise emissions at the nearest noise sensitive receptors.

Our calculations indicate that the proposed plant should be capable of achieving the limits set out in this report, and therefore the requirements set out by Manchester City Council. This is subject to approval by Manchester City Council.

14.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's policy on other projects in the area.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive receptor for both the roof level and ground level plant proposals.

The assessment indicates that the proposed plant should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive receptors.

Appendix A

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	<p>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</p> <p>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.</p>
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (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, <i>T</i> .
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.

Sound Pressure Level (L_p) 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).

Sound Power Level (SWL or L_w) 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).

Appendix B – Time History Graphs

Freetrade Exchange

Position 1

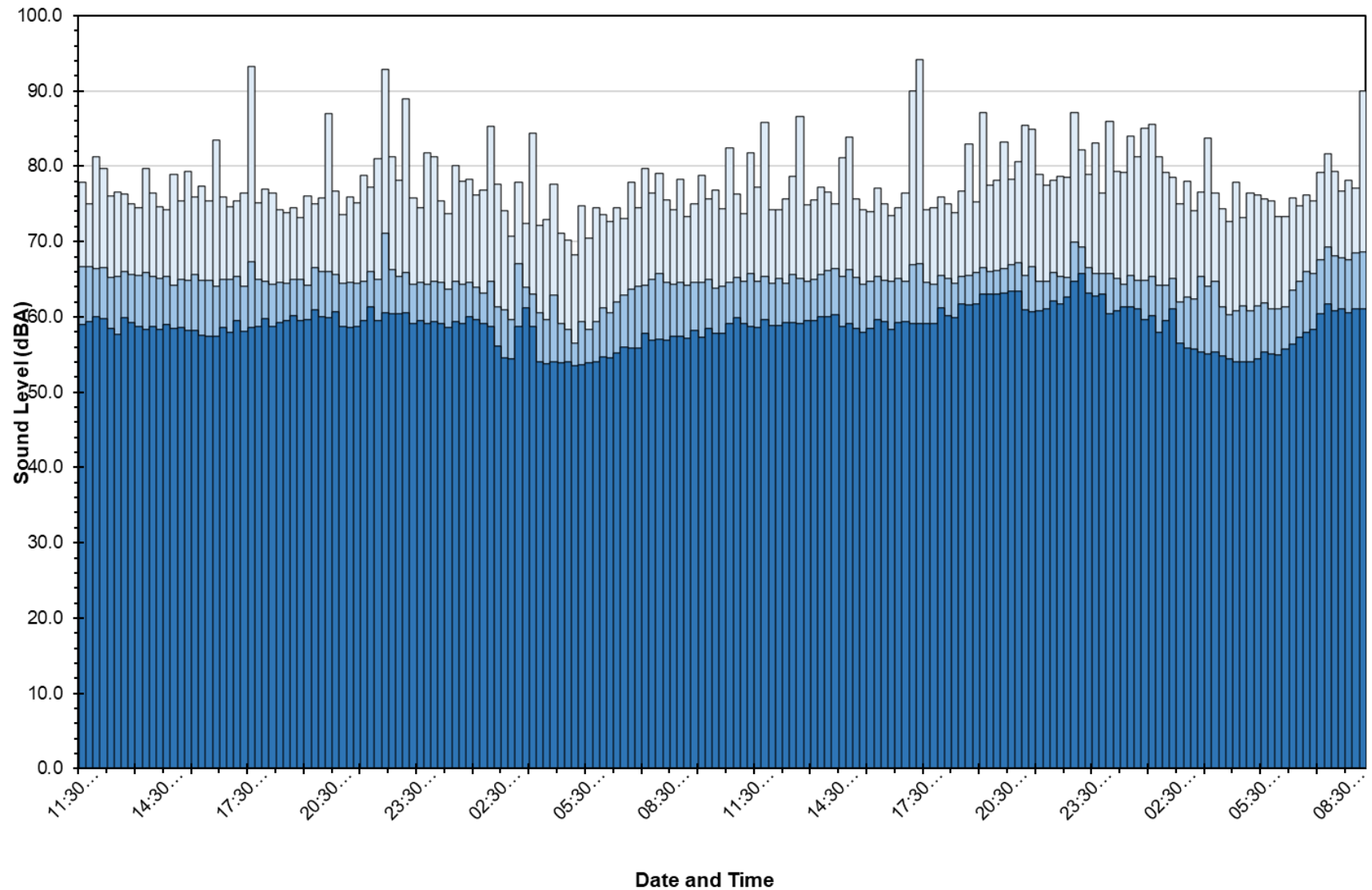
L_{eq} , L_{max} and L_{90} Noise Levels

Monday 6 December 2021 to Wednesday 8 December 2021

□ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Freetrade Exchange

Position 2

L_{eq} , L_{max} and L_{90} Noise Levels

Monday 6 December 2021 to Wednesday 8 December 2021

□ L_{Amax}

■ L_{Aeq}

■ L_{A90}

