Cross Keys Street Manchester

Noise Impact Assessment Report

Client:
Cross Keys Estates Limited
Hilton House, 26-28 Hilton Street
Manchester, M1 2EH

Date:
28 February 2025

Our Ref:
22086-RP-1-R3

JAMESON ACOUSTICS

Consultants in acoustics, noise and vibration

JAMESON
ACOUSTICS

Document Control

Revision	Date	Author	Description
0	23-02-2024	AJ	First issue
1	23-04-2024	AJ	Update to reflect latest floor plans
2	01-05-2024	AJ	Minor amendments
3	28-02-2025	AJ	Update to reflect latest scheme design

This report has been prepared with all reasonable skill, care and diligence for the sole benefit, use and information of the aforementioned Client in accordance with the purposes and terms agreed between ourselves and the Client. The liability of Jameson Acoustics Limited in respect of the information contained within this report will not extend to any third party.

Author	Andrew Jameson (AJ)
Position	Director
Qualifications	BSc(Hons) Acoustics, MIOA, MIET
Experience	20+ years
Signature	
Date	28-02-2025

Executive Summary

Planning permission is sought for a new-build residential development on Cross Keys Street in Manchester. The development is for the erection of a 9-storey residential building (Use Class C3) comprising 104nr residential units and communal space, landscaping, infrastructure and other associated works.

The site is subject to traffic noise from surrounding road network.

Jameson Acoustics Limited has been commissioned to undertake a noise impact assessment to supplement the planning application. The assessment seeks to demonstrate that noise impacts can be sufficiently mitigated to achieve acceptable acoustic conditions within new dwellings.

The assessment finds that acceptable internal noise levels within new dwellings can be achieved through the appropriate specification of façade elements and appropriate ventilation and overheating mitigation solutions.

Preliminary guidance on suitable specifications and solutions for framed external window/door systems has been provided. All windows can be rated at 30 dB $R_w + C_{tr}$, which should correspond to relatively conventional double glazing in standard aluminium window frames.

Ventilation shall be provided by whole-house MVHR systems. These systems may need to be sized to assist in the overheating design strategy to help mitigate reliance on openable windows. The overheating strategy shall assume all windows to habitable rooms will be closed through the night (23:00-07:00hr). During the day, the reliance on openable windows should be restricted to not more than 9 out of the 16 hour day (07:00-23:00hr).

Plant noise emission limits have been proposed so that future plant installations do not adversely impact on the locality.

JAMESON
ACOUSTICS

Contents

1.0 Introduction 4

2.0 Objectives 4

3.0 Site Description 5

4.0 Planning Policy, Legislation & Assessment Guides 7

5.0 Baseline Noise Survey 9

6.0 Incident Noise Levels 15

7.0 Achieving Internal Noise Levels 17

8.0 Outdoor Living Space 19

9.0 Development-Generating Noise Impacts 20

10.0 Conclusions 20

Appendix A – Acoustic Terminology 22

Appendix B – Planning Policy & Assessment Guides 23

Appendix C – Noise Survey Time History Graphs 29

1.0 Introduction

Planning permission is sought for a new-build residential development on Cross Keys Street in Manchester. The development is for the erection of a 9-storey residential building (Use Class C3) comprising 104nr residential units and communal space, landscaping, infrastructure and other associated works.

The site is subject to traffic noise from surrounding road network.

Jameson Acoustics Limited has been commissioned to undertake a noise impact assessment to supplement the planning application. The assessment seeks to demonstrate that noise impacts can be sufficiently mitigated to achieve acceptable acoustic conditions within new dwellings.

For a description of the acoustic terminology used herein, please see Appendix A.

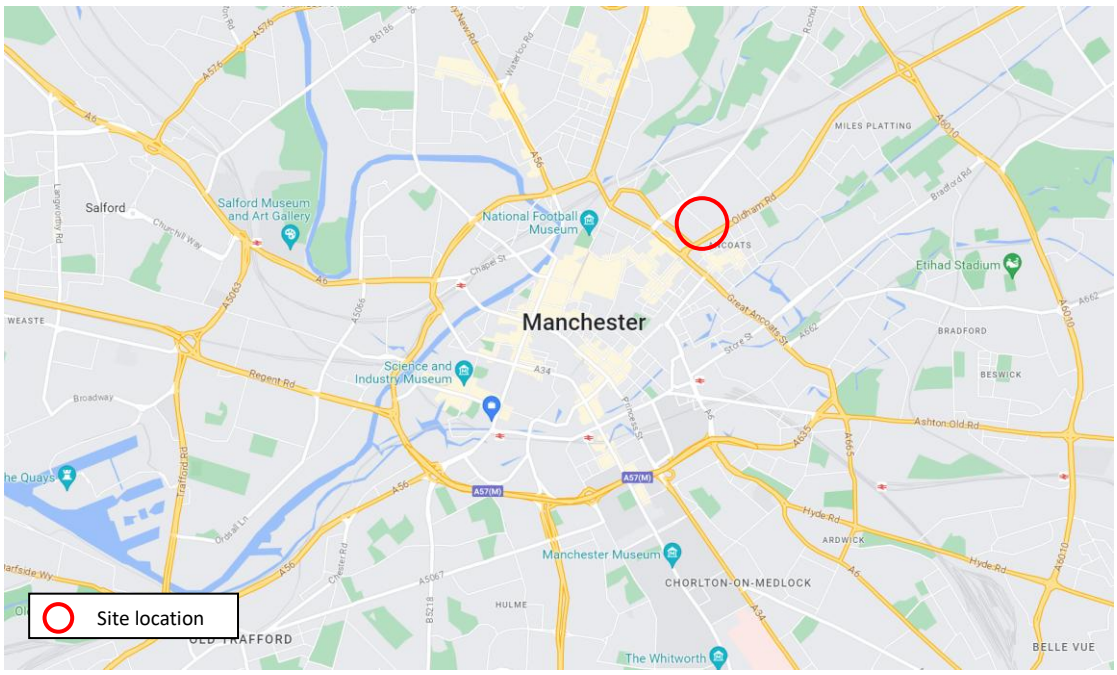
2.0 Objectives

- To review the latest national and local planning policies/requirements and relevant design standards and good practice guides that will inform the noise impact assessments.
- To carry out a detailed noise survey at the site, capturing daytime and night-time traffic noise levels at selected positions in accordance with BS 7445.
- Based on the survey data, to undertake a noise assessment for the suitability of the site for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), statutory legislation, Planning Practice Guidance (ProPG), British Standard BS8233:2014 and Local Authority guidance/requirements.
- To subsequently provide guidance on noise mitigation and façade sound insulation solutions to achieve acceptable acoustic conditions within the completed scheme.
- To set noise emission limits for the development in line with BS 4142 with the aim of minimising the risk of the operation of new plant causing a noise nuisance to neighbours.

3.0 Site Description

3.1 Location

The site is located on Cross Keys Street in Manchester and falls under the jurisdiction of Manchester City Council. See Location Plan below.



