



AIY LIMITED

283 WHITE MOSS ROAD, CHARLESTOWN

NOISE ASSESSMENT FOR PLANNING PURPOSES

11 July 2022

AEC REPORT: P4550/R01a/RDC

Acoustic & Engineering Consultants Limited

Suite 316, 3rd Floor, Broadstone Mill, Broadstone Road, Stockport, SK5 7DL

Telephone 0161 449 5900 mail@aecltd.co.uk www.aecltd.co.uk

CONTENTS

	Page
1.0 INTRODUCTION	3
2.0 BACKGROUND AND SITE DESCRIPTION	3
3.0 NOISE MEASUREMENTS	4
4.0 BASIS OF ASSESSMENT	6
5.0 ASSESSMENT OF PROPOSED DEVELOPMENT	10
6.0 SUMMARY AND CONCLUSIONS	15
Figure A1 – Proposed and Existing Site Layout	3
Figure B1 – Site Location Plan Identifying Monitoring Locations	18
APPENDIX A – Acoustic Terminology in Brief	16
APPENDIX B – Noise Survey Details	18

DOCUMENT STATUS

Prepared by:  R D Chamberlain BSc (Hons) MIOA(D)

Revision	Date	Document Details	Author	Checked By
-	16/02/22	Original Document	RDC	PSK
a	11/07/22	Site reference changes	RDC	-

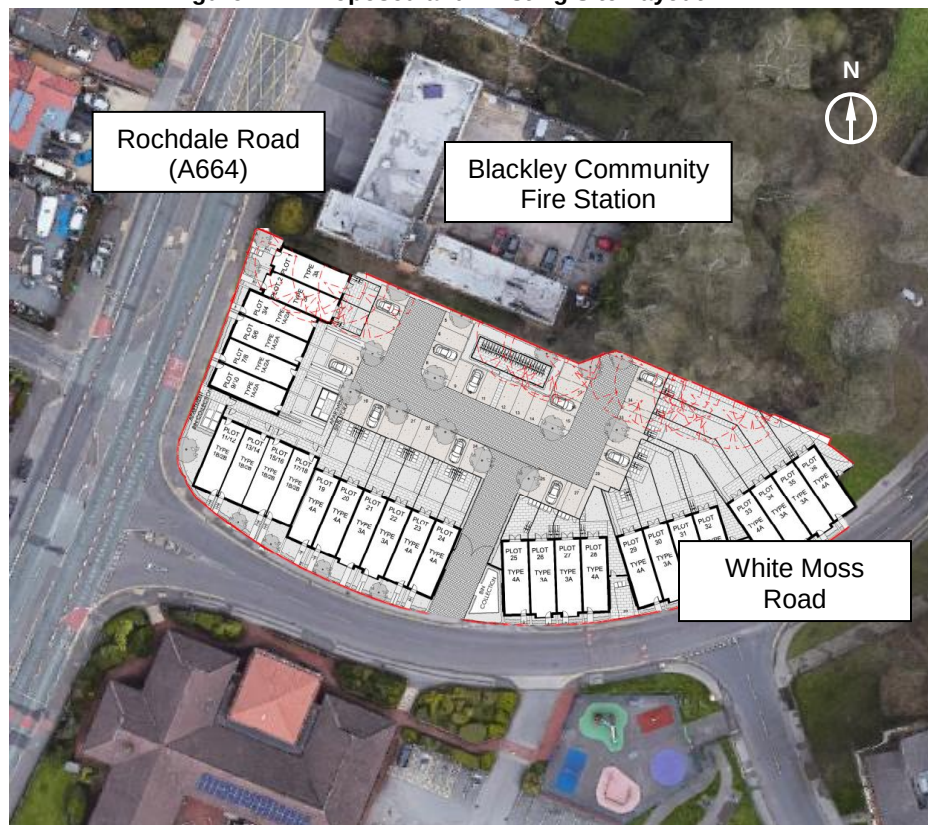
1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by AIY Limited to undertake a noise assessment in relation to the proposed housing development at 283 White Moss Road, Charlestown.
- 1.2 This report details the baseline noise levels measured on the development site, presents the assessment criteria and discusses the implications on the building design, to achieve acceptable internal noise levels as required by the Local Authority.
- 1.3 Acoustic terminology is discussed in brief in Appendix A.

