

Lomax Street Manchester

Noise Impact Assessment Report

25369/NIA1

25 April 2018

For:
Rain City Developments (Ducie Street) Ltd
The Mill House
6 Worsley Rd
Worsley
Manchester
M28 2NL



Hann Tucker Associates
Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595
Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041
(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



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Document Control

Issue	Date	Comment	Prepared by	Authorised by
-	19/04/2018	-		
			Jamie Murray Consultant BEng(Hons), AMIOA	Andrew Jameson Director BSc(Hons), MIOA, MIET
1	25/04/2018	Updated to incorporate comments from Euan Kellie.		
			Jamie Murray Consultant BEng(Hons), AMIOA	Andrew Jameson Director BSc(Hons), MIOA, MIET



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1.0 Introduction

It is proposed to construct a new-build part 7No, part 8No storey residential building at Lomax Street, Manchester, comprising approximately 41No apartments. The site is subject to environmental noise from road traffic and industrial sources nearby.

Hann Tucker have therefore been commissioned to undertake an environmental noise survey and assess any potential impact on the proposed residential building from both environmental and commercial sources in order to ensure compliance with Local Authority requirements.

Our survey results and assessment findings are presented herein.

2.0 Objectives

To establish, by means of manned environmental noise monitoring, the existing A-weighted (dBA) L_{90} , L_{eq} and L_{max} environmental noise levels at selected accessible positions around the site.

To undertake detailed acoustic analysis of environmental noise intrusion into the building through the external building fabric.

To subsequently prepare sound reduction performance specifications for the external building fabric in order to achieve the specified internal acoustic design criteria.

To set plant noise emission limits in accordance with Local Authority guidance.

3.0 Acoustic Terminology

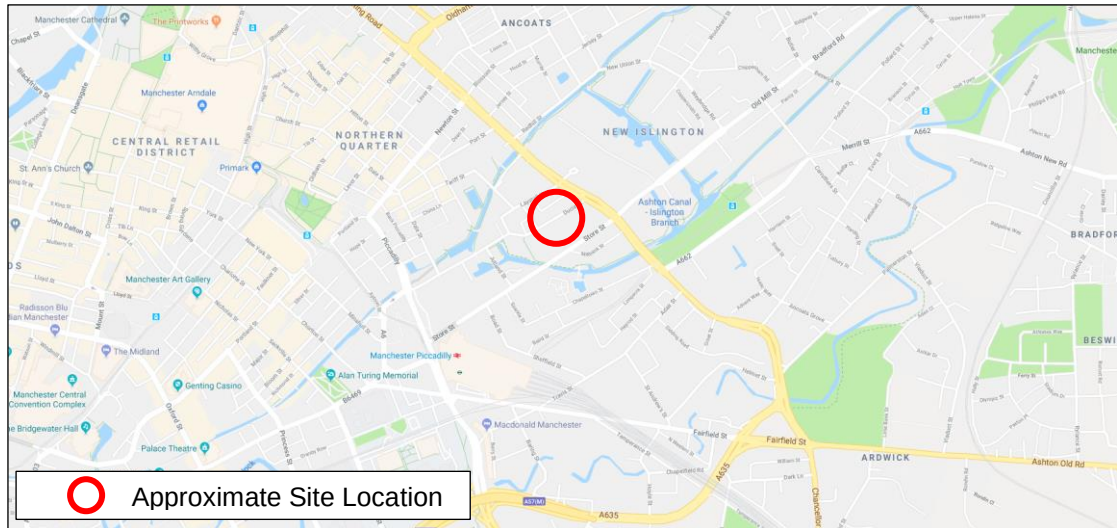
Please refer to Appendix A for an explanation of acoustic terminology used herein.



