Snell Street Manchester

Noise Impact Assessment Report

28744/NIA1

13 April 2021

For:

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Document Control

Issue	Date	Comment	Prepared by	Authorised by
0	23/03/2021	-	Thomas Jebson Technical Assistant	Jake Howarth Principal Consultant BEng(Hons), MIOA
1	13/04/2021	Section 6.5 - Corrected reference to local authority		

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1.0 Introduction

A row of town houses are proposed at Snell Street in Manchester. The site is primarily subject to road traffic noise along Snell Street with some contribution from nearby commercial and school play area uses.

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

Our survey results and assessment findings are presented herein.

2.0 Objectives

To visit site to establish the prevailing environmental noise levels by automated monitoring over a minimum 24 hour period in accordance with BS 7445.

Based on the above, to undertake a noise impact assessment of the proposed development, covering:-

i. Incident external noise levels/sources & suitability of the site for residential use;
ii. Measures to achieve acceptable noise levels within new dwellings;
iii. Measures to achieve acceptable noise levels in new outdoor living spaces;
iv. Noise limits for future fixed plant and equipment to protect the locality.

To provide preliminary specifications for windows and ventilators to control external noise intrusion, along with preliminary guidance on commercial noise control measures

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

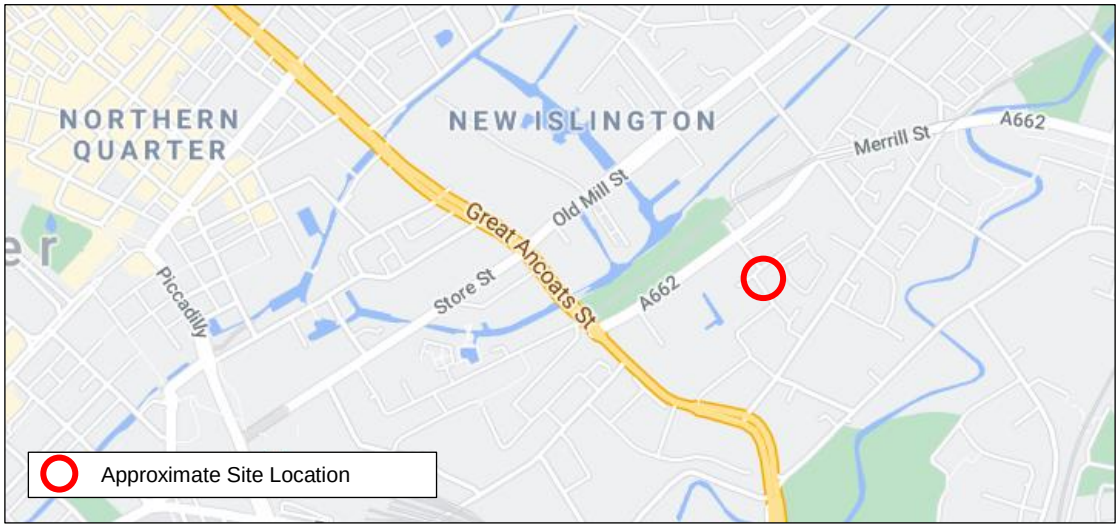
3.0 Acoustic Terminology

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 Snell Street in Manchester, and falls under the jurisdiction of Manchester City Council. See site location below.



Site Location (© maps.google.co.uk)

4.2 Description

The approximate site boundary is indicated on the plan below. The site itself is currently a single storey commercial unit located on Snell Street and the surrounding area comprises of residential buildings to the north, east, south and west.

Site Plan (© maps.google.co.uk)

5.0 Acoustic Standards & Guidelines

5.1 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).

5.1.1 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."

5.1.2 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."

5.2 National Planning Policy Framework

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

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

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

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

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

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

- *"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."*

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.

5.4 Planning Practice Guidance

The Department for Communities and Local Government's Planning Practice Guidance (PPG) website was launched in 2014 and provides guidance on 'Noise' for new developments in line with NPPF policies.

Notably, the website provides a table to help recognise when noise could be a concern relevant to the NOEL, LOAEL and SOAEL effect levels described in NPSE, as below:-

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

There are no numeric values to reference in this guide; everything is descriptive and so cannot inform an objective assessment of noise.