Location Plan (© maps.google.co.uk)

3.2 Description

The site (currently an open air car park) is bounded by Cross Keys Street to the north-west, Goulden Street to the north-east, Chadderton Street to the south-east and Marshall Street to the south-west. The surrounding area is a mix of commercial and residential, with the commercial units operating primarily as offices (or commercial operations with no notable noise output).

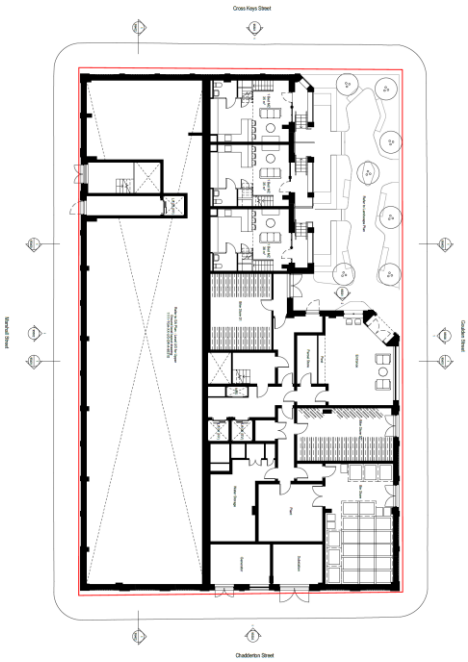
At the time of the noise survey, the site to the north (over Goulden Street) was a live construction site. The development will become a new build residential development but, during the survey, construction noise was affecting daytime noise levels on-site.

In the absence of construction noise, the noise climate on site was dominated by road traffic. The road immediately surrounding the site are minor access roads with relatively low traffic flows. Distant traffic noise maintains the noise floor on-site, namely from Oldham Road to the east, Addington Street to the south (ring road, one-way traffic) and Rochdale Road to the west.

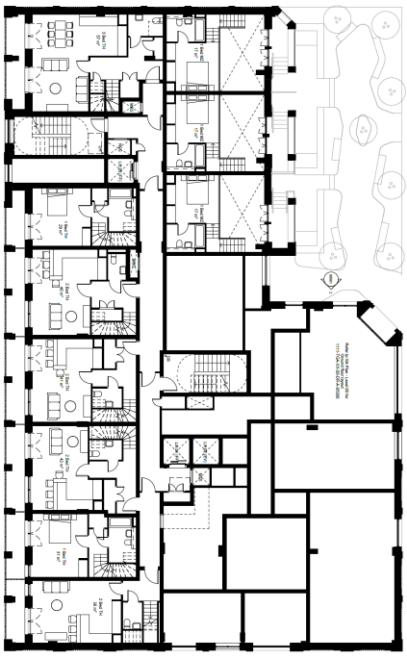
See site plan below.

Site Plan (© maps.google.co.uk)

The proposed development is for a single 9-storey residential building occupying the majority of the site, with a front portion of land to the north corner reserved for landscaped public realm. The scheme includes 97nr apartments and 7nr townhouses. Two of the top floor apartments will benefit from private balconies. See below the proposed floor plans below. The development will not contain any commercial or shared amenity spaces.



Proposed Ground Floor Plan



Proposed Upper Ground Floor Plan

Proposed Typical Upper Floor Plan

Proposed Level 8 Plan (with Roof Terrace)

4.0 Planning Policy, Legislation & Assessment Guides

4.1 National Planning Policy

National planning policies are set out in the following:

- Noise Policy Statement for England [NPSE], 2010;
- National Planning Policy Framework [NPPF], 2024;
- National Planning Practice Guidance – Noise [PPGN], 2019.

These documents provide a qualitative approach to noise assessments. See Appendix B for a detailed description of each.

4.2 Local Planning Requirements

4.2.1 Local Authority Development Plan

Manchester City Council's [MCC] Core Strategy was adopted on the 11 July 2012 and is the key document in the Manchester Local Plan. It sets the out the long-term strategic policies for Manchester's future development and will form the framework that planning applications will be assessed against.

The Core Strategy requests that all new developments follow the 'Development Principles' and accord with the design guidance set out in the Supplementary Planning Documents. In accordance with Policy DM1, this includes the effects on amenity due to noise generated by a new development and, conversely for noise sensitive uses (e.g. residential), the effects of environmental noise onto the new development.

MCC's Supplementary Planning Document relating to noise is their 'Planning & Noise, Technical Guidance' published in October 2022 by their Environmental Protection Team. This document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development. The key elements relevant to this development are summarised below.

4.2.2 Specific Guidance on Noise

In relation to noise affecting newly proposed residential properties, the council has adopted the following noise limits for sites affected only by environmental noise (e.g. road traffic):

- **Bedrooms (night time – 23.00 – 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)**
- **Living Rooms (daytime – 07.00 – 23.00) 35 dB L_{Aeq}**
- **Gardens and terraces (daytime) 55 dB L_{Aeq}**

In relation to commercial noise, MCC's guidance advises that "*BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises*". The Council consider that new developments should contribute and enhance the area in which they are located and where possible, i.e. prevent 'noise creep', contribute to the improvement of people's health and quality of life as per the NPSE. For fixed plant, the Council advises a BS 4142 assessment that demonstrates that:

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

4.3 Legislation (Building Regulations)

The development will need to be built in such a way that it conforms to the Building Regulations 2010. In relation to noise and acoustics, the key documents to consider are:

- Approved Document E: 2003 Edition (incorporating amendments to 2015) – Resistance to the Passage of Sound [ADE];
- Approved Document F: 2021 Edition – Ventilation [ADF];
- Approved Document O: 2021 Edition – Overheating [ADO].

ADE relates to the design of the building's internal building fabric and primarily considers the control sound transfer between adjacent spaces. In planning terms, this development will not contain any party floors separating new apartments from commercial/amenity spaces, and thus does not require any further consideration herein.

ADF includes a section on controlling noise from ventilation systems. It states that "*account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation*" and that noise from mechanical ventilation systems operating under normal conditions (not boost rates) should not exceed 30 dB $L_{Aeq,T}$ for noise sensitive rooms (e.g. bedrooms) and 45 dB $L_{Aeq,T}$ in less sensitive rooms.

ADO requires noise to be considered as part of the development's overheating strategy in locations where external noise may be an issue. It states that the overheating strategy should take account of the likelihood that windows will be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- 40 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- 55 dB L_{AFmax}, more than 10 times a night (between 11pm and 7am).

4.4 Assessment Guides

For planning and noise, the following industry standards and assessment guides shall be considered.

- ProPG: Planning & Noise, 2017;
- BS 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings'*;
- World Health Organisation [WHO] Environmental Noise Guidelines, 2018;
- Acoustics, Ventilation & Overheating [AVO] Residential Design Guide, 2020;
- BS 4142: 2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*'.

See Appendix B for a detailed description of each.