2.0 BACKGROUND AND SITE DESCRIPTION

- 2.1 The proposed development will incorporate 36 residential properties, comprised of 20 houses, 8 duplexes and 8 apartments, all with associated parking and gardens, located at 283 White Moss Road, Charlestown. A site location plan and proposed site layout is presented on Figures A1, below.

Figure A1 – Proposed and Existing Site Layout



- 2.2 The site is currently occupied by the Victoria Avenue East Ex Service Men's Club; however, that will be demolished as part of the works.
- 2.3 The development is bound by Rochdale Road (A664) to the west, White Moss Road to the east and south, and the Blackley Community Fire Station to the north.
- 2.4 Rochdale Road is a busy 'A' road that links Manchester City centre to the south, and the M60 to the north. White Moss Road is a street providing access to other residential housing in the area.
- 2.5 Based on conversations with the Fire Station, it was determined that the fire station only had a single fire engine. The sirens used by the fire engine are only turned on immediately when leaving the station during the daytime. At night-time, they remain off until they are further away from the station.
- 2.6 Within the area to the rear of the fire station, there is a car park and also space for the fire station to be washed once a day using a Jetwash. In this area, drills are undertaken that include practicing the use of water devices. It is understood that these are only undertaken during daytime hours.
- 2.7 As shown on Figure 2.1, all of the garden areas serving the development will be located to the rear of the houses which face onto Rochdale Road and White Moss Road. Based on the provided drawings it is understood that a 2m high close boarded timber fence is to be provided to all garden areas.
- 2.8 Vehicle access to the site will be gained off White Moss Road and this will lead to a car park area for the residents. In addition, there will also be pedestrian access to the car park area off Rochdale Road.
- 2.9 Following conversations with the architect, it is understood that the development will incorporate a MVHR ventilation system. Further details of this are detailed in Sections 4.0 and 5.0.

3.0 NOISE MEASUREMENTS

- 3.1 An attended daytime noise level survey was undertaken by AEC on Wednesday 02 February 2022 between approximately 1430 and 1750h. A night-time noise level survey was undertaken between approximately 2300h on Wednesday 02 February 2022 and 0030h on Thursday 03 February 2022.
- 3.2 Measurements were undertaken at three locations identified as A to C on the attached Figure B1.
- 3.3 All measurements were undertaken under free-field conditions in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'. A full measurement procedure is presented in Appendix B, Table B.1, and the measured data is presented in Tables B2 and B3.

- 3.4 The noise climate at all locations during both the daytime and night-time noise surveys was dominated by road traffic on Rochdale Road and in the area. Further details of the noise levels measured are presented in Table 3.1, below.
- 3.5 While the site is in close proximity to the fire station, no noise sources from their premises was audible during either the daytime or night-time noise level survey. Therefore, the determination of noise levels from sources associated with the fire station has been based on previously measured noise levels held on file by AEC and is discussed further below.

Road Traffic Noise Levels

- 3.6 Location A, B and C were all chosen to measure noise levels from the road traffic on the surrounding roads. Whilst Locations B and C were both chosen to measure noise levels from White Moss Road, Location C was positioned behind the Victoria Avenue East Ex Service Men's Club so that road traffic from Rochdale Road would be screened from the measurements.
- 3.7 A summary of the measured noise levels affecting the site during both the daytime and night-time periods is presented in Table 3.1, below.

Table 3.1 – Summary of Measured Noise Levels

Measurement Location	Period	Noise Levels, dB			
		Ambient, L _{Aeq,T}	L _{A10,T}	Background, L _{A90,T}	Maximum, L _{AFmax}
A (Rochdale Road)	Daytime	71	74	65	-
	Night-time	69	59	58	83
B (White Moss Road)	Daytime	63	66	55	-
	Night-time	59	45	45	82
C (White Moss Road)	Daytime	63	67	49	-

Fire Station Noise Levels

- 3.8 As stated in Section 2, the only activities associated with the fire station which could potentially impact the proposed development include; the use of a jet wash, practice drills using high pressure hoses, the public address system and the fire engine siren. Based on AEC's understanding following conversations with the fire station, these activities were only confirmed to take place during the daytime.
- 3.9 During our visit, we were not permitted to measure the noise levels associated with the above activities, however, based on previous surveys carried out by AEC of fire stations, the loudest noise sources associated with fire stations were measured and these are presented in Table 3.2, below.