5.5 BS 4142:2014

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

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

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

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

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

5.6 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.

For outdoor living spaces, a desirable upper guideline value of 55dB $L_{Aeq,T}$ is quoted.

6.0 Baseline Noise Survey

6.1 Procedure

Unattended noise level measurements were undertaken from 10:00 hours on Friday 19 March 2021 to 10:00 hours on Monday 22 March 2021 in order to establish typical noise levels over a typical weekday and weekend period.

Additional attended noise measurements were un undertaken between 11:00 and 12:00 hours on Friday 19 March 2021 in order to establish how noise levels vary across the site.

All measurements were taken of the A-weighted (dBA) L_{90}, L_{eq} and L_{Fmax} sound pressure levels over discrete 5 and 15 minute periods (15-minute periods reported herein). Measurements were undertaken in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

6.2 Weather Conditions

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the weather conditions throughout the entire survey period. However, upon set-up and collection of the equipment wind conditions were calm, road surfaces were dry and the sky was generally overcast. These conditions are considered suitable for obtaining representative measurement results.

6.3 Measurement Positions

A mixture of attended and automated free-field noise level measurements were undertaken at 2No positions on site, as described/illustrated below.

Position	Description
1	Unattended façade measurement along Snell Street at an approximate distance of 1m from the curb side with the microphone location approximately 3m above local ground level.
2	Free-field measurement located to the rear of the existing unit with the microphone location approximately 24 m from the curb side and 1.5m above local ground level.

Site Plan (© maps.google.co.uk)

6.4 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	LxT	4569	28/07/2020
2	Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	5111	28/07/2020
1&2	Type 1 Calibrator	Larson Davis	CAL200	3083	19/05/2020

The sound level meter in Position 1 was secured in a metal case that was fixed to a lamppost with the microphone protruding out of the base of the casing and the sound levels meter in Position 2 was fixed to a tripod.

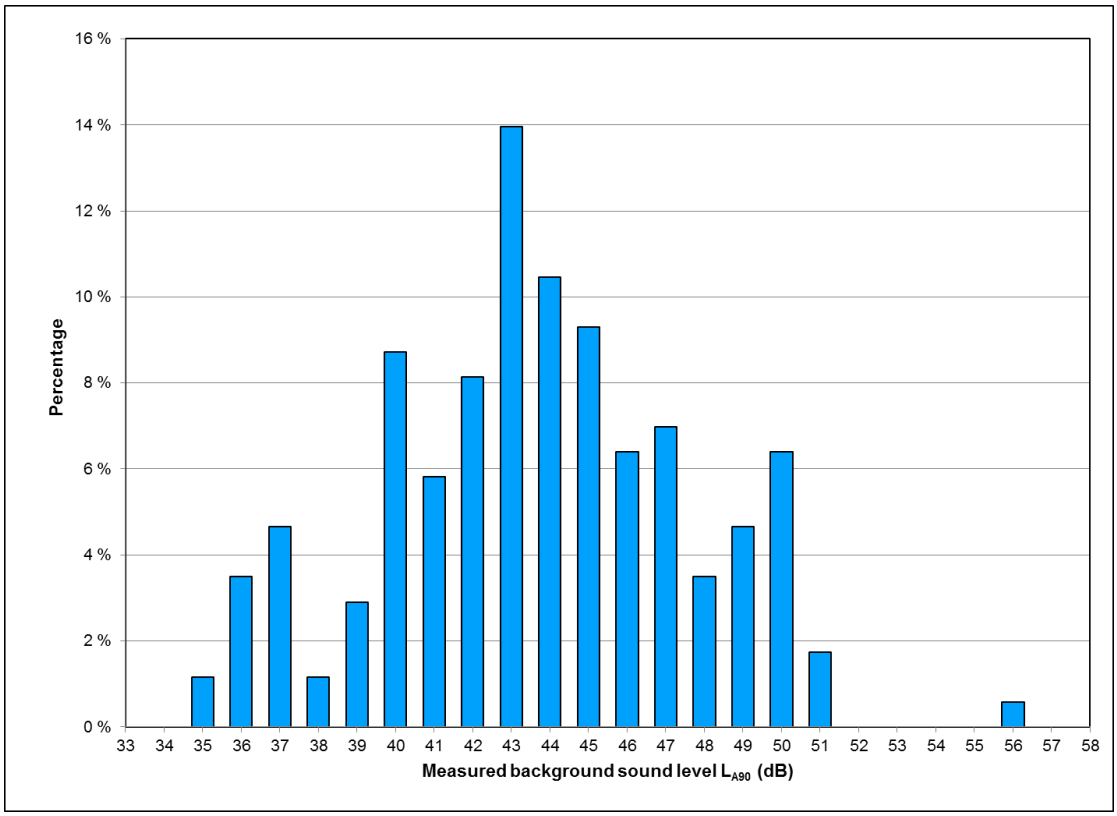
Each microphone was fitted with a windshield. All equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).