4.0 Site Description

4.1 Location

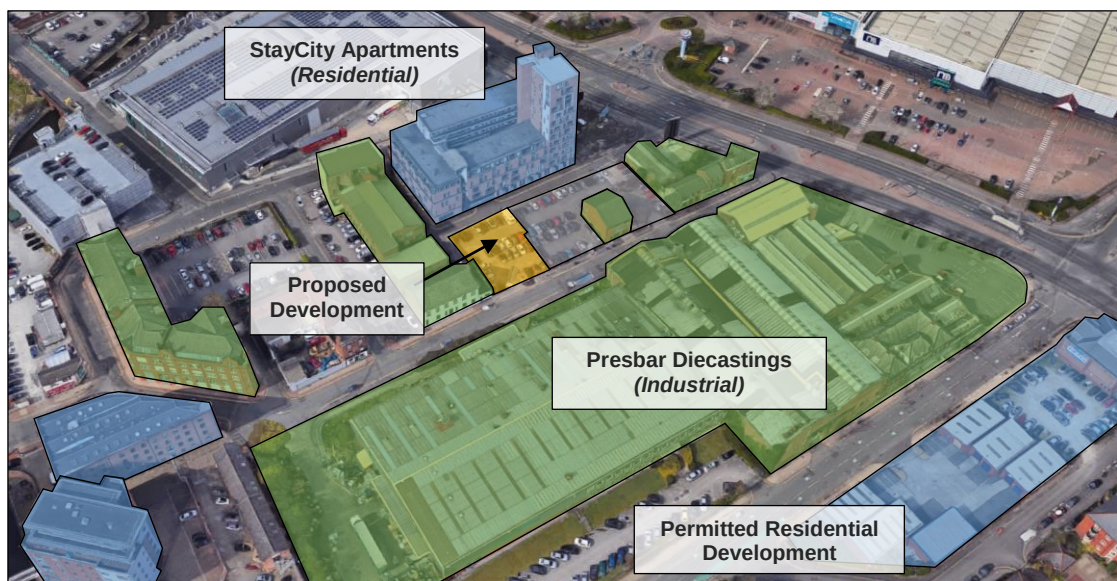
The proposed development is located on Lomax Street in Manchester city centre, and falls under the jurisdiction of Manchester City Council. See site location below.



Site Location (© maps.google.co.uk)

4.2 Description

The site is an existing surface level car park bounded by Ducie Street to the south-east and Lomax Street to the north-west. Presbar Diecastings (industrial) lies to the south of the site. The nearest off-site noise sensitive receptors are understood to be the windows of the StayCity Aparthotel on Laystall Street. See site plan below showing nearby commercial/industrial sites (green) and nearby residential buildings (blue).



Site Plan (© maps.google.co.uk)



5.0 Acoustic Standards & Guidelines

5.1 Noise Policy Statement for England

The Government's Noise Policy Statement for England (NPSE, March 2010) sets out the long term vision for Government noise policy, which is to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

The NPSE includes three primary aims to be achieved through effective management of environmental, neighbour and neighbourhood noise; (1) avoid "significant adverse" impacts on health and quality of life, (2) mitigate and minimise "adverse" impacts on health and quality of life, and (3) where possible, contribute to the improvement of health and quality of life.

5.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF, March 2012) sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

The planning system should prevent both new and existing development from contributing to, or being put at, unacceptable risk from environmental factors including noise.

Planning policies and decisions should aim to avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development. Conditions may be used to mitigate and reduce noise to a minimum so that adverse impacts on health and quality of life are minimised.

Reference is made to the Government's Noise Policy Statement for England (NPSE, March 2010) which sets out the long term vision for Government noise policy, which is to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

5.3 ProPG: Planning & Noise

ProPG: Planning & Noise '*Professional Practice Guidance on Planning & Noise*' was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.



It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is “not dominant”.

ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The ProPG considers suitable guidance on internal noise levels found in BS8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’ with the addition of an “ideal” $L_{Amax,f}$ requirement for bedrooms at night of 45 dB (10th highest).

5.4 Local Planning Requirements

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

Achieving Suitable Internal Noise Levels

Section 3.6.1.1 sets out the following noise levels to be achieved for residential developments:

- *Bedrooms (Night time - 23:00 to 07:00): 30dB L_{Aeq} and individual noise events should not normally exceed 45 dB (L_{Amax}).*
- *Living Rooms (Day time 07:00 to 23:00): 35 dB (L_{Aeq}).*
- *Gardens and terraces (daytime) 55 dB (L_{Aeq}).*

Section 5.3.1.3.1.2 of the Planning & Noise – Technical Guidance December 2015 document states the following with regards to maintaining internal ambient noise levels when it desired to keep windows closed but provide adequate ventilation:

“Occupants should be provided with a supply of fresh air in habitable rooms without having to open windows (whilst also having the option to do this for purge ventilation, or at the occupant’s discretion.