- 3.10 It should be noted that noise from the jet wash will be used for assessing both the cleaning of the fire engine and the practice drills that are carried out.

Table 3.2 – Noise Levels from Fire Station Activities

Source	Sound Exposure Level (SEL), dBL _{AE} @ 20m
Public Address System	69
Alarm (with rear door open)	79
Fire Engine Siren (with rear door open)	88
Jetwash	87

- 3.11 As stated above, AEC understand that the siren only operates during the daytime period when the engine is leaving the station. As the siren would only be audible for a few seconds during the daytime as the engine drives off noise from this source has not been considered further.

4.0 BASIS OF ASSESSMENT

Determining of External Noise Levels

- 4.1 BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS8233) describes how noise levels can be determined and assessed from different sources in chapters 6.2 to 6.7.
- 4.2 In relation to road traffic noise, BS8233 states that the noise from road traffic can be determined using the Department of Transport Welsh Office document '*Calculation of Road Traffic Noise*' issued in 1988 (CRTN). CRTN presents the shortened measurement procedure which can be used to convert the arithmetic mean of the measured $L_{A10,T}$ levels (measured over 3 consecutive hours during the period 1000h to 1700h) into an 18-hour L_{A10} level by subtracting 1dB.
- 4.3 BS8233 suggests that the conversion of the $L_{A10,18h}$ to $L_{Aeq,16h}$ can be achieved by the (approximate) relationship of $L_{Aeq,16h} = L_{A10,18h} - 2dB$. Therefore, the daytime ambient noise level can be determined by subtracting 3dB from the arithmetic mean of the $L_{A10,T}$ levels measured on-site over 3 consecutive hours (between 1000 and 1700h).

National Planning Policy Framework

- 4.4 Current national planning policies are set out in the National Planning Policy Framework (NPPF) published by the Department for Communities and Local Government in March 2012 and revised in February 2019.
- 4.5 The planning policies which relate specifically to noise, were updated in July 2021, and are presented in paragraphs 174, 185 and 187 which are reproduced below:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- (e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*

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

- (a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

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

- 4.6 Further to the above, the Governments ‘*Planning Practice Guidance*’ (PPG) published on 6 March 2014 and updated on 22 July 2019 states:

“Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced). When preparing plans, or taking decisions about new development, there may also be opportunities to make improvements to the acoustic environment. Good acoustic design needs to be considered early in the planning process to

ensure that the most appropriate and cost-effective solutions are identified from the outset.”

- 4.7 In addition, the guidance indicates that, whilst noise can override other planning concerns, it should not be considered in isolation from the economic, social and other environmental dimensions of any proposed development.

Internal Noise Level Limits

- 4.8 Manchester City Council (MCC) has outlined their requirements for noise assessments to accompany planning applications in *‘Planning & Noise – Technical Guidance’* (2015) (PNTG).
- 4.9 Section 3.6.1.1 of this document states *“Manchester City Council has adopted the following internal limits for residential properties:*
- *Bedroom (night-time – 23.00 – 07.00) 30dBL_{Aeq} (individual noise events should not normally exceed 45dBL_{Amax, F} by more than 15 times);*
 - *Living Rooms (daytime – 07.00 – 23.00) 35dBL_{Aeq}.”*
- 4.10 These levels are based on guidance presented in BS8233 and The Association of Noise Consultants (ANC) document Professional Practice Guidance (ProPG) on Planning and Noise *‘New Residential Development’* (2017).

Ventilation and Control of Overheating

- 4.11 The ventilation specifications presented in BS8233 and ProPG are based on achieving the requirements of Approved Document F (ADF) *‘Ventilation’* (2010) of the Building Regulations only.
- 4.12 ADF requires that continuous whole dwelling (background) ventilation be provided to limit the accumulation of moisture and other pollutants originating within a building. This is typically achieved either via a partially opened window, or by a whole building ventilation system through the provision of trickle ventilators or mechanical ventilators. ADF states that *‘The ventilation provisions will not necessarily meet cooling needs’*.
- 4.13 ProPG notes that the attenuation of external to internal noise levels provided by a window partially open for whole dwelling ventilation is no more than 15dB.
- 4.14 Therefore, for habitable rooms to have whole dwelling ventilation via a partially open window, external noise levels outside habitable rooms should not exceed 50dBL_{Aeq,16h} during the daytime, and 45dBL_{Aeq,8h} and 60dBL_{Amax,F} at night.
- 4.15 In relation to purge ventilation, ProPG suggests that as this should only occur occasionally (e.g., to remove odour from painting and decorating or from burnt food), the internal desired noise levels are not generally applicable. Therefore, internal noise levels due to windows being opened for purge ventilation has not been discussed further.
- 4.16 To provide guidance on the relationship between internal noise levels and the control of overheating in residential properties, the ANC issued *‘Acoustic ventilation and Overheating*