6.5 Results

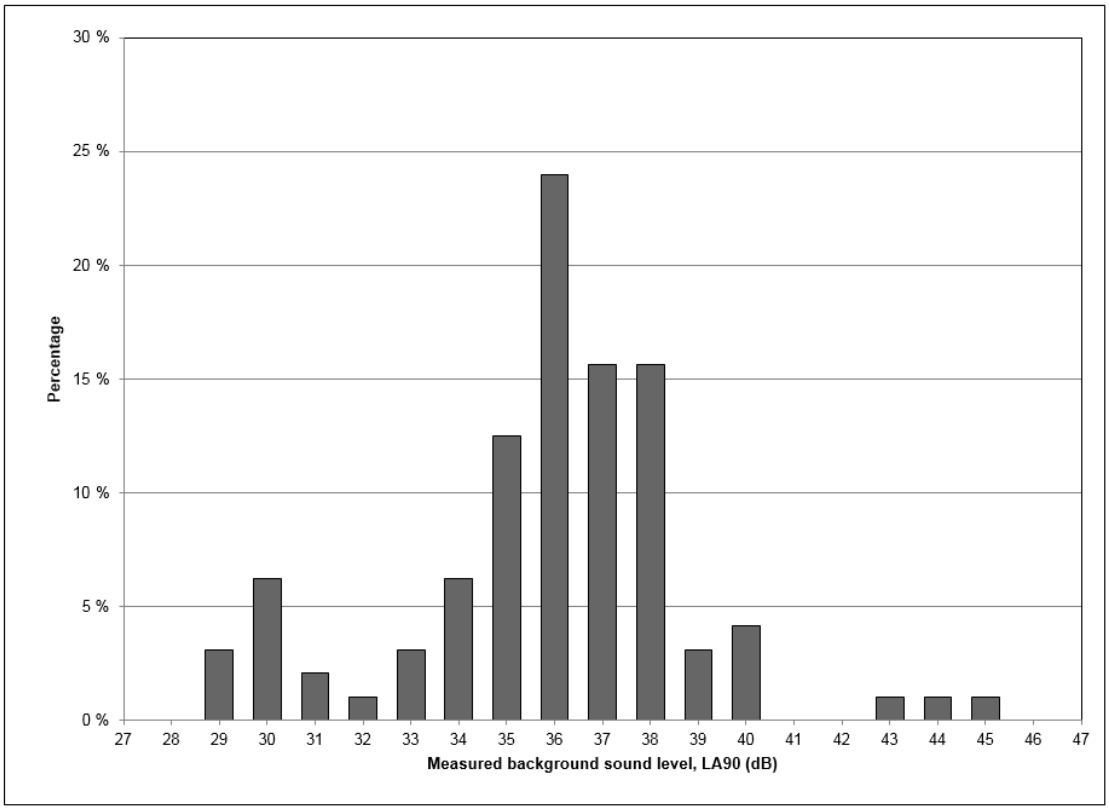
The results of the automated survey have been plotted on Time History Graphs 28744/TH1 enclosed. These graphs present the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each position throughout the duration of the survey.

BS 4142 states that *"the background sound level must be reliable and suitably represent he particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."* The atmospheric plant noise requirements of Manchester City Council stated in Section 5.1 make reference to BS4142 (2014).

