



303 Cheetham Hill Road

Acoustic Planning Report

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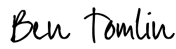
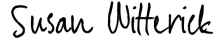
Client: Mayfair Estates

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Revision History

Revision	Date	Revision Details	Author	Checked
R01	15/07/2020	Original Issue	Matt Jones SMIOA	Joseph Tony BSc MIOA
R01A	29/09/2020	Updated to include rush hour noise data	DocuSigned by:  2DD2C00AF12B454... Ben Tomlin BSc MIOA	DocuSigned by:  3E69257DCFC14C6... Susan Witterick BSc MIOA

Introduction

dBx Acoustics Ltd has been appointed by Mayfair Estates to carry out a noise survey and noise impact assessment for the proposed residential development at 303 Cheetham Hill Road, Salford, M8 0SN.

The development comprises a single 4-bedroom house, as shown in Figure 2, below.

This report updates the previous report to include additional noise survey data during a rush hour period on 19th September 2020, as requested by Manchester City Council.

A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

Basis of Noise Assessment

The principal aims of the assessment are summarised below:

- Assess the suitability of the site for residential accommodation;
- Control noise breakout from building services and any noise generating uses associated with the proposed development to nearby sensitive receptors.

The noise impact assessment is based on the following:

- BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*';
- World Health Organisation (2000) '*Guidelines for Community Noise*'; and
- BS 4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*'.
- Manchester City Council – Planning & Noise Technical Guidance (December 2015);

Manchester City Council: '*Planning & Noise Technical Guidance*' (December 2015)

This document sets out Manchester City Council's requirements with regard to current guidance and policy, with the aspiration that new developments achieve the highest standards without compromising the health and wellbeing of residents. The guidance refers to the WHO Guidelines for Community Noise 1999, BS 8233:2014, BS 4142:2014, NPPF and NPSE as described below.

MCC has adopted the following internal noise limits for residential properties:

- Bedrooms (night time 23:00-07:00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB L_{Amax} more than 15 times);
- Living Rooms (daytime – 07:00-23:00) 35 dB $L_{Aeq,16h}$; and
- Gardens and terraces (daytime) 55 dB L_{Aeq} .

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 5 dB $L_{Ar,Tr}$ below the typical background L_{A90} level at the nearest noise sensitive location.

Noise Policy Statement for England (NPSE)

NPPF affirms that National Policy Statements form part of the overall framework of national planning policy, and should be a material consideration in decisions on planning applications. The Noise Policy Statement for England came into force in 2010 and states:

This Noise Policy Statement for England (NPSE) should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. The NPSE does not apply to noise in the workplace (occupational noise).

Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy 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; and*
- *where possible, contribute to the improvement of health and quality of life.*

The NPPF noise aims widely reflect those in NPSE. The NPSE does however include some context within the explanatory note to assessing noise impact and uses established concepts from toxicology currently being applied to noise impacts, these include:

- **NOEL** – *No Observed Effect Level*. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **SOAEL** – *Significant Observed Adverse Effect Level*. This is the level above which significant adverse effects on health and quality of life occur.
- **LOAEL** – *Lowest Observed Adverse Effect Level*. This is the level above which adverse effects on health and quality of life can be detected.
- However, it is clear that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

The table on the following page is extracted from the Government's Planning Practice Guidance on noise¹. It summarises the noise exposure hierarchy, based on the likely average response.