– *Residential Design Guide* (AVO) in January 2020. It is important to note that this is a design guide only and not a statutory document and the Local Authority may have their own requirements.

- 4.17 At this stage AEC are unaware of any specific Local Authority requirements in relation to acceptable internal noise level limits in habitable rooms with windows open to aid with the control of overheating. Therefore, this indicative assessment is based on the guidance presented in AVO.
- 4.18 Table 3.3 of AVO presents guidance for allowable noise from transportation sources whilst windows are open for the control of overheating. With reference to this document AEC would propose that windows can be utilised in the control of overheating provided that the resultant internal ambient noise levels are below approximately $50\text{dBL}_{\text{Aeq}, 16\text{h}}$ during the daytime, and $42\text{dBL}_{\text{Aeq}, 8\text{h}}$ and $65\text{dBL}_{\text{Amax}, \text{F}}$ during the night-time.
- 4.19 These internal noise levels are the upper end of the medium risk category for adverse effects. Where these internal noise levels would be exceeded, AVO states that “noise causes a material change in behaviour (e.g., having to keep windows closed most of the time)”. In this situation, AEC would suggest alternative means for the control of overheating are considered, which do not rely on open windows.
- 4.20 AVO states that where transportation is the main source of noise, “it is assumed that a partially open window will provide an outside-to-inside level difference of 13dB and is considered representative of typical domestic rooms with simple façade openings of around 2% of the floor area”.
- 4.21 Considering the above, it is considered acceptable to control summertime heating via opening windows where external free-field noise levels are no greater than those presented in the following Table 4.1. This is based on simple façade openings to around 2% of the floor area.

Table 4.1 – External Free-Field Noise Level Limits for the Control of Overheating via Openable Windows

Activity	Location	Noise Level Limit, dB		
		Daytime 0700 – 2300h	Night-Time 2300 – 0700h	
		$L_{\text{Aeq}, 16\text{h}}$	$L_{\text{Aeq}, 8\text{h}}$	$L_{\text{Amax}, \text{F}}$
Resting	Living Room	63	-	-
Dining	Dining Room/Area	63	-	-
Sleeping (daytime resting)	Bedroom	63	55	78

- 4.22 The limits presented in Table 3.3 are subject to agreement with the Local Authority and may be subject to change.
- 4.23 In relation to noise from MEV systems, AVO provides desirable internal ambient noise level limits of no greater than $30\text{dBL}_{\text{Aeq}, \text{T}}$ in living rooms and bedrooms.

Atmospheric Plant Noise Emissions

- 4.24 Based on guidance presented in MCC's document PNTG, the following is stated in relation to noise level limits for industrial sources at noise sensitive premises:

"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."

Indoor Ambient Noise Level Limits from Mechanical Services

- 4.25 Based on AEC's experience, it would be appropriate to control noise levels from the MVHR system to NR25 (+/-5dB) and NR30 (+/-5dB) within bedrooms and living / dining rooms, respectively, however.

External Noise Level Limits

- 4.26 For traditional external areas that are used as an amenity space, such as gardens and patios, BS8223 states that it is desirable that ambient noise levels should be not exceed 50dBL_{Aeq,16h} during the daytime, with an upper limit of 55dBL_{Aeq,16h}.
- 4.27 Furthermore, PNTG provides a limit for 50dBL_{Aeq,16h} to stop '*moderate annoyance*', and an upper limit of 55dBL_{Aeq,16h} for '*serious annoyance*'.
- 4.28 These noise level limits have been used as the design aim for this assessment.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

- 5.1 As identified above, there are two noise sources in the area that will affect the proposed development and these are road traffic on the surrounding roads and activities associated with the Blackley Community Fire Station. Noise from these sources is discussed below.