5.0 Baseline Noise Survey

5.1 Procedure

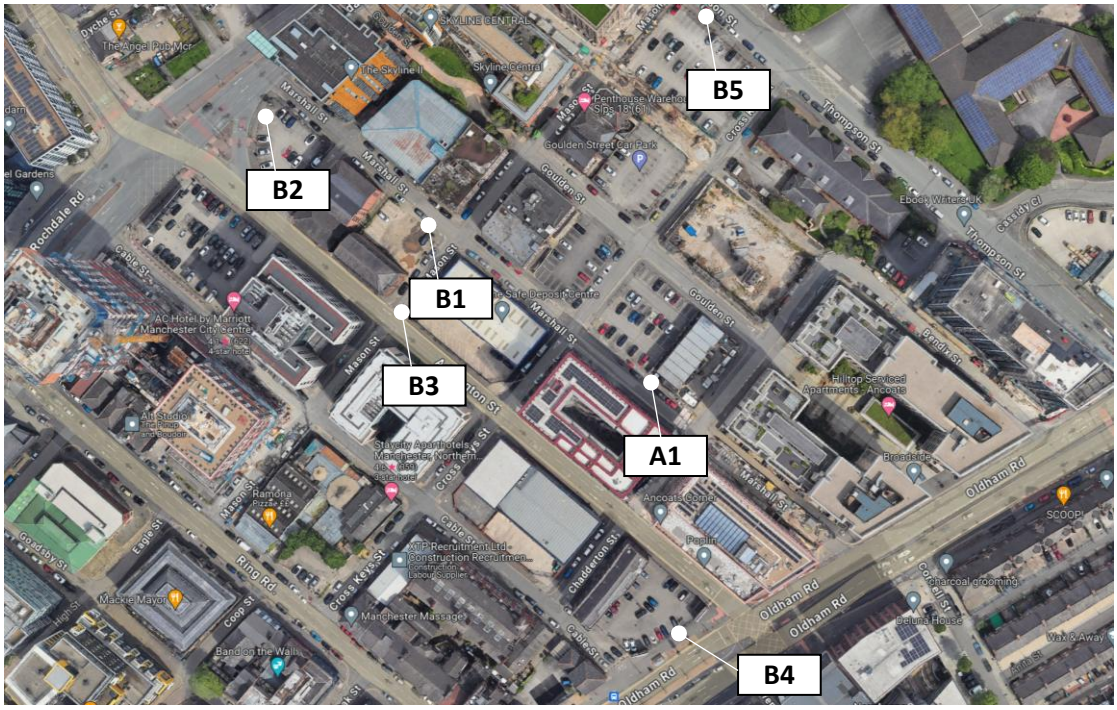
A combination of automated and manned noise level measurements has been taken at various positions around the development site. The positions were selected to obtain a detailed description of the prevailing daytime and night-time environmental noise climate at the site.

The survey periods are summarised below:

Survey Ref.	Start-End Period (2024)	Type	Reason
A	[14:00] Wed 31 Jan – [11:00] Thu 8 Feb	Automated	To establish weekday and weekend period day/night environmental noise levels at-the site.
B	[11:00 – 14:00] Mon 19 Feb	Manned	A CRTN* shortened-period day and night road traffic noise survey at various positions around the site (to calibrate the noise model).

The measurement positions for each of the survey sets are described and illustrated below.

Survey Ref.	Position	Description
A	A1 [Automated]	Marshall St – microphone tied to metal stair case on side of GMI site cabins, approx. 9 m above ground in free-field conditions. *NB: Position influenced by construction noise between 8am-6pm Mon-Fri, 8am-1pm Sat.*
B	B1 [Manned]	Marshall St (away from construction site to obtain true traffic noise data) – sound level meter attached to a tripod on pavement, approx. 2 m from roadside edge.
	B2 [Manned]	Rochdale Rd – sound level meter attached to a tripod on pavement, near junction with Marshall St, approx. 3.5 m from roadside edge.
	B3 [Manned]	Addington St – sound level meter attached to a tripod on pavement, near junction with Mason St, approx. 3 m from roadside edge.
	B4 [Manned]	Oldham Rd – sound level meter attached to a tripod on pavement, approx. 6 m from roadside edge.
	B5 [Manned]	Thompson St - sound level meter attached to a tripod on pavement, approx. 3 m from roadside edge.



Site Plan showing measurement positions (© maps.google.co.uk)

For the automated survey, the equipment was programmed to continuously log all relevant A-weighted broadband (dBA) and linear spectral noise level indices, including L_{eq}, L_{90}, L_{10} and L_{max}, over intervals of 5-minutes, 15-minutes and 1-hour intervals.

For all manned CRTN survey measurements, the sound level meter was set to record all relevant A-weighted broadband (dBA) and linear spectral noise level indices, including L_{eq}, L_{90}, L_{10} and L_{max} over periods of around 10-minutes per hourly period. Each measurement was considered to be representative of the noise climate at that position in that respective measurement hour.

All measurements were taken in conditions considered to be 'free-field'. All measurements were taken in general accordance with BS 7445-1: 2003 '*Description and Measurement of Environmental Noise*'.

5.2 Instrumentation

The instrumentation used for the survey is summarised below. The sound level meters were hand-calibrated at the beginning and end of the survey periods. No significant deviations in calibration level were noted.

Description	Equipment	Serial Nr	Lab Calibration Expiry	Lab Calibration Certificate Nr
Class 1 sound level meter	Svantek 971A (with Type 7152 microphone)	131642 (85571)	9 Nov 2024	10 Nov 2022
Class 1 sound level meter	Svantek 971A (with Type 7152 microphone)	127647 (84398)	12 Mar 2025	13 Mar 2023
Class 1 sound calibrator	Cirrus CR:515	57570	28 Nov 2024	1153776

5.3 Weather Conditions

During the automated survey period, internet weather reports indicate conditions were suitable for obtaining representative measurement results, although periods of prolonged rainfall were reported on Tuesday 6 February 2024. With the exception of this day, road surfaces would have dry. Wind speeds were sufficiently low throughout (below 5 m/s, the upper tolerance for the windshield).

During the manned survey period, weather conditions were sufficiently calm to obtain representative source noise readings. Road surfaces were dry and wind speeds were low. The sky was generally clear with patchy cloud cover.

5.4 Observed Noise Climate

Due to the nature of the automated survey, i.e. unmanned, it is not possible to describe the noise climate throughout the duration of the survey period. However, on install and collection the noise

climate was noted to be dominated by road traffic. Vehicle passbys on local roads were infrequent and the climate was more influenced by distant traffic. Construction activities were dominant on install and collection. The works involved CFA piling operations. This noise will have influenced readings during site working hours, known to be 8am-6pm Mon-Fri and 8am-1pm Sat. The operation of a standby generator near to the site cabins will have also influenced readings – evident by the L_{A90} readings on the time history graphs, with sharp rises in noise levels in the early mornings.