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

Table 1: Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No observed adverse effect	No specific measures required
		Lowest observed adverse effect level (LOAEL)	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude. E.g. turning up the volume of the television; speaking more loudly; where there is no alternative ventilation, having to close windows are some of the time because of the noise. Potential for some reportedly disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
		Significant observed adverse effect level (SOAEL)	
Noticeable and disruptive	The noise causes material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep the windows closed most of the time because of the noise. Potential for sleep disturbance result in difficulty in getting to sleep. Premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or psychological effects e.g. regular sleep deprivation/awakening; loss of appetite; significant, medically definable harm e.g. auditoria and non-auditory	Unacceptable adverse effect	Prevent

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Internal Noise Level Limits

BS 8233 gives guidance for noise levels within residential properties. It discusses appropriate criteria for reasonable rest and sleep conditions and provides noise levels which are considered to provide appropriate conditions in accordance with WHO guidelines. The guidance on limits from the standard is reproduced in Table 2, below;

Table 2 – Internal Ambient Noise Limits, BS8233

Activity	Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

It should be noted that these levels represent the average noise level over the 16-hour day or 8-hour night period. This potentially means that higher noise levels may be experienced internally over a shorter period of time (e.g. individual passing trams or vehicles). These equivalent noise levels over a period of time are the best representation of the average noise level and are generally the main focus when it comes to evaluating noise exposure.

Under the updates to BS 8233 in 2014, for both day and night time cases, a relaxation of up to 5 dB is considered to provide “reasonable internal conditions” where development is considered necessary or desirable.

To assess the maximum noise levels, the World Health Organisation (WHO) document “*Guidelines for Community Noise: 1999*” recommends that maximum noise levels ($dB L_{Amax,F}$) do not exceed $45dB L_{Amax,F}$ more than 10-15 times a night.

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating is determined and compared with the existing local Background Sound Level.

The Rating Level ($dB L_{Ar,T}$) is evaluated from the Specific Noise Level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.

The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

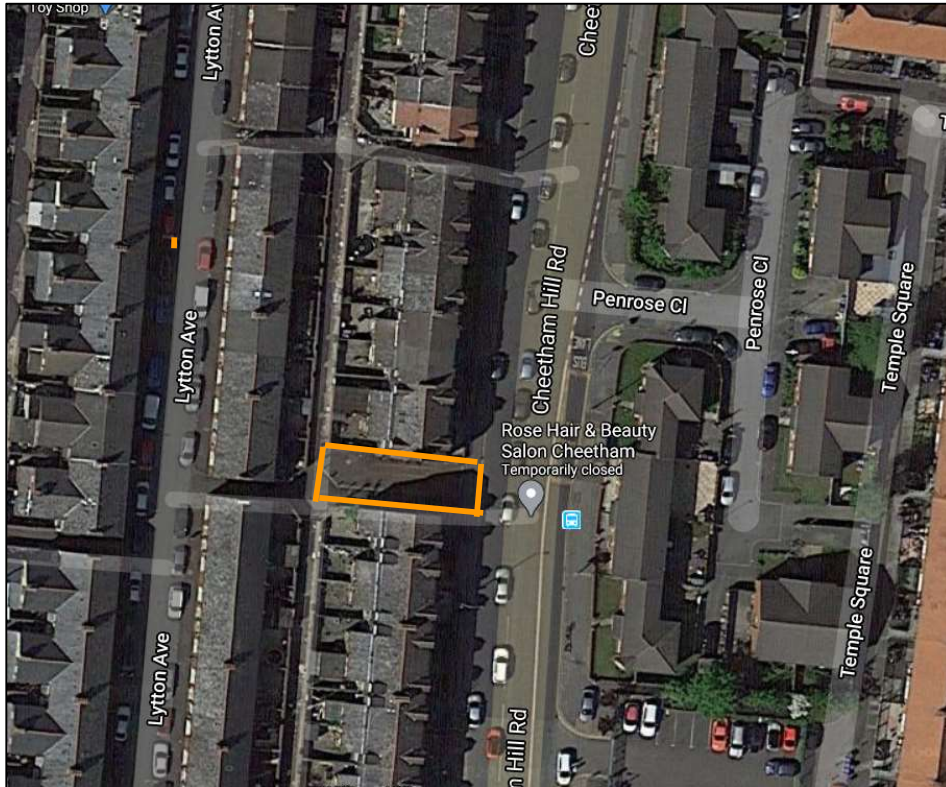
- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Site Description

Site Description

The proposed site is located at 303 Cheetham Hill Road, M8 0SN as outlined in Figure 1, below. The site is currently cleared awaiting development.