Road Traffic

- 5.2 As identified in Section 3.0, the daytime and night ambient and maximum noise levels affecting the proposed development are predominantly affected by road traffic on Rochdale Road and White Moss Road.
- 5.3 The 16-hour daytime ambient noise levels affecting the proposed elevations facing Manchester Road, have been calculated using the CRTN shortened measurement procedure as described above (i.e. dBL_{Aeq,16h} = dBL_{A10, 3h} -3dB)
- 5.4 The determined free-field daytime and night-time ambient and maximum noise levels due to road traffic are presented on Figure 5.1 and in Table 5.2, below. These have been based on appropriate distance attenuation and screening attenuation, where applicable.

Fire Station

- 5.5 As stated in Section 2.0, other than the fire engine departing from or arriving back at the station, there are no noise sources associated with the fire station during the night-time period.
- 5.6 The daytime ambient noise level in the gardens of the properties has been calculated using Equation 1, below, the SELs presented in Table 3.2 and the assumption that each activity will occur once during a worst-case 1-hour period. The calculated noise levels are presented in Table 5.1.
- 5.7 T

Equation 1

$$LA_{eq,1h} = SEL - 10 \log(t) + 10 \log(n) - 20 \log(r2/r1)$$

Where:

- SEL* = Sound Exposure Level or dBL_{AE}
t = Time in seconds, 3600s.
n = number of operations, 1.
r1 = distance to source
r2 = distance to receiver

Table 5.1 – Fire Station Calculation

Noise Source	dBL _{AE} @ 20m	Time Correction, dB	Number of Operations, dB	Distance Attenuation, dB	Total, dB(A) _{1h}
Public Address System	69	-36	0	+2.5	36
Alarm	79	-36	0	+2.5	46
Jet Wash (Cleaning)	87	-36	0	+2.5	54
Jet Wash (Drill)	87	-36	0	+2.5	54
					57

- 5.8 It should also be noted that the above does not consider screening attenuation from the fire station building itself or the proposed 2m high close boarded timber fences. Therefore, the resultant ambient noise level in the gardens of the properties in the development from this source are expected to be no greater than 50dBL_{Aeq,T} during the worst-case hour.

Determined Free-Field External Noise Levels

- 5.9 Based on the noise sources discussed above, the free-field daytime and night-time noise levels affecting each of the facades within the proposed development have been determined and these are presented on Figure 5.1, below and in Table 5.2, below.