During the CRTN (road traffic) manned survey, the noise climate at all positions was dominated by road traffic on the respective road under measurement, with the exception of Position B1. At this position, noise levels were influenced by distant road traffic from Addington Street and Rochdale Road.

5.5 Results & Analysis

5.5.1 Automated Noise Survey A

The results of the automated survey have been plotted on Time History Graph 22055-A1-G1 enclosed in Appendix C. The graph presents the 15-minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels throughout the duration of the survey. Periods influenced by construction noise have been highlighted.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the following tables.

L_{Aeq} Ambient Noise Levels

The logarithmically averaged 16-hour daytime and 8-hour night-time L_{Aeq} ambient noise levels

Position A1 Period Commencement (Day/Night of…)	Free-Field Ambient Noise Level (dB)	
	Daytime $L_{Aeq,16hr}$ (07:00-23:00)	Night-time $L_{Aeq,8hr}$ (23:00-07:00)
Wednesday 31 January 2024	60 [1, 2]	56
Thursday 1 February 2024	58 [2]	56
Friday 2 February 2024	59 [2]	56
Saturday 3 February 2024	60 [2]	57
Sunday 4 February 2024	59	55
Monday 5 February 2024	60 [2]	56
Tuesday 6 February 2024	60 [2]	56
Wednesday 7 February 2024	58 [2]	56
Taken for Assessment	**60**	**56**

[1] incomplete 16-hour period

[2] periods of construction noise or adverse weather excluded

L_{Afmax} Maximum Noise Levels at Night

The 10-15th highest 5-minute L_{Afmax} maximum noise level 'event' at night

Position	Free-Field Maximum Noise Level (dB) At Night-time $L_{Amax,5min}$ (23:00-07:00)
A1	70

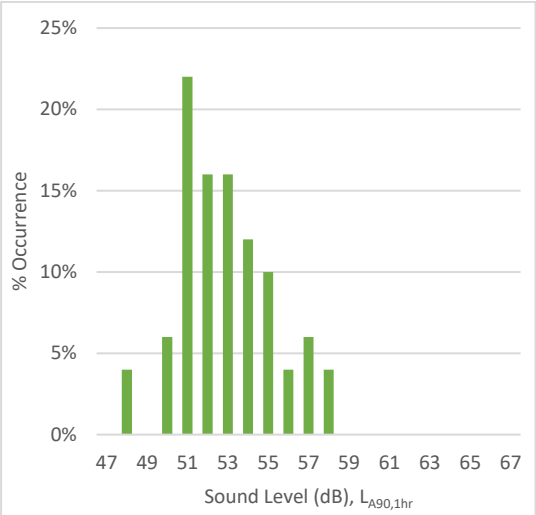
L_{A90} Background Noise Levels

The representative background determined through statistical analysis to BS 4142

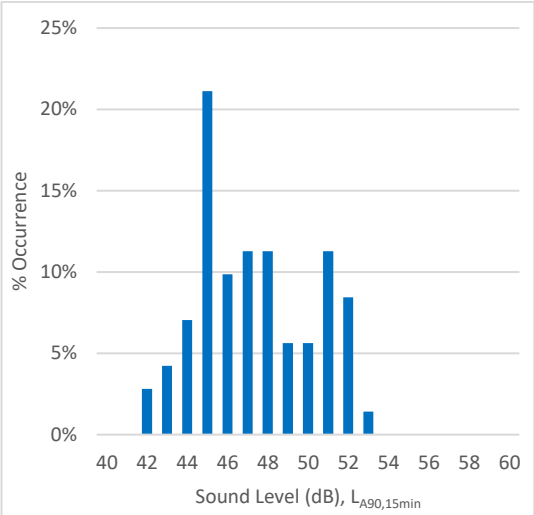
Position	Free-Field Background Noise Level (dB)	
	Daytime $L_{A90,1hr}$ (07:00-23:00)	Night-time $L_{A90,15min}$ (23:00-07:00)
A1	51 [1]	45 [1]

[1] Excludes periods unduly influenced by construction (or standby generator) noise

See below graphs showing the % distribution of background noise levels at each position throughout the duration of the survey.



Daytime – Position A1



Night-time – Position A1

5.5.2 Road Traffic Noise Survey B

The results of Survey B are summarised in the following table in the form of A-weighted broadband L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} noise levels.

Position	Period	Sound Level (dB)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
B1	11:00-12:00	62	77	65	56
	12:00-13:00	62	76	65	57
	13:00-14:00	62	80	66	57
B2	11:00-12:00	68	81	71	61
	12:00-13:00	69	80	72	62
	13:00-14:00	68	81	72	61
B3	11:00-12:00	74	82	77	64
	12:00-13:00	74	84	78	62
	13:00-14:00	74	83	78	62
B4	11:00-12:00	71	81	75	63
	12:00-13:00	71	80	74	62
	13:00-14:00	70	80	76	64
B5	11:00-12:00	68	75	71	59
	12:00-13:00	69	81	73	59
	13:00-14:00	70	78	74	58

As the dominant noise source was noted to be road traffic on each respective road, the above measurements can be applied to a calculation to determine the corresponding 16-hour (daytime) and 8-hour (night-time) L_{Aeq} ambient noise levels in accordance with:

- the shortened measurement procedure of the Department of Transport's Calculation of Road Traffic Noise (CRTN) 1988;
- Method 3 in the Transport Research Laboratory (TRL) Project Report PR/SE/451/02 '*Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping*'.

It should be noted that the daytime measurement period was undertaken during rush-hour traffic period, which is not strictly in accordance with CRTN procedures, but will as a result ensure 'worst-case' noise levels are obtained. The approach can be summarised as follows:

- CRTN: Measure three consecutive $L_{A10,1hr}$ as per the CRTN shortened procedure;
- CRTN: Average the three $L_{A10,1hr}$ values and subtract 1 dB to obtain the $L_{A10,18hr}$;
- Apply TRL Method 3 equations to determine the likely $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ values.