Where ambient noise levels are high a scheme of ventilation will need to be provided that does not compromise the acoustic attenuation afforded by glazing. This may come in the form of individual window trickle vents or acoustic trickle vents.”

For schemes that are affected by existing industrial noise, it is common for Local Authorities to request an assessment is carried out in line with BS 4142:2014 to assess the impact on proposed residential receptors. It is also common for the assessment to give an initial estimate of an adverse impact where the measured specific noise level (and subsequent rating level) of industrial noise affecting the site is higher than the background sound level.



However, this assessment is often made redundant through good design since the final outcome of such an assessment is entirely dependent on the context of the site, which BS 4142:2014 states should consider the following:

“The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) facade insulation treatment;*
- ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) acoustic screening.”*

Manchester City Council requires any new development to secure good internal and outdoor acoustic conditions, as discussed above. This effectively enforces good design and ensures that appropriate façade insulation treatment and ventilation measures are offered to future occupants of the development. In line with BS 4142:2014, if design measures that secure good internal and/or outdoor acoustic conditions are incorporated into a development, the result of an assessment of existing industrial noise would likely indicate a low impact.

Noise from Fixed Building Services Plant

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.”

5.5 BS 8233: 2014

British Standard 8233: 2014 “Sound insulation and noise reduction for buildings” recommends design criteria for internal ambient noise levels for dwellings providing a reasonable or good level of protection from external noise. It states that it is desirable that ambient noise levels do not exceed the following guidelines:

Activity	Location	Desirable Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

The document goes on to state that all of the above target levels may be relaxed by 5 dB and “reasonable” internal conditions would still be achieved.



5.6 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 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.

6.0 Baseline Noise Survey

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 18:00 hours on Wednesday 28 March 2018 to 18:00 hours on Thursday 29 March 2018. During this period, the site was routinely attended by the surveyor to subjectively assess the noise climate, with particular reference to the potential industrial noise from Presbar Diecastings.

In order to better understand the noise climate during weekend evening/night-time periods, additional attended measurements were undertaken from approximately 17:30 hours on Friday 23 March 2018 to 05:00 hours on Saturday 24 March 2018. Further measurements were also undertaken from approximately 10:00 hours on Saturday 24 March 2018 to 13:00 hours on Saturday 24 March 2018 to obtain representative daytime measurements.

Ducie Street is a major thoroughfare to football matches at the Etihad Stadium and our attended measurements on Friday 23 March 2018 include noise from people walking both to and from a Friday night football match at the Etihad Stadium.

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



6.2 Weather Conditions

Due to the nature of the automated survey (i.e. unmanned), it is not possible to accurately comment on the weather during the entire survey period, however at the beginning and end of the automated survey period, and for the duration of the manned measurements, the weather conditions were calm and the sky was generally overcast. These conditions are considered suitable for obtaining representative measurement results.

6.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Sound Level Meter	Larson Davis	824	3533	Calibration on 30/08/2018
Type 1 Sound Level Meter	Larson Davis	824	3053	Calibration on 30/08/2018
Type 1 Calibrator	Larson Davis	CAL200	3083	Calibration on 16/04/2017

Both microphones were mounted on a pole with the microphone fitted with a windshield. All equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).

6.4 Measurement Positions

Free-field noise level measurements were undertaken at 2 No positions on site, as described/illustrated below.



Site Plan (© maps.google.co.uk)



Position	Description
1	Free-field measurement taken at 2m above ground level on the south-eastern boundary of the site overlooking Ducie Street.
2	Free-field measurement taken at 2m above ground level on the north-western boundary of the site overlooking Lomax Street.