Figure 5.1 – Determined Free-Field External Noise Levels

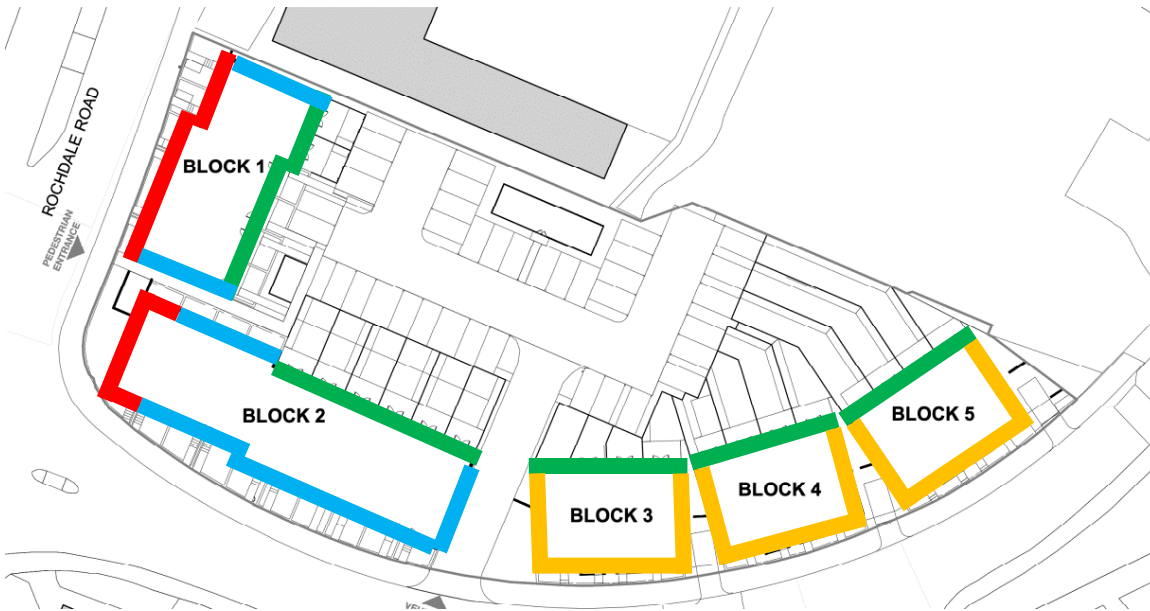


Table 5.2 – Determined Free-Field External Noise Levels

Colour on Figure 5.1	Noise Levels, dB		
	Daytime	Night-time	
	Ambient, $L_{Aeq,16h}$	Ambient, $L_{Aeq,8h}$	Maximum, $L_{Amax,F}$
Red	≤ 71	≤ 69	≤ 83
Blue	≤ 65	≤ 64	≤ 76
Orange	≤ 63	≤ 55	≤ 82
Green	≤ 50	≤ 50	≤ 65

Glazing and Ventilation Requirements

- 5.10 As previously stated, an MVHR system will be installed in all habitable rooms within the development. Therefore, the requirements for providing whole dwelling (background) ventilation to all rooms will be achieved with this system.
- 5.11 Therefore, the minimum sound insulation performances of the glazing to meet the required internal noise levels limits have been calculated based on the source noise levels and the glazing and room sizes that are shown on the provided drawings. The minimum sound insulation performances are presented in Table 5.3, below.
- 5.12 Please note that the same sound insulation performance is required for the daytime and night-time on the red and green elevations.

Table 5.3 – Outline Glazing Sound Insulation Performance Requirements for Habitable Rooms

Colour on Figure 5.1	Sound Insulation Performance	
	Daytime	Night-time
Red	43dBR _w / 37dBR _w + C _{tr}	
Blue / Orange	36dBR _w / 31dBR _w + C _{tr}	43dBR _w / 37dBR _w + C _{tr}
Green	32dBR _w / 26dBR _w + C _{tr}	

- 5.13 Example glazing build-ups to achieve the required sound insulation performances are presented in Table 5.3, below.
- 5.14 It should be noted that these are based on a desire to install triple glazed units at the site and the calculations have been based on the proposed glazing data for these units.
- 5.15 In any case, prior to any glazing being installed and especially if it differs from the below, octave band sound insulation performance data of the glazing build-ups selected must be verified by AEC or others. In addition, it is recommended that the glazing requirements are reviewed once the areas of glazing and rooms sizes has been confirmed.

Table 5.3 – Example Glazing Constructions

Sound Insulation Performance	Example Construction (Manufacturer = Futura Triple Glazed)
43dBR _w / 37dBR _w + C _{tr}	8.8mm Glass / 10mm Spacer / 6mm Glass / 10mm Spacer / 8.8mm Glass
36dBR _w / 31dBR _w + C _{tr}	6mm Glass / 14mm Spacer / 4mm Glass / 16mm Spacer / 4mm Glass
32dBR _w / 26dBR _w + C _{tr}	4mm Glass / 16mm Spacer / 4mm Glass / 16mm Spacer / 4mm Spacer

- 5.16 Please note that the potential for the window frames to downgrade the sound insulation performance of the glazing starts to become an issue where a performance in excess of 40dBR_w is specified.

Purge Ventilation

- 5.17 Windows can be openable for purge ventilation provided that they are effectively acoustically sealed when closed, and it is important that any frames and seals do not downgrade the sound insulation performance of the glazing.

Control of Overheating

- 5.18 If it is determined by others that there is a need to control overheating within the development, a comparison between the noise levels presented in Table 5.2 and those presented in Table 4.1, indicates that windows would need to be closed on the Red and Blue elevations. Habitable rooms on these elevations would the control of overheating

ventilation strategy to be achieved by alternative means. On the remaining elevations, the control of overheating ventilation can be achieved with openable windows.

- 5.19 This would need to be developed once the risk of overheating has been confirmed by others.

Other Facade Elements

- 5.20 To maintain the sound insulation performance of the external envelope the remainder of the façade construction should have a sound insulation performance of at least 10dB higher than the glazing. Therefore, the external walls and roof on the noisiest elevations would need achieve a sound insulation performance of at least around 53dBR_w.

External Noise Levels in Gardens

- 5.21 Based on the noise levels presented on Figure 5.1, all of the noise levels within the gardens will be below 50dBL_{Aeq, 16h}, and therefore, comply with the requirements of MCC.