Taking this into account, the following histograms have been created which display the occurrence of each sound level (L_{90}) as a percentage for the day and night time periods.



[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)

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

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	Typical $L_{A90,15min}$	$L_{Aeq,8hr}$	Typical $L_{A90,15min}$	15th highest $L_{Afmax,5min}$
1	54	40	50	33	71

A summary of the results from the attended noise survey, as used to inform subsequent assessments against current guidelines in relation to the use of openable windows as a means for background ventilation, is presented in the table below. All results are free-field levels.

Start Time (mm:ss)	Position	Measured Sound Pressure Levels (dB)	
		$L_{Aeq,5min}$	$L_{AFMax,5min}$
11:20	**1**	55	71
	2	49	58
11:25	**1**	57	75
	2	50	63
11:30	**1**	53	69
	2	49	59
11:35	**1**	55	74
	2	51	64

6.6 Discussion of Noise Climate

Due to the nature of the unmanned survey, 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 dominant noise sources were noted to be distant traffic noise from the A662 and the A665.

During the manned measurements the dominant noise sources were noted to be pass-bys on Snell Street and noise egress from the surrounding road networks.

6.7 Impact of COVID-19

At the time the noise survey was undertaken, the UK was exiting a nationwide lockdown due to the COVID-19 pandemic. It should be noted that the lockdown had been significantly relaxed at the time the survey was completed with most commercial operations in the UK operational and advice to work from home where possible still in effect.

Commuters that would typically work in offices may still have been working from home at the time of the survey, however the majority of office commuters along this stretch of Oldham Road (major route to city centre) are anticipated to utilise public transport rather than small passenger vehicles. With the above in mind, regular public transport timetables had fully resumed at the time of the survey and traffic flows from small passenger vehicles at the site were constant throughout site visits. General environmental noise levels at the site are therefore considered to be representative of normal pre-COVID conditions.

7.0 Calculated Incident Noise Levels

Based on the measured noise levels detailed in section 6.5, we have calculated the incident noise levels on each of the proposed facades as follows:

Based on the current design, the closest façade appears to be 6.5m from the curb side of Snell Street. The relative distances between the unmanned measurement position and façade from the road have been used to calculate a distance loss correction which has then been applied to the measured values on Snell Street.

The manned measurements have been used to average a correction between the two measurement positions. This has then be applied to provide $L_{Aeq,16hr}$, $L_{Aeq,8hr}$ and $L_{Afmax,5min}$ values for the rear façade.

Facade	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	15th highest $L_{Afmax,5min}$
Snell Street	54	50	62
Rear	50	46	55

8.0 Internal Ambient Noise Assessment

8.1 Overview

This section assesses external noise intrusion into residential rooms (living rooms and bedrooms) in order to determine preliminary acoustic performance specifications for the critical façade elements.

The design proposals allow for traditional brick and block external walls and we understand that open windows are being considered as a means of background ventilation.

The external walls are expected to comprise brick and block with a plasterboard lining internally. The overall sound reduction afforded by the walls is expected to be at least 50 dB $R_w + C_{tr}$, which will far surpass the sound reduction requirements for this site.

Our calculations follow BS 8233 procedures and consider bedroom and living room dimensions and window sizes as per the latest design drawings (at the time of writing), and the intent is to ensure internal noise levels do not exceed limits proposed in Section 5.7.

8.2 Assessment of Open Windows

As background ventilation via open windows is being considered for the site we have calculated the internal noise levels based on the incident noise levels set out in Section 7.0 and the typical level of attenuation provided by an open window.

In this regard, BS 8233:2014 states that: "If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB". Taking this reduction into account the calculated internal noise levels are set out below:

Facade	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	10th highest $L_{Afmax,5min}$
Snell Street	39	35	47
Rear	35	31	40

Based on the above, a reliance upon openable windows as a mean of background ventilation is unlikely to be suitable on the Snell street façade. However, openable windows as a means of background ventilation could be possible on rear facades.

Based on the above, suitable façade specifications for glazing and ventilators would be required in order to achieve suitable internal noise levels of the Snell Street façade. These are discussed in Section 8.3.