6.5 Results

The results of the environmental noise survey, as used to inform subsequent assessments against current guidelines, are summarised in the table below. This summary considers the worst-case noise levels measured across both weekday and weekend periods, all results are free-field levels. The full automated and manned survey data can be found in Appendix B.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	L _{Aeq,16h}	Typical Lowest L _{A90,15min}	L _{Aeq,8h}	Typical Lowest L _{A90,15min}	Typical Highest L _{Afmax,15min}
1	66 dB	54 dB	63 dB	54 dB	79 dB
2	58 dB	51 dB	58 dB	51 dB	73 dB

6.6 Discussion of Noise Climate

During both daytime and night-time weekday and weekend periods the dominant noise source was noted to be external fixed plant items serving the adjacent industrial unit (Presbar Diecastings), evidenced by the relatively constant background sound levels across periods. Noise from road traffic on the A665 was noted to elevate ambient noise levels during rush hour periods, however noise from pedestrians walking to and from the football match on the Friday night did not appear to have a noticeable effect on overall noise levels.

L_{Afmax} noise levels were generally noted to be caused by cars passing the site at speed along Ducie Street, for both weekday and weekend night-time periods.

A review of the data indicates that noise levels are generally lower during weekend periods.

7.0 Internal Ambient Noise Assessment

This section aims to determine the acoustic performance requirements for critical façade elements. All external noise has been considered, including the adjacent industrial unit.

7.1 Noise from Adjacent Industrial Unit

Subjectively, the surveyor noted that operational activity noise from within the adjacent industrial unit (Presbar Diecastings) was not distinguishable, either in level or character, from the residual ambient noise level during the survey period. However, building services noise from external fixed plant items associated with the industrial unit dominated the noise climate at both measurement positions.

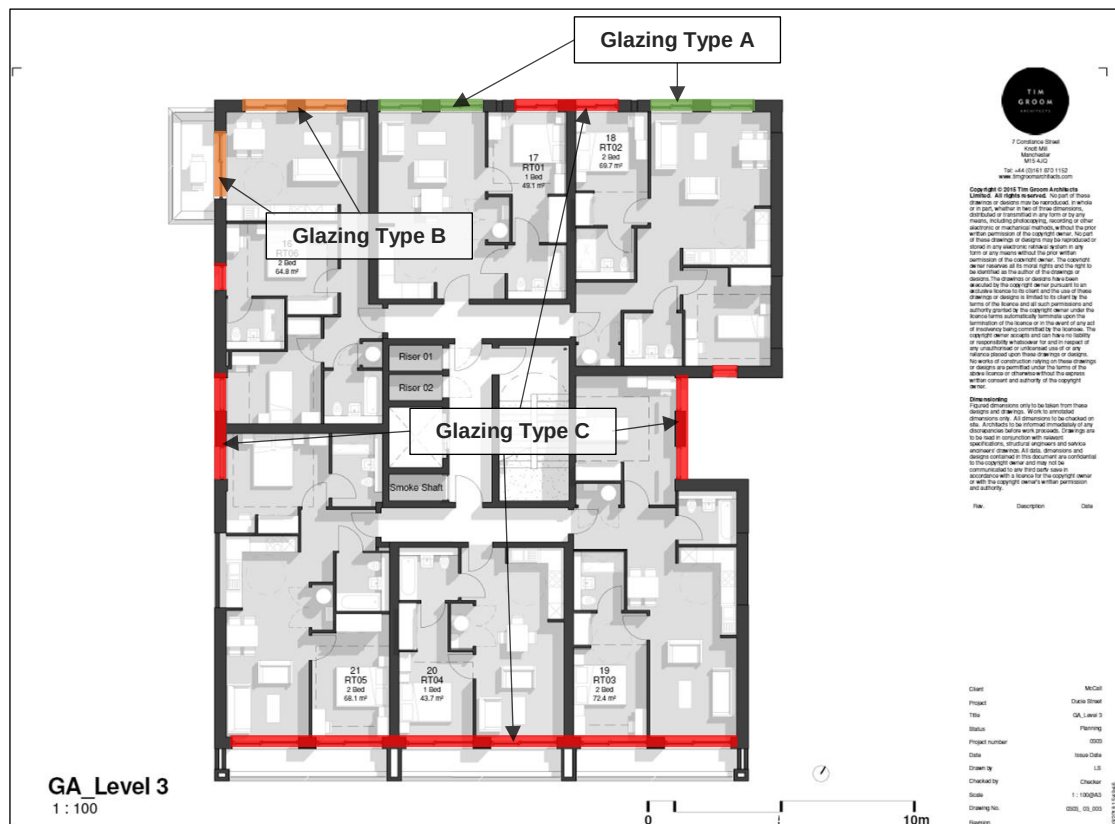
Regardless of the above, our assessment of critical façade elements has considered representative noise levels obtained while the adjacent unit was operational. Therefore, the mitigation measures presented below would be expected to sufficiently reduce noise from both the industrial unit and environmental sources to below the internal ambient noise levels required by MCC. We would expect this approach to provide suitable internal acoustic conditions for future residents.