External Noise Breakout - Mechanical Services

- 5.22 As previously stated, an MVHR system will be installed and therefore, there may be some mechanical services located externally.
- 5.23 Based on the measured on-site noise levels, the typical night-time background noise level is approximately 45dBL_{A90, T}.
- 5.24 Therefore, in order to comply with AEC's proposed criteria, the combined rating level from all external plant operating simultaneously should not exceed 40dBL_{Af, Tr} during the night-time period at the nearest noise sensitive receptor. AEC would need to be issued with any plant data prior to installation to confirm that the noise level limit would not be exceeded. By ensuring this limit is not exceeded, the daytime background noise level would inherently not be exceeded.

Internal Plant Noise Levels

- 5.25 As stated above, in order to meet the internal noise level criteria from mechanical services, the limits presented in Section 3.0 will need to be achieved. At this stage, a system has not been proposed and therefore, this will need to be confirmed with AEC prior to installation to ensure that the limits are not exceeded.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 Acoustic & Engineering Consultants Limited (AEC) has been appointed by AIY Limited to undertake a noise assessment in relation to the proposed residential development that will be located at 283 White Moss Road, Manchester. This assessment is required to accompany the associated planning application for the development.
- 6.2 The development is bound by Rochdale Road (A664) to the west, White Moss Road to the east and south, and the Blackley Community Fire Station to the north.
- 6.3 The site location and the proposed site layout are presented on Figure 2.1. Further details of the development are presented in Section 2.0.
- 6.4 Based on the details of the proposed development, a basis of assessment is presented for the site in Section 3.0. Details of how the site must comply with the requirements of Manchester City Council is discussed as well as with relevant guidance.
- 6.5 A daytime and night-time noise level survey were conducted at the proposed development site on Wednesday 02 February and Thursday 03 February, 2022. Noise levels affecting the development were due to road traffic in the area but also noise associated with the Blackley Community Fire Station.
- 6.6 A summary of the noise levels affecting the development is presented in Section 4.0. Full details of the survey are presented in Appendix B and the noise levels are presented in Tables B2 and B3.
- 6.7 Based on the noise levels measured, an assessment has been carried in Section 5.0 that aims to ensure that appropriate internal noise levels within habitable spaces are sufficiently controlled and are in line with the requirements.
- 6.8 AEC understand that a MVHR system will be installed within the development meaning that the requirements for whole dwelling (background) ventilation will be met for all rooms within the development, removing the need to open windows for this element.
- 6.9 Therefore, appropriate internal noise levels inside the rooms of the development will be achieved via acoustic glazing and the performance requirements for this is presented in Table 5.3, with example glazing make-ups presented in Table 5.4.
- 6.10 Based on the requirements of AVO and the noise levels affecting the facades of the development, if it is deemed to be at risk of overheating, the red and blue facades (as indicated on Figure 5.1) would have to achieve these requirements without the use of openable windows and a mechanical system would be required. On all elevations, sufficient ventilation for the control of overheating can be achieved with openable windows.
- 6.11 As per the noise levels measured on-site, the noise level within the proposed garden areas of the site would not exceed 50dBL_{Aeq, 16h}.
- 6.12 As there is an MVHR system that has been proposed, there may be some external mechanical services and therefore, an external plant noise level limit has been proposed and this is presented in Section 5.0.

APPENDIX A – Acoustic Terminology in Brief

Sound Description

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency - a 'pure tone' - most sound is made up of many different frequencies.