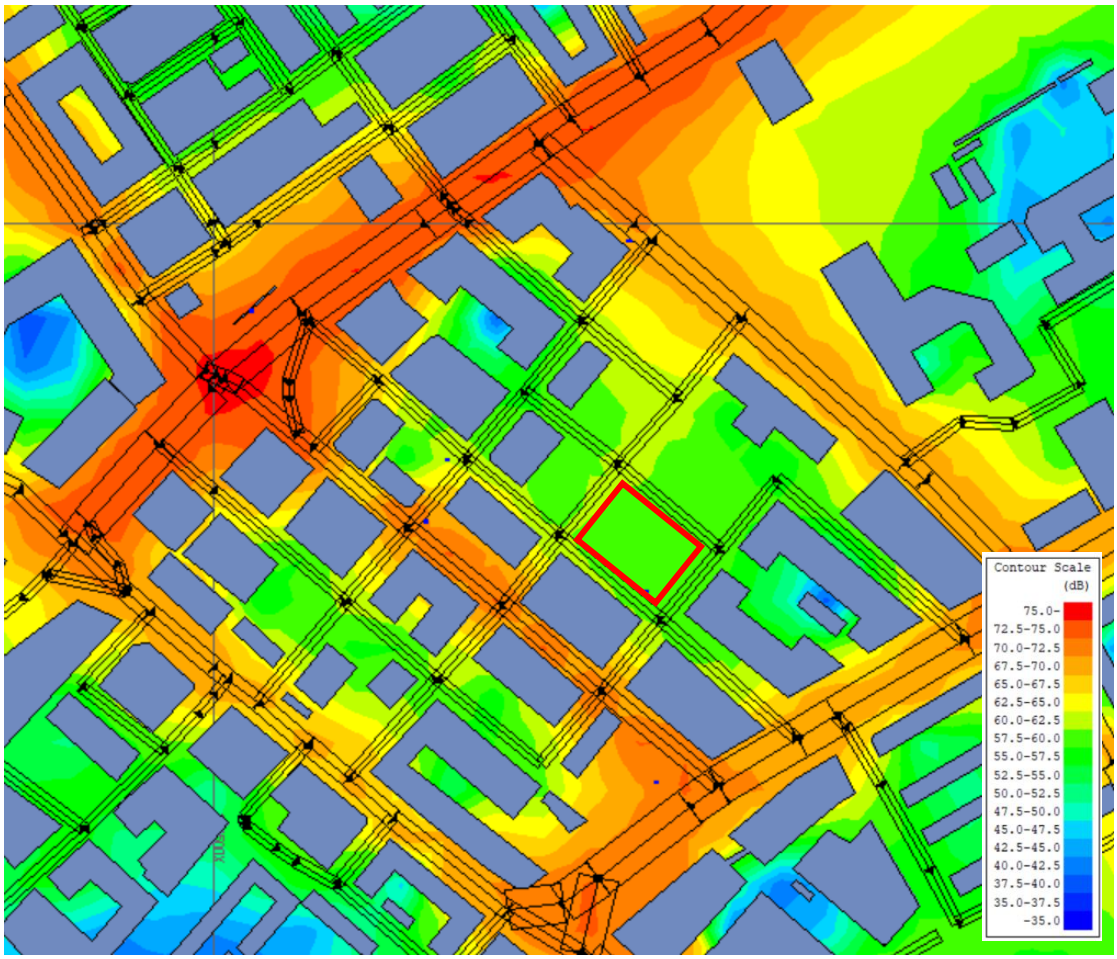
Based on this and the results of the survey, the free-field incident L_{Aeq} noise levels onto each principal boundary of the site have been determined. These are summarised in the table below. These values shall be used to calibrate road traffic noise sources in the noise model.

Position	Calculated Incident Noise Level (dB)	
	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$
B1	63	55
B2	69	63
B3	74	68
B4	72	66
B5	70	62

6.0 Incident Noise Levels

6.1 Road Traffic Noise

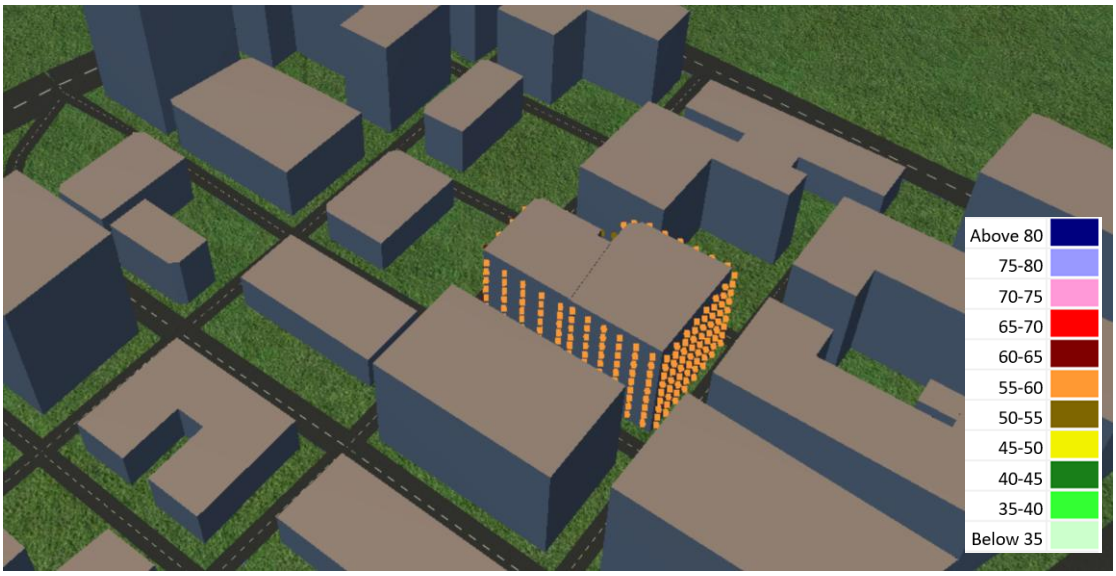
Incident road traffic noise levels onto each building façade have been analysed using 3D noise modelling software. The following plan illustrates the spread of daytime $L_{Aeq,16hr}$ traffic noise levels across the existing site.



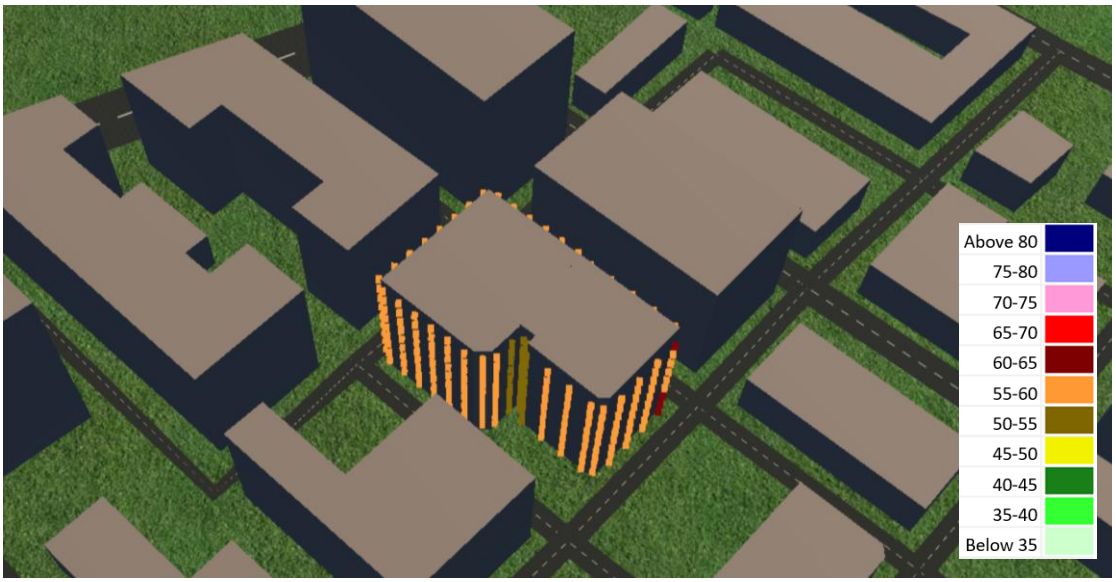
Noise Map of Existing Site – Daytime $L_{Aeq,16hr}$ traffic noise levels (4 m above ground level)

The following Figures illustrate the incident daytime $L_{Aeq,16hr}$ traffic noise levels across the proposed facades of the development. Note, night-time $L_{Aeq,8hr}$ noise levels will be consistently circa 4-5 dB lower than these values.