7.2 Required Mitigation Measures

Preliminary sound insulation calculations have been undertaken in order to specify the minimum sound insulation performance of the façade elements to meet the internal noise criteria, using the noise levels presented in Section 6.5. We understand that all habitable rooms are to be mechanically ventilated.

The information presented below is intended as planning guidance only, with the aim of demonstrating that solutions are available to suitably mitigate noise intrusion. Detailed acoustic façade specifications shall be produced through detailed design.

From the results of our assessment, the following sound insulation performance specifications are recommended for the windows of habitable rooms to achieve the internal ambient noise criteria.





Type		Windows	Guidance Overall Performance Required (Min.)	Example Configurations (For Guidance Only)
A	Green	Living rooms overlooking Lomax Street	26 dB $R_w + C_{tr}$	Conventional double glazing (e.g. 6 / 16 / 6mm)
B	Orange	Gable living rooms overlooking Lomax Street	30 dB $R_w + C_{tr}$	Upated double glazing (e.g.10 / 16 / 6mm)
C	Red	All other habitable rooms	35 dB $R_w + C_{tr}$	Laminated acoustic double glazing (e.g. 10 / 16 / 6.4mm)

In summary, our calculations have indicated that the internal ambient noise criteria should be achievable in all habitable rooms through the use of appropriately specified façade elements.

7.3 Ventilation/Cooling

The current ventilation strategy is to mechanically ventilate habitable rooms with MVHR, sufficiently sized to eliminate the need for openable windows or trickle ventilators in window heads to provide background ventilation.

Rapid/purge ventilation is normally required in circumstances such as to assist in expelling smoke from burnt toast or paint fumes, which would only be required for a short amount of time, as the activity requires, and it is unlikely that an increase in noise levels, as a result of an open window, during these occurrences would be considered significant by occupants. For summertime cooling, reliance on openable windows could be minimised by ensuring MVHR systems are suitably oversized with a manually operable boost (at user's discretion).

8.0 Outdoor Amenity Areas

On this scheme, we understand that there is a communal roof terrace at seventh floor level overlooking Lomax Street. In this regard, Manchester City Council states a desired level of 55 dB $L_{Aeq,T}$.

There are also some small balconies which are not generally considered as 'outdoor living' due to their size. In this regard, BS 8233 states:-

"Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation"

Considering the screening from the dominant noise sources afforded to the communal roof terrace by both the proposed building and the terrace itself, our calculations indicate noise levels can be expected to achieve the desired 55 dB $L_{Aeq,16hr}$ across the proposed communal terrace.

Hence, no specific noise mitigation measures should be required.



9.0 Fixed Plant Noise Emissions

9.1 Proposed Limits

On the basis of the Manchester City Council's guidance and the results of the environmental noise survey, we propose that the following cumulative incident plant noise emission limits be achieved at 1 metre from the nearest noise sensitive residential windows.

Period	Plant Noise Emission Limit
Daytime 07:00-23:00 hrs	46 dB $L_{Aeq,1h}$
Night-time 23:00-07:00 hrs	41 dB $L_{Aeq,15min}$

Noise from existing building services dominates the current noise climate at the site, we therefore believe it is appropriate to base the night-time plant noise emission limit above on achieving 10 dB below the lowest measured background level to ensure minimal risk of adverse impact to nearby receptors during critical night-time periods. This would also ensure compliance with Manchester City Council requirements.

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.

10.0 Conclusions

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

The acoustic requirements of local planning conditions and current industry guidelines have been reviewed and used to inform an assessment of road traffic and industrial noise sources affecting the proposed residential properties.