Figure 1 – Site Location Plan

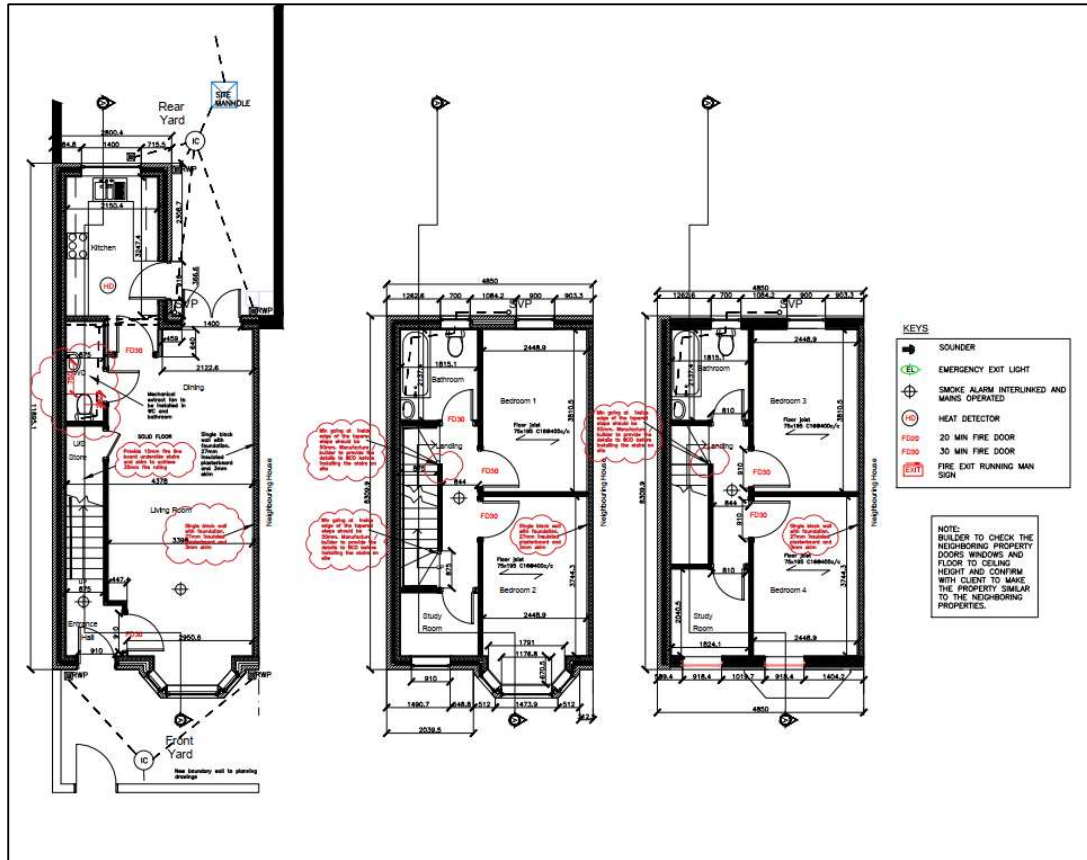


The site is within a heavily residential area adjacent to the A665 Cheetham Hill Road, which is a major route into Manchester City Centre. The proposed development will be at the end of an existing terrace of housing.

Proposed Development

The proposed development comprises a new build 4-bedroom house, as shown in Figure 2, below.

Figure 2 – Proposed GA Plans



Noise Sources

The dominant noise source at this site is road traffic on Cheetham Hill Road, with contributions from traffic on the surrounding road network.