The proposed site model includes neighbouring building projects, either consented or in construction.



Looking North



Looking South

Incident night-time L_{Amax} noise levels are calculated to be less than 70 dB on the lower levels of facades on perimeter (roadside) facades.

7.0 Achieving Internal Noise Levels

7.1 Criteria

We would propose the following internal noise levels to be achieve within new dwellings during normal ventilation conditions.

Room	Desirable Internal Noise Level	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	35 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB* L_{Afmax}

* Noise events (5-min) - not exceeded more than 10-15 times per night

7.2 Building Envelope Acoustic Design

7.2.1 External Walls & Roofs

The façade design proposes brick (or brick-slip) external walls with insulated external cavity, SFS with outer sheathing board, full fill insulation and double layer plasterboard linings with punched-in double glazed windows. The external wall construction would be expected to provide a sound reduction performance of not less than 45 dB $R'_w + C_{tr}$. This performance would far surpass what will be required on this site to control noise ingress.

The roof elements will be a solid concrete slab of circa 200-225 mm depth with plasterboard ceilings to top floor apartments. Such a construction would be expected to provide a sound reduction performance of not less than 50 dB $R'_w + C_{tr}$. This performance would far surpass what will be required on this site to control noise ingress.

7.2.2 Framed External Windows/Door Systems

Preliminary sound insulation calculations have been carried out in order to specify the minimum sound insulation performance of the windows. Our calculations follow BS 8233 procedures and consider the apartment room dimensions and window sizes taken from the planning stage drawings.

Our calculations suggest provisions should be made for the following specifications for the complete framed window/door systems to habitable rooms (living rooms and bedrooms). Example configurations are provided for guidance only.

Façade Zone	Min. Overall $R_w + C_{tr}$	Example Configuration
ALL	**30 dB**	6.4 (lam.) / 16 / 6 mm

7.2.3 Ventilation

For ventilation (and to assist with overheating), MVHR heat recovery systems will be provided to each apartment. These will remove the need for trickle ventilators and/or openable windows for normal ventilation (in line with Approved Document F). These units will be suitably sized and provided with a manual operable boost and an evening bypass mode that will remove any reliance on opening windows during the night to avoid overheating (in line with Approved Document O) – see Section 7.3.

Our calculations indicate that with conventional MVHR duct sizes, additional in-duct attenuators at façade openings for noise ingress control should not be required.

Note: Noise from mechanical ventilation systems shall be designed to NR 25 in bedrooms at night and NR 30 in bedrooms and living rooms during the day.

7.3 Overheating & Noise

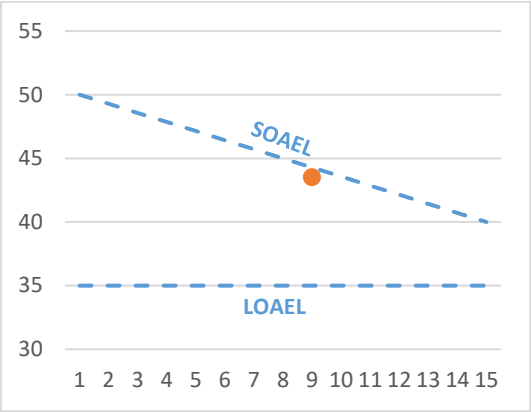
Often the overheating strategy for residential buildings places some reliance on openable windows in the summer months. For sites where incident noise levels are high, noise should be taken into account when considering whether openable windows are appropriate for providing this extra purge ventilation to control overheating.

In accordance with the Acoustics, Ventilation and Overheating Guide (AVO), the associated risk of noise levels been deemed unacceptably high with windows open would be when incident external noise levels exceed 65 dB $L_{Aeq,16hr}$ (day) and 55 dB $L_{Aeq,8hr}$ (night). In addition, Building Regulations' Part O advises that the overheating strategy should assume windows will be closed throughout the night where incident façade noise levels exceed circa 49 dB $L_{Aeq,8hr}$ and 64 dB L_{Amax}.

Based on the Part O requirements**, the overheating strategy shall assume bedroom windows will be closed throughout the night (23:00-07:00hr) for all apartments**.

During the day, the overheating strategy can assume that *some* reliance on openable windows for overheating is permissible, based on the AVO guidance. This reliance should be limited not longer than 9 hours of the 16 hour day period (07:00-23:00hr) for all apartments.

The following Figure demonstrates that $L_{Aeq,16hr}$ daytime internal noise levels would fall below the Significant Observed Adverse Effect Level (SOAEL) defined in AVO with reliance on openable windows restricted to not more than 9 out of the 16 hour day for the worst-case apartments (highest incident traffic noise levels).



AVO Assessment – daytime $L_{Aeq,16hr}$

The use of whole-house MVHR solutions may help to 'trim' the reliance on openable windows if, for example, they are provided with a manual operable boost setting that increases ventilation rates as/when occupants require.

Air conditioning can be considered for quality developments (or 'lop' cooling boxes onto MVHR outlets). However, the introduction of mechanical solutions should be considered carefully; not only with regard to cost and maintenance, but sustainability and the environment, which are factors that carry more importance for any new development under MCC's jurisdiction.

8.0 Outdoor Living Space

The development only proposes small roof balconies for two top floor apartments. There is no large shared outdoor amenity space to consider. For outdoor living spaces, BS 8233 states:

"*For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable and a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited*.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses."

In line with BS 8233, noise limits on these small rooftop balconies should not apply.

9.0 Development-Generating Noise Impacts

9.1 Plant Noise Emission Limits

Based on the results of the noise survey and the requirements of the Local Authority, we propose the following plant noise emission limits to be achieved incident at the nearest noise sensitive windows with all plant operating simultaneously. These limits are 5 dB below the prevailing 'representative' background noise levels.

Receptor Location	Plant Noise Rating Limit, $L_{Ar,Tr}$ ref. BS 4142 (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Any Noise Sensitive Receptor	46	40

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality.

The above limits shall be subject to the final approval of the Local Authority.

9.2 Plant Noise Mitigation

At this stage, new plant items to serve the development have not been selected so we cannot perform the associated noise emission calculations. However, it is envisaged that the risk of excessive building services noise can be mitigated by design, and this could be secured by a suitably worded condition of planning. The noise reduction/attenuation measures required for external plant will depend on the type and location of the equipment. Typically, provisions should be made for in-duct attenuation to air handling equipment and appropriate positioning/screening of any heat rejection plant (such as condensers).