Our assessment indicates that acceptable internal noise levels should be achievable through the appropriate selection of critical façade elements. Minimum performance requirements for critical façade elements have been presented which should be achieved as a minimum by any system.

Openable windows should not be relied upon as a means of background ventilation. Background ventilation will therefore be provided via MVHR units.

Noise levels within the proposed communal roof terrace are expected to be in line with Manchester City Council's requirements for outdoor living areas.

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	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 <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.
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).

Appendix B

Environmental Noise Survey Results

Weekend Attended Measurement Results at Position 1

Date (dd/mm/yy)	Period Start Time (hh:mm)	L _{Aeq,15min} (dB)	L _{Afmax,15min} (dB)	L _{A10,15min} (dB)	L _{A90,15min} (dB)
23/03/2018	17:30	65	82	69	57
	17:45	65	81	68	57
	18:00	63	80	67	57
	18:15	66	84	70	58
	18:30	64	88	67	57
	18:45	63	75	67	57
	19:00	66	82	70	57
	19:15	64	79	69	57
	21:00	62	82	65	56
	21:15	61	75	63	56
	21:30	63	80	66	56
	21:45	62	76	65	56
	22:00	62	75	66	57
	22:15	62	76	66	57
	22:30	61	74	63	56
	22:45	62	76	65	57
	23:00	62	80	65	56
	23:15	62	76	65	56
	23:30	61	78	61	56
	23:45	61	78	62	56
24/03/2018	00:00	61	74	63	56
	00:15	61	80	63	56
	00:30	60	78	62	55
	00:45	61	79	62	55
	01:00	60	78	62	55
	01:15	58	72	60	55
	01:30	60	76	61	55
	01:45	59	73	60	55
	02:00	59	73	61	54
	02:15	59	75	61	55
	02:30	59	75	60	55
	02:45	58	71	60	55
	03:00	59	79	60	55
	03:15	60	74	61	55
	03:30	59	76	60	55
	03:45	58	71	59	55

Weekend Attended Measurement Results at Position 1 (Continued)

Date (dd/mm/yy)	Period Start Time (hh:mm)	L _{Aeq,15min} (dB)	L _{Afmax,15min} (dB)	L _{A10,15min} (dB)	L _{A90,15min} (dB)
24/03/2018	04:00	58	73	59	55
	04:15	59	74	60	55
	04:30	58	72	59	55
	04:45	58	71	60	55
	10:00	64	85	66	57
	10:15	63	77	66	57
	10:30	64	83	65	56
	10:45	62	75	65	55
	11:00	63	79	68	56
	11:15	63	78	66	56
	11:30	64	78	66	59
	11:45	63	77	65	57
	12:00	63	76	66	57
	12:15	62	77	65	57
	12:30	62	80	65	57
	12:45	64	78	68	57
	13:00	64	70	67	58