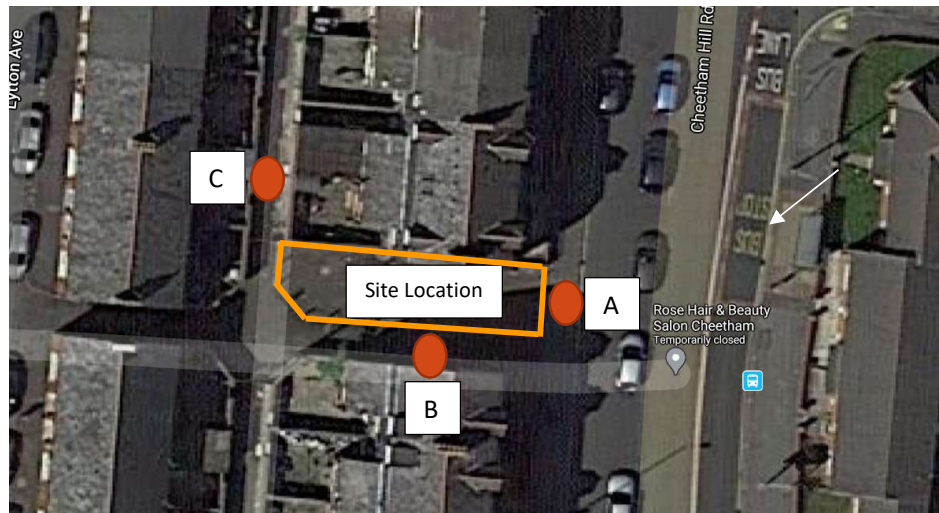
With regards to any proposed external plant, the nearest noise sensitive receptors can be considered as the neighbouring properties, 301 and 305 Cheetham Hill Road, and housing on Lytton Avenue to the rear.

Environmental Noise Survey

Methodology

To assess the noise environment at the site, attended noise surveys were carried out on Friday 26 June 2020 (daytime), and Friday 3 July 2020 (night-time). Additional measurements were taken during the rush hour period on Friday September 19th 2020. The measurement locations are shown in Figure 3, below.

Figure 3 – Site Location Showing Measurement Locations



Location A was at the site boundary on Cheetham Hill Road; 2.5m from the carriageway and 2.15m from the proposed façade.

Location B was on the footpath on the site's southern boundary, approximately 10m from the carriageway of Cheetham Hill Road.

Location C was chosen to determine the noise levels at the rear of the proposed development and representing the nearest noise sensitive receptors on Lytton Ave, and so a location on the footpath to the west of the site, screened from the road traffic noise on Cheetham Hill Road was chosen. This location was midway along the western façade of 305 Cheetham Hill Road.

The daytime measurements were carried out generally in accordance with the shortened measurement procedure detailed in the Calculation of Road Traffic Noise (CRTN) document (Department of Transport (Welsh Office), 1988).

Night-time measurements were carried out between 05:00 and 07:00h, representative of the noisiest period at night. Although night-time noise levels will reduce further in the period 23:00-05:00h, the measured levels have been considered representative of the entire 8-hour period, in order to provide a robust, worst-case assessment.

Weather Conditions

Weather conditions during the measurement periods were generally cloudy and dry, although brief periods of drizzle occurred between measurement periods. There was no standing water, and this was not considered to have affected the measured noise levels. It was dry during all measurement periods. Wind speeds were within suitable parameters for the measurement of environmental noise (i.e. generally under 5 ms⁻¹). All microphones were protected with a windshield for the duration of the survey.

Equipment

The equipment used during the environmental noise survey is detailed in Table 3, below.

Table 3 – Equipment used in the environmental noise survey

Equipment	Manufacturer & Part No.	Serial Number
Sound Level Meter	Casella C633C	3921025
Pre-amplifier	CEL 495	001773
Microphone	CEL 251	000847
Calibrator	CEL 120/1	2045151

The sound level meter was calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Environmental Noise Survey Results

Daytime Noise Levels

A summary of the daytime noise levels measured are presented in Table 4, below. Measurements were taken over 15-minute periods, in 3 consecutive hours between 10:00 and 17:00h, generally in accordance with the shortened measurement procedure in CRTN.