10.0 Conclusions

Planning permission is sought for a new-build residential development on Cross Keys Street in Manchester. The development is for the erection of a 9-storey residential building (Use Class C3) comprising 104nr residential units and communal space, landscaping, infrastructure and other associated works.

The site is subject to traffic noise from surrounding road network.

Jameson Acoustics Limited has been commissioned to undertake a noise impact assessment to supplement the planning application. The assessment seeks to demonstrate that noise impacts can be sufficiently mitigated to achieve acceptable acoustic conditions within new dwellings.

The assessment finds that acceptable internal noise levels within new dwellings can be achieved through the appropriate specification of façade elements and appropriate ventilation and overheating mitigation solutions.

Preliminary guidance on suitable specifications and solutions for framed external window/door systems has been provided. All windows can be rated at 30 dB $R_w + C_{tr}$, which should correspond to relatively conventional double glazing in standard aluminium window frames.

Ventilation shall be provided by whole-house MVHR systems. These systems may need to be sized to assist in the overheating design strategy to help mitigate reliance on openable windows. The overheating strategy shall assume all windows to habitable rooms will be closed through the night (23:00-07:00hr). During the day, the reliance on openable windows should be restricted to not more than 9 out of the 16 hour day (07:00-23:00hr).

Plant noise emission limits have been proposed so that future plant installations do not adversely impact on the locality.

Appendix A – Acoustic Terminology

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.

dB(A) 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 (e.g. $L_{Aeq,T}$ in dB). Noise 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 only just perceptible.

$L_{Aeq,T}$ $L_{Aeq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time measurement period, *T*.

$L_{10,T}$ L_{10} is the noise level exceeded for 10% of the measurement period *T* (i.e. the quietest 10% of the measurement) and has, for many years, been used in the assessment of road traffic noise.

$L_{90,T}$ L_{90} is the noise level exceeded for 90% of the measurement period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the 'background' noise level.

L_{max} L_{max} is the maximum sound pressure level recorded over the measurement period, *T*. L_{max} is often used in assessing scheduled environmental noise 'events' (such as train passbys), particularly at night where such events may cause sleep disturbance.

R_w The weighted sound reduction index, R_w, is a single figure description of sound reduction as defined in BS EN ISO 717-1. It is single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The R_w is calculated from sound insulation measurements taken in an acoustic laboratory. Sound insulation ratings derived from site measurements are invariably lower than the laboratory figures and are referred to as the apparent weighted sound reduction index, R'_w.

$D_{n,e,w}$ The weighted element-normalised level difference, $D_{n,e,w}$, is a single figure description of the sound insulation performance of small building elements, such as a trickle ventilator.

C_{tr} C_{tr} is correction term applied against the sound insulation single-number values (e.g. R_w) to provide a weighting against low frequency performance. The reference values used within the C_{tr} calculation are based on urban traffic noise.

Appendix B – Planning Policy & Assessment Guides

Planning Policy

- **Noise Policy Statement for England (NPSE)**

  The Noise Policy Statement for England (NPSE) launched in March 2010 states the long-term vision of Government noise policy 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 long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

  - Avoid significant adverse impacts on health and quality of life;
  - Mitigate and minimise adverse impacts on health and quality of life;
  - Where possible, contribute to the improvement of health and quality of life.

  The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

  The NPSE introduces a three-tier concept for the assessment of noise impacts onto a receptor:

  - **NOEL – No Observed Effect Level:** The level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

  - **LOAEL – Lowest Observable Adverse Effect Level:** The level above which adverse effects on health and quality of life can be detected.

  - **SOAEL – Significant Observed Adverse Effect Level:** The level above which significant adverse effects on health and quality of life occur.

  There are no numeric thresholds relating to each of the above. The NPSE acknowledges that the severity of noise impacts vary depending upon the type of noise, the type of receptor, the duration (on-time) of the noise, the characteristics of the noise, the time of day, the day of the week, etc.. As a result, the definition of what constitutes an SOAEL is somewhat flexible.

- **National Planning Policy Framework (NPPF)**

  The National Planning Policy Framework (NPPF) was first published in 2012 and sets out the government's planning policies for England and how these are expected to be applied.

  The latest revision of the NPPF (2024) states that planning system should **contribute to, and enhance**, the natural and local environment by (amongst others) "*preventing both new and existing development from*

contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or ***noise pollution*** *or land stability*."

The express inclusion of noise in the NPPF means that it is a material planning consideration for local planning decisions.

Paragraph 123 of the NPPF document states that planning policies and decisions should aim to:

"A*. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*

B*. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*

C*. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*

D*. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

NPPF advises that decisions relating to planning applications should ensure "*…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."*

To achieve this, new developments should *"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"* and should also *"identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*."

The NPPF recognises 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*."

- **Planning Practice Guidance on Noise (PPG)**

The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF and make it more accessible. It advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category. The guidance is for ad hoc developments, as major infrastructure is covered by overarching National Policy Statements.

PPG provides the following tabulated summary of the effects of noise exposure (in terms of health and quality of life) associated with noise generating and sensitive developments.

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Assessment Guides

- **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 two sequential stages of the overall approach are:

Stage 1 – an initial noise risk assessment of the proposed development site; and
Stage 2 – a systematic consideration of four key elements.

Element 1 – demonstrating a "Good Acoustic Design Process";
Element 2 – observing internal "Noise Level Guidelines";
Element 3 – undertaking an "External Amenity Area Noise Assessment"; and
Element 4 – consideration of "Other Relevant Issues".

The ProPG considers suitable guidance on internal noise levels found in BS 8233 (see below) with the addition of an $L_{Amax,f}$ requirement for bedrooms at night, as below.

"*Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events*."

- **BS 8233: 2014**

British Standard 8233: 2014 '*Sound insulation and noise reduction for buildings*' presents the following desirable internal ambient noise levels for dwellings based on steady external noise sources (e.g. road traffic).

Activity	Location	Desirable Internal Ambient Noise Level	
		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 $L_{Aeq,8hour}$

BS 8233 states that where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For outdoor living spaces, BS 8233 states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable and a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not 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. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB LAeq,T or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

- **World Health Organisation (WHO)**

The current WHO Environmental Noise Guidelines 2018 for the European Region supersede the 1999 Guidelines for Community Noise, although it does suggest that the 1999 values for indoor noise levels remain valid, as presented below.