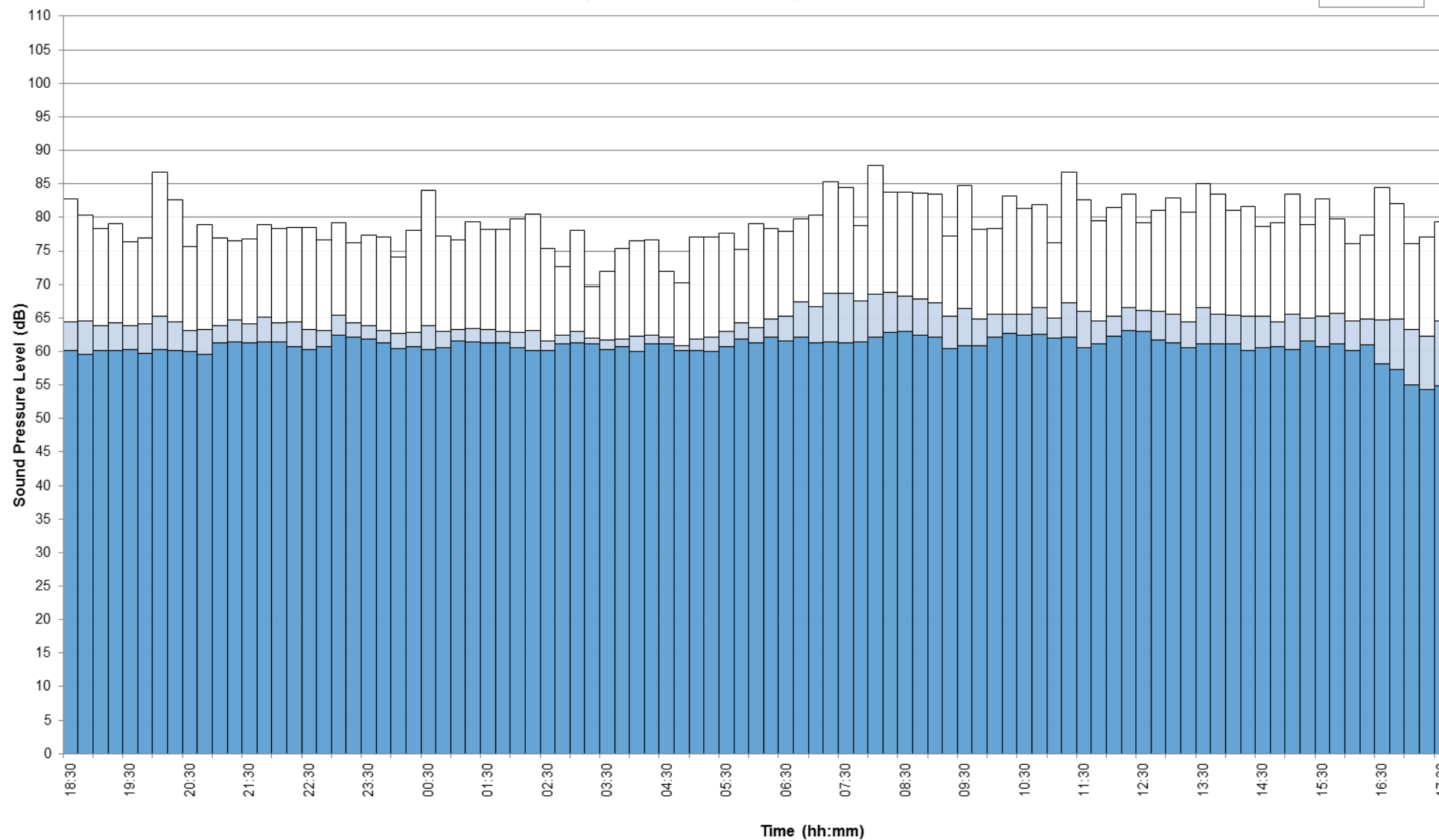
Weekend Attended Measurement Results at Position 2

Date (dd/mm/yy)	Period Start Time (hh:mm)	L _{Aeq,15min} (dB)	L _{Afmax,15min} (dB)	L _{A10,15min} (dB)	L _{A90,15min} (dB)
23/03/2018	17:15	58	80	61	53
	17:30	57	68	59	52
	17:45	58	68	61	52
	18:00	58	71	61	52
	18:15	57	67	60	52
	18:30	57	68	59	53
	18:45	57	77	59	52
	19:00	57	70	59	52
	21:00	57	80	59	52
	21:15	56	67	59	52
	21:30	55	65	58	52
	21:45	56	64	58	52
	22:00	56	67	59	52
	22:15	56	69	59	52
	22:30	56	69	59	51
	22:45	57	73	60	52
	23:00	57	74	59	52
	23:15	57	76	60	52
	23:30	56	74	59	52
	23:45	55	66	57	52
24/03/2018	00:00	56	71	58	52
	00:15	56	73	57	52
	00:30	55	66	57	51
	00:45	55	66	58	51
	01:00	55	69	58	51
	01:15	55	71	57	51
	01:30	54	64	56	51
	01:45	54	65	56	51
	02:00	55	73	56	51

Ducie Street, Manchester
A-weighted Sound Levels at Automated Position 1
Wednesday 28 March - Thursday 29 March 2018

25369/TH1

□ LAmax,15min
▒ LAeq,15min
■ LA90,15min



Ducie Street, Manchester
A-weighted Sound Levels at Automated Position 2
Wednesday 28 March - Thursday 29 March 2018

25369/TH2

- L_{Amax}, 15min
- L_{Aeq}, 15min
- L_{A90}, 15min