Table 4: Summary of daytime measured noise levels

Location	Start Time (hh:mm)	End Time (hh:mm)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Amax,F} (dB)
A	14:16	14:31	72	76	63	89
	15:03	15:61	73	75	59	88
	15:16	15:31	74	77	63	86
	16:03	16:16	72	75	64	88
	16:16	16:31	73	77	63	85
B	14:31	14:46	69	68	55	84
	15:31	15:46	67	69	57	80
C	14:47	15:02	60	62	54	74
	15:47	16:02	59	61	51	82*(73)

*The maximum noise events at these times were sirens and so are considered atypical; the typical maximum noise level is presented in brackets.

All measurements were taken in free-field conditions.

Based on the CRTN methodology, the data shown in Table 4, above, can be used to determine the 16-hour daytime ambient noise level at measurement location A.

The logarithmic average of the dBL_{A10} values provides the 3-hour average, dBL_{A10,3hour}. This is converted to the 18-hour dBL_{A10,18hour} value by subtracting 1dB. This is then converted to the 16-hour ambient noise level, dBL_{Aeq,16hour}, by subtracting a further 2dB. This resulted in a daytime ambient noise level of 73 dB L_{Aeq,16hr} at location A.

Rush Hour Measurements

As requested by MCC, additional noise level measurements were undertaken during a rush hour period on Friday 18 September 2020, between 16:53h and 18:08h.

Table 5: Summary of rush hour measured noise levels

Location	Start Time (hh:mm)	End Time (hh:mm)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Amax,F} (dB)
A	17:05	17:20	75	77	65	98
	17:36	17:51	74	78	65	85
	18:09	18:24	74	77	63	95
B	17:53	18:08	65	69	58	78
C	17:21	17:36	62	65	56	77

As can be seen, the ambient noise levels in the rush hour period were marginally (up to 2dB) louder than the 16-hour average levels determined using the CRTN methodology.

The increase in noise levels at rush hour is unusual, based on a number of previous measurements made in Manchester. Rush hour noise levels are usually the same, or lower, than the daytime average, as vehicles typically move more slowly at this time. It is believed that the noise levels measured on this occasion were slightly higher as a result of fewer vehicles travelling, possibly due to COVID19 restrictions.

It is not possible to determine the 16-hour daytime average, which forms the basis of MCC's noise criterion, from 15-minute measurements. Designing the glazing to mitigate the worst case 15-minute period in a day is onerous, and does not correlate to the MCC criterion.

This was discussed with Graeme Souter, Environmental Protection officer at MCC, who agreed that the 1-2dB increase in noise levels would unlikely to be noticeable, and is likely to be atypical due to COVID19 restrictions, and hence the usual 16 hour daytime noise levels confirmed above can be used to determine the mitigation measures required to achieve the Council's required 16 hour daytime criteria.

Night-Time Noise Levels

A summary of the night-time noise levels measured are presented in Table 6, below. The measurements were carried out between 05:00 and 07:00h, representative of the noisiest period at night. Although night-time noise levels will reduce further in the period 23:00-05:00h, these levels have been considered representative of the entire 8-hour period, in order to provide a robust, worst-case assessment.

Table 6: Summary of night-time measured noise levels

Location	Start Time (hh:mm)	End Time (hh:mm)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Amax,F} (dB)
A	05:00	05:15	67	71	45	84
	05:45	06:00	69	73	49	84
	06:30	06:45	72	76	58	84
	06:45	07:00	71	76	54	87
B	05:15	05:30	61	66	44	76
	06:00	06:15	62	67	46	76
C	05:30	05:30	55	60	44	71
	06:15	06:30	56	61	46	68

Again, all measurements were taken in free-field conditions.