8.3 Preliminary Guidance for Windows & Ventilators

Preliminary sound insulation calculations have been undertaken in order to specify the minimum sound insulation performance of the façade elements to meet the Local Planning Authority internal noise criteria.

From the results of our assessment, the following minimum preliminary acoustic performance specifications are recommended for the windows and ventilators to habitable rooms to achieve the internal ambient noise criteria. Our assessment has considered the equivalent continuous level (L_{Aeq}) during all periods and L_{Afmax} events during night-time periods.

Façade Element	Preliminary Minimum Sound Reduction Specification	Example Configuration (For Guidance Only)
Window	27 dB $R_w + C_{tr}$	- 6 / 16 / 6 mm conventional double glazing
Ventilator	33 dB $D_{ne,w} + C_{tr}$	- 1 x 2,500 mm^2 standard trickle vent per habitable room with MEV

In summary, our calculations indicate that the internal ambient noise criteria should be achievable in all habitable rooms using appropriately specified façade elements.

The information presented above 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.

8.4 Ventilation & Overheating

Section 8.3 presents solutions to satisfy the proposed internal ambient noise limits within dwellings during normal ventilation conditions where windows are closed but ventilators/MVHR systems (to meet Part F minimum ventilation requirements) are operational.

Guidance relating to noise and overheating is set out in the IoA/ANC Acoustics Ventilation and Overheating – Design Guide (AVO guide) which provides an assessment procedure for assessing internal noise levels during overheating control with respect to the likely changes in occupant behaviour due to noise (ie annoyance during the day or sleep disturbance at night).

The AVO guide states that the Significant Observed Adverse Effect Level (SOAEL) which is the noise level above which significant adverse effects on health and quality of life occur is dependent on how frequently and for what duration the overheating condition occurs (ie how often the windows need to be open to mitigate overheating).

The table below provides the SOAEL for the daytime and night-time periods based on having to open widows ‘rarely’ or ‘most of the time’ to mitigate overheating.

Time Period	SOAEL Internal Noise Level (dB) With Windows Open to Mitigate Overheating	
	Open Rarely	Open Most of the time
Daytime	50 dB $L_{Aeq,16h}$	35 $L_{Aeq,16h}$
Night-time	42 dB $L_{Aeq,8h}$	30 $L_{Aeq,8h}$
	65 dB $L_{AFMax,T}$	45 dB $L_{AFMax,T}$

At this stage we understand a detailed overheating assessment has not been carried out, therefore, it is not possible to provide an assessment in line with the AVO guide.

Notwithstanding the above, with reference to the above noise levels and the calculated internal noise levels with windows open set out in Section 8.2 it can be seen that the internal noise levels could be up to 5 dB above the SOAEL for a scenario where the windows need to be open most of the time to mitigate overheating.

However, note 8 of Table 3-3 of the AVO Guide states that "*BS 8233 states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.*" Therefore, subject to a detailed overheating assessment, openable windows as a means of overheating control should be suitable for the site.

9.0 Outdoor Living Areas

The design incorporates private patios to the rear of each townhouse. Given the measured noise levels on site , it expected that noise levels throughout the amenity and garden spaces on the site will be below the maximum recommended criteria of 55 dB $L_{Aeq,16h}$.

10.0 Plant Noise

Based on the results of our noise survey, and the typical requirements of Manchester City Council, we would propose the following plant noise emission criteria. The following limits are to be achieved at 1m from residential windows, and are presented as facade noise limits.

Period	Plant Noise Limit (BS 4142 Rating Level)
Daytime (07:00-23:00)	38 dB
Night-time (23:00-07:00)	31 dB

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 Manchester City Council.

11.0 Conclusions

A detailed environmental noise survey and noise impact assessment has been undertaken in relation to the proposed residential development (when operational).

Our assessment indicates:-

- Acceptable internal noise levels could be achievable in rooms facing the rear façade through use of openable windows.
- Acceptable internal noise levels in all rooms could be achievable with appropriately specified acoustic double glazing and the use of acoustic ventilator openings.
- Openable windows can be provided for overheating and purge. Reliance should be properly specified following a detailed overheating assessment.
- Noise levels in external amenity areas are expected to achieve the desired criteria.