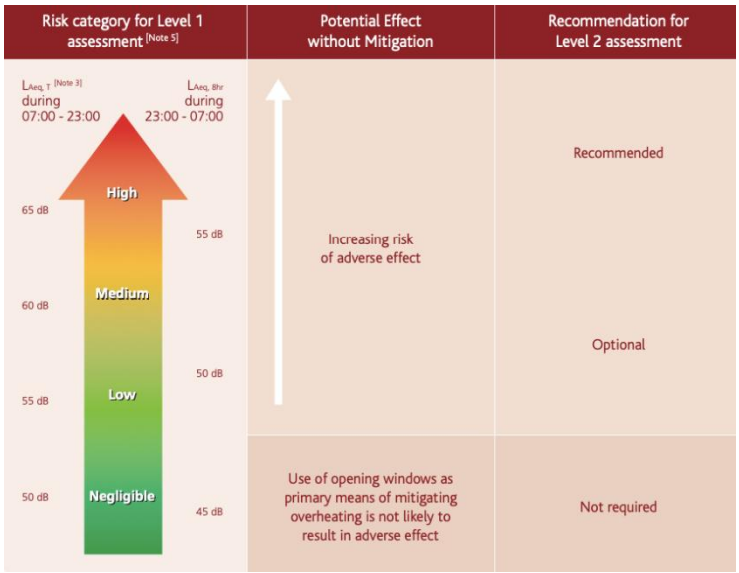
Noise Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic	35 dB $L_{Aeq,\ 16h}$	53 dB L_{den}
	30 dB $L_{Aeq,\ 8h}$	45 dB L_{night}
Railway	35 dB $L_{Aeq,\ 16h}$	54 dB L_{den}
	30 dB $L_{Aeq,\ 8h}$	44 dB L_{night}
Aircraft	35 dB $L_{Aeq,\ 16h}$	45 dB L_{den}
	30 dB $L_{Aeq,\ 8h}$	40 dB L_{night}

With regard to night-time noise "events", WHO states *"In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."*

- **Acoustics, Ventilation & Overheating Residential Design Guide**

The Acoustics, Ventilation and Overheating Residential Design Guide (Version 1.1) was issued in January 2020 by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). This document provides guidance on the interdependence between acoustics, ventilation and overheating.

The AVO guide recommends a two-level approach to assess the potential impact of noise ingress through windows that have been opened to mitigate overheating and also noise from any mechanical services used to provide comfort cooling. The level 1 assessment relates to incident environmental noise levels across a proposed site, it is used to define "risk categories" for each building façade based on these levels. These categories are set out below:



At planning stage the level of information required to undertake a level 2 assessment in-line with the AVO guide is often not available and a level 1 assessment, which establishes the risk categories of each proposed façade, would be most suitable.

- **BS 4142:2014**

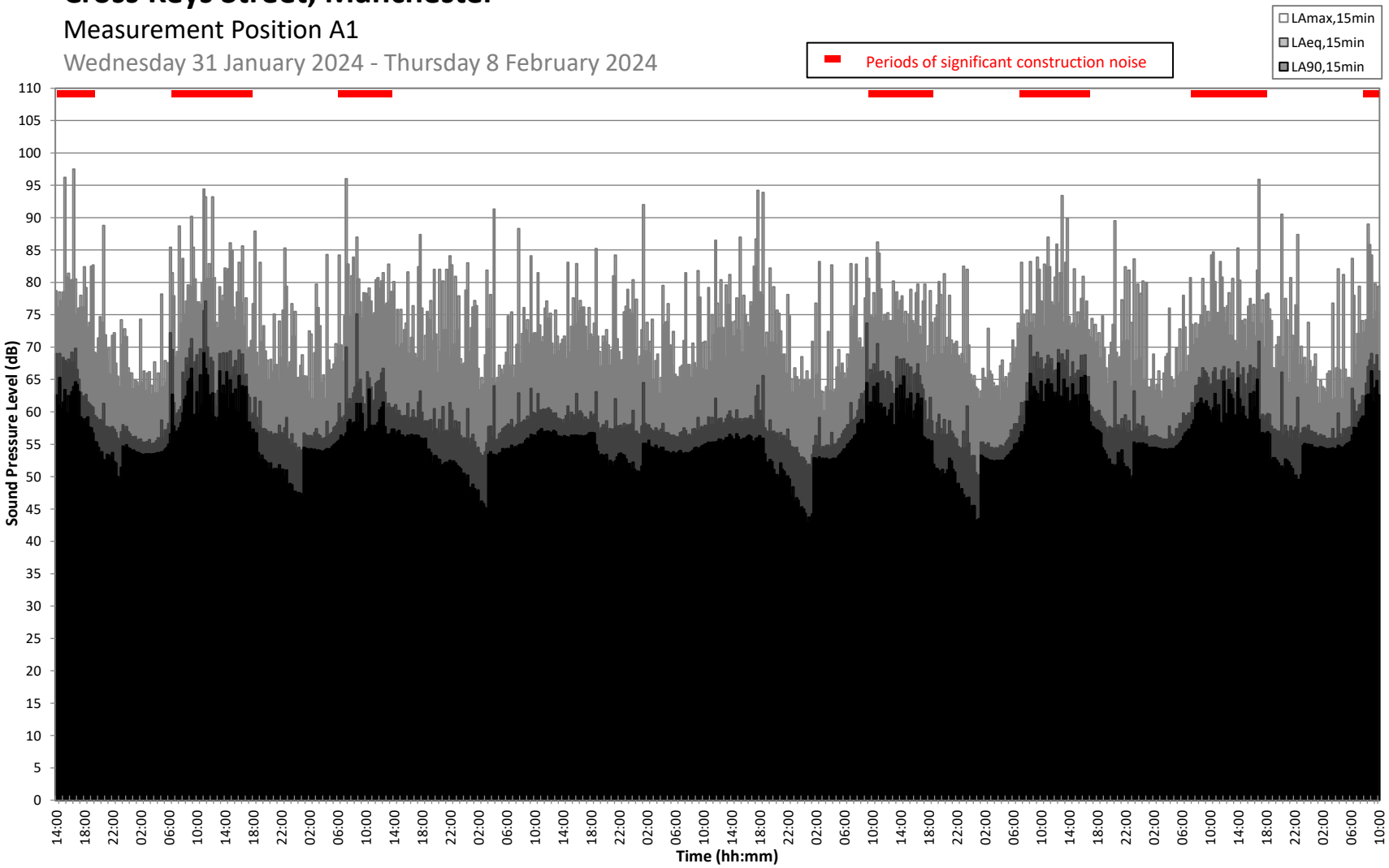
British Standard BS 4142 looks at the assessment of noise of a commercial / industrial nature. It describes methods for rating and assessing outdoor sound of an industrial and/or commercial nature "*on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident".* In relation to this development, this includes sound from fixed installations, comprising M&E plant and equipment.

The assessment method is based on the difference between the measured 'background sound level' without the influence of any industrial noise source, and the 'rating level' of the industrial source, at the receiver location. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact. A difference of around +5 dB is of marginal significance, and where the rating level does not exceed the background, this is an indication of the specific sound source having a low impact.

Appendix C – Noise Survey Time History Graphs

Cross Keys Street, Manchester

Measurement Position A1

Wednesday 31 January 2024 - Thursday 8 February 2024

22086-1-G1