To derive the noise levels used in the break-in assessment, the measured levels have been corrected for distance and angle of view to the measurement locations as appropriate. The resultant noise levels used in the break-in assessment are presented in Figure 4 and Table 7, below;

Figure 4 – Proposed layout with reference facades

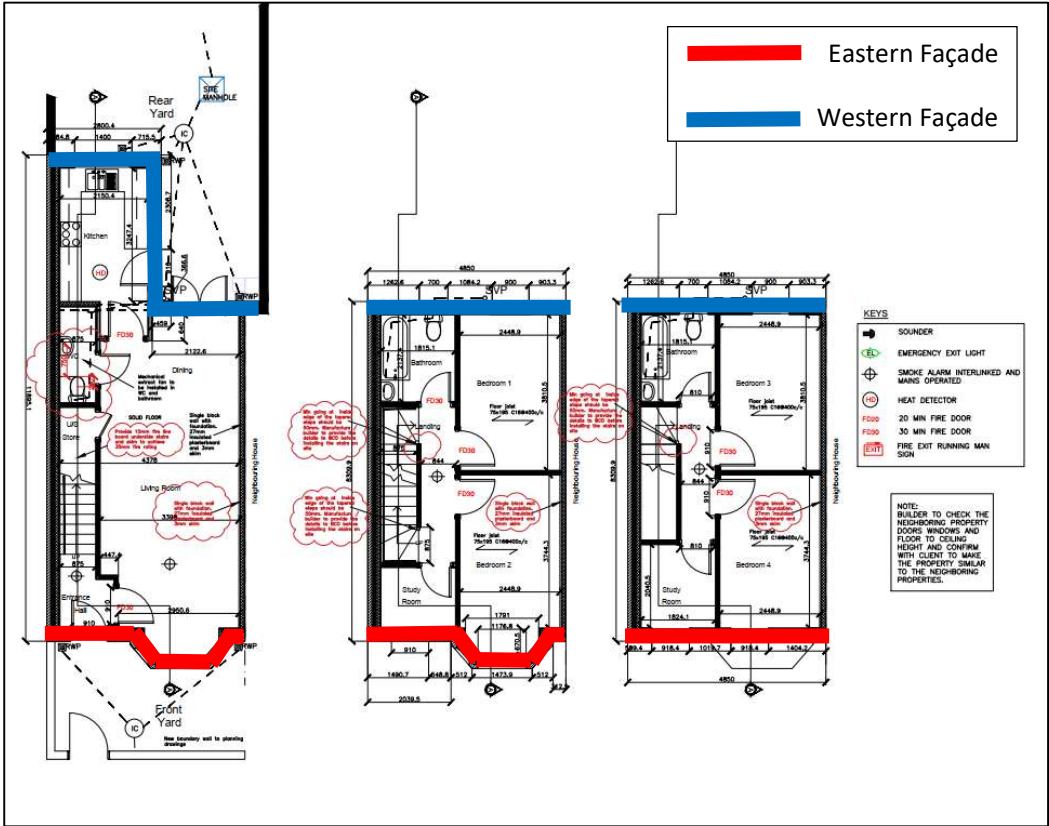


Table 7 –Noise Levels per Façade

Façade	Day, dBL _{Aeq} ,16hour	Night dBL _{Aeq} ,8hour	Night, dBL _{Amax} ,F
Eastern (Cheetham Hill Road)	73	70	84
Western (rear of building)	62	56	71

Building Envelope Sound Insulation

Internal Ambient Noise Criteria

The internal noise criteria which have been adopted for the proposed development using BS 8233:2014 and WHO guidelines are outlined in Table 8, below. Achieving these limits will also ensure compliance with Manchester City Council's requirements.