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 *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

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

L_{max} — L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

L_p — Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

L_w — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

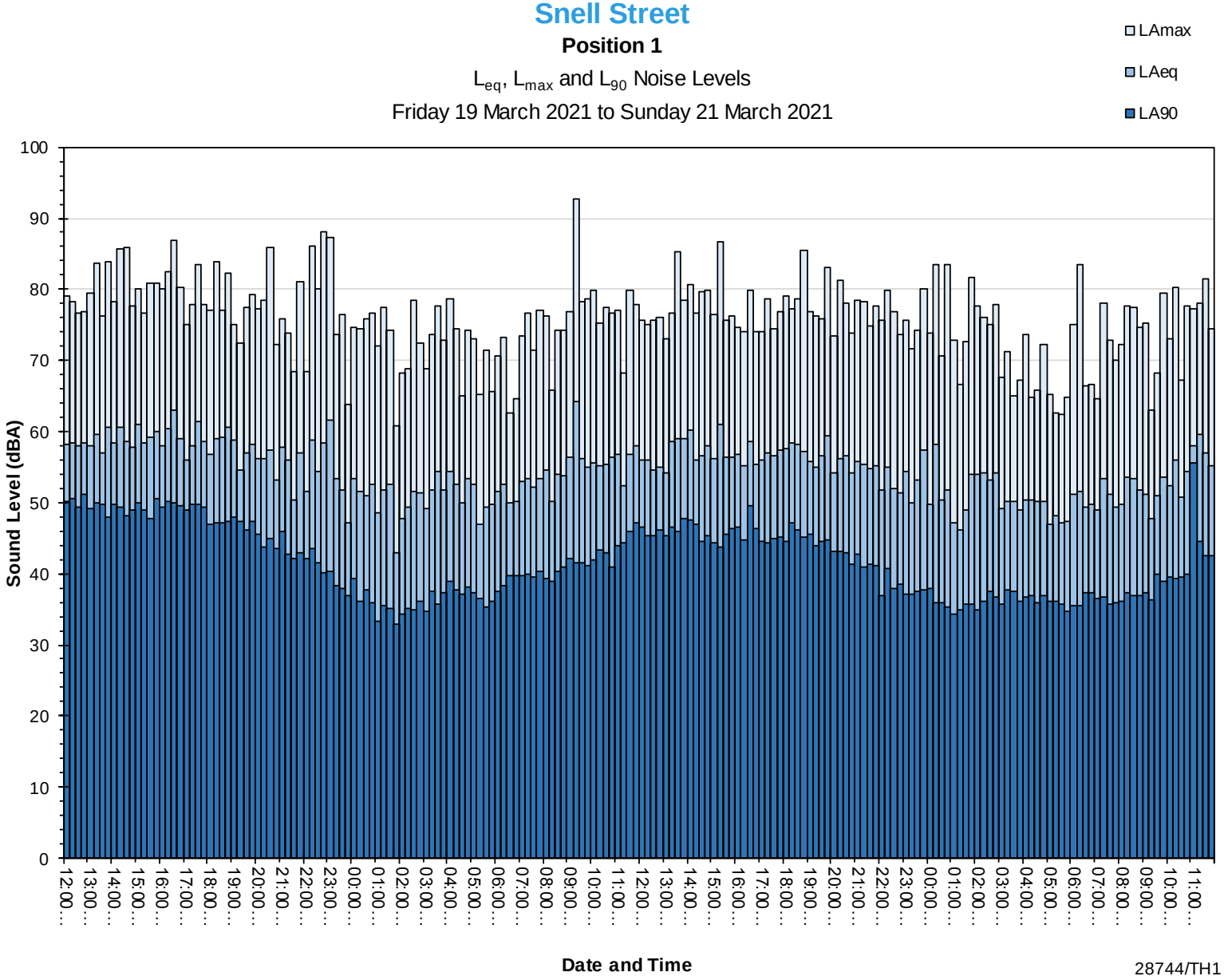
Environmental Noise Survey Result

Snell Street

Position 1

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

Friday 19 March 2021 to Sunday 21 March 2021



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