Table 8 – Internal ambient noise criteria

Daytime (07:00 – 23:00 hrs)	Night-time (23:00– 07:00 hrs)	
$L_{Aeq, 16h}$	$L_{Aeq, 8h}$	L_{Amax}
35 dB	30 dB	45 dB ¹
¹ It is generally agreed that this limit would not apply to atypical night-time maximum events. The previous version of BS 8233:1999 stated that, "...individual noise events should not normally exceed 45 dB L_{Amax} ."		

External Noise Break-In Assessment

Based on a reduction in external noise levels to internal noise levels of 15dB for a partially opened window (based on WHO guidance), allowable external noise levels are therefore 50dB $L_{Aeq,T}$ outside living rooms in the day, and 45dB $L_{Aeq,T}$ and 60dB $L_{Amax,F}$ outside bedrooms at night.

With reference to Table 6, above, it can be seen that *the required internal ambient noise levels cannot be achieved using open windows for natural ventilation*. The required internal ambient noise levels can therefore only be achieved with closed windows, and ventilation will need to be provided via alternative means.

Based on the predicted noise levels on each elevation with windows, the requirements for the glazing and ventilators required to achieve the internal ambient and maximum noise level limits have been calculated, as detailed in Table 9 below.

Table 9 – Glazing and Ventilator Sound Insulation Requirements

Façade/Room	Glazing Sound Insulation Performance, $\text{dBR}_w (+ C_{tr})$	Example Glazing Construction, mm	Ventilator Sound Insulation Performance, $\text{dBD}_{n,e,w} (+ C_{tr})$
Cheetham Hill Road /Living Room&Study	36 (39)	10/20/4	44 (40)
Cheetham Hill Road/Bedrooms	47 (40)	16.8/16/16.8 Insulight	46 (41)
Rear/Bedrooms	30 (26)	4/20/4	33 (33)

TC = Thermal Cavity

The minimum required sound insulation performances are high for rooms with windows on the Cheetham Hill Road façade. For the bedrooms, wide airspace secondary glazing could be considered as a solution to reduce internal ambient noise levels.

Considering the external living room door on the rear façade, the minimum sound insulation requirement for this aperture is **30 dB R_w and 26 dB $R_w + C_{tr}$** . The door should be well sealed when closed and the frame should not reduce the performance of the door.

The glazing configuration shown in Table 8 is a suggestion only, and alternative configurations may be acoustically suitable.

Windows can be openable, however, must be well sealed when closed. The frames should not downgrade the sound insulation performance of the glazing.

Building Services Noise Emissions

Manchester City Council require a typical plant noise limit of a rating level 10dB below the background noise levels during the period of operation. The rating level is defined in BS4142, and described above. On this basis, plant noise should be controlled to a rating level of $41\text{dB}_{L_{Ar,Tr}}$ in the daytime, and $34\text{dB}_{L_{Ar,Tr}}$ at night at the surrounding residential properties.

Conclusions

dBx Acoustics Ltd has been appointed by Mayfair Estates to carry out a noise survey and noise impact assessment for the proposed residential development on Cheetham Hill Road, Manchester. The proposed development comprises a new build house, as shown in Figure 2, above.

To assess the noise environment at the site, attended noise surveys were carried on Friday 26 June 2020 (daytime), and Friday 3 July 2020 (night-time). Rush hour spot check measurements were also undertaken on Friday 18 September 2020.

Using the measured noise levels, calculations have been undertaken to determine the requirements for glazing and the ventilators to achieve internal noise level limits in compliance with BS8233:2014.

It has been determined that natural ventilation by means of openable windows **will not be** acoustically appropriate for this site; however, windows may be openable at residents' discretion for purge ventilation. Minimum sound insulation requirements for glazing and ventilators have been provided.

Plant noise limits have been set in line with Manchester City Council requirements, and such that plant noise at the nearest noise sensitive properties would not be expected to affect residential amenity.

On this basis, noise should not therefore be a limiting factor in any planning application.

Appendix A – Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.