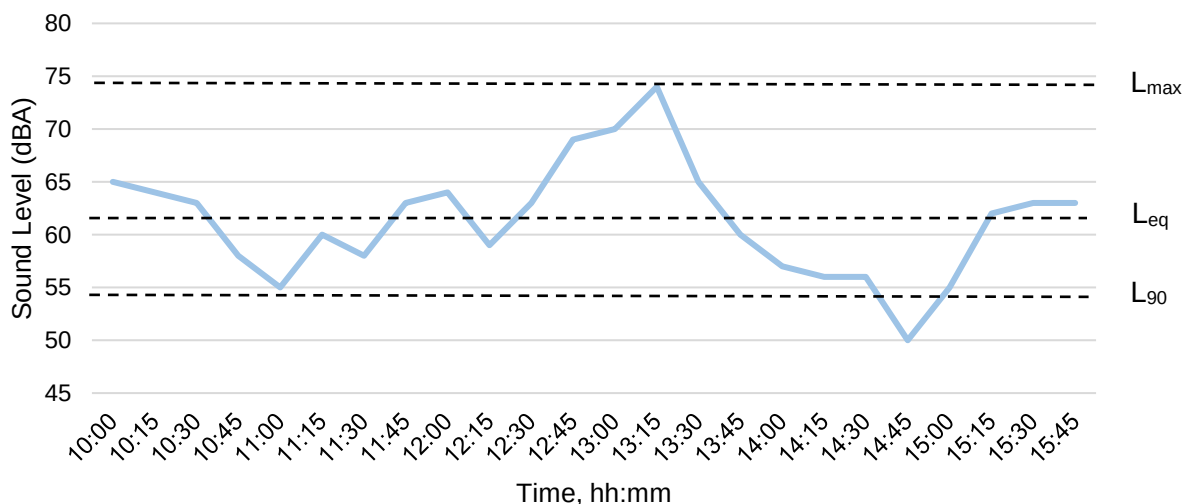
The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation, the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be preceded by a dB descriptor in the report e.g. $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$.

Example of Sound Varying with Time



Unit Type	Acoustic Unit	Description
Ambient Sound Level	$L_{Aeq, T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the “average” sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the “ambient” noise level.
Percentile Level	L_{A1}	The (A-weighted) sound level exceeded for 1% of a measurement period. It is the value generally used to indicate a ‘typical’ maximum noise level.
	L_{A10}	The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value often used to describe traffic noise.
	L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
Maximum Sound level	L_{Amax}	The maximum (A-weighted) sound level measured during a given time. ‘Fast’ or ‘Slow’ meter response should be cited.
Sound reduction index	R_w	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Apparent sound reduction index	R'_w	Single number rating used to describe the sound reduction index of an on-site construction over a range of frequencies, typically 100-3150Hz.
A road traffic spectrum adaptation term	C_{tr}	Referenced to demonstrate the to the low frequency sound insulation performance of building elements. Makes reference to the A-weighted urban traffic noise spectrum.
Element normalized level difference	$D_{n,e,w}$	Single number rating used to describe the sound insulation performance of small elements.
Rating Level	$L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound

APPENDIX B – Noise Survey Details

FIGURE B1 – Site Location Plan Identifying Monitoring Locations



Map data © 2022 Google United Kingdom

Table B1 – Measurement Procedure

Date & Time of Survey:	Wednesday 02 February 2022, 1434 to 1750h					
Date & Time of Survey:	Wednesday 02 February 2022, 2300h to Thursday 03 February 2022					
Personnel:	Ross Chamberlain (AEC).					
Equipment Used:	Cirrus CR:171B Real Time Analyser (AEC Kit 3					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2013 <i>‘Electroacoustics – Sound level meters - Part 1 Specifications’</i> for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	02/02/22	Day	Dry	9°C	Negligible	90%
	02/02/22 – 03/02/22	Night		8°C		80%
Measurement Locations:	Measurements were undertaken at three locations around the development site. Identified as A to C on Figure 1 and described below. A – 2m from Rochdale Road. B – 2m from White Moss Road. C – 2m from White Moss Road.					
Measurement Details:	Measurements were undertaken over various periods in terms of L _{eq} , L ₁₀ , L ₉₀ , and L _{max} .					
Façade / Free-Field:	A, B & C - free-field.					
	Full results for the attended measurements are given in Tables B1 and B2.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					

TABLE B2 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L _{Aeq}	L _{A10}	L _{A90}	L _{Amax, F}	
A	1434 – 1449	70.8	73.5	65.3	81.8	Ambient and maximum noise levels due to road traffic on Rochdale Road.
	1530 – 1545	71.2	73.8	65.5	83.3	
	1627 – 1642	71.4	74.4	65.1	83.7	
	1725 - 1740	71.2	74.0	65.9	80.8	
B	1450 – 1505	63.2	66.5	55.7	82.3	Ambient and maximum noise levels due to road traffic on Rochdale Road and White Moss Road.
	1546 – 1601	61.6	65.4	54.1	79.8	
	1642 – 1657	63.3	67.0	54.7	78.3	
	1740 – 1750	62.6	66.6	55.2	79.0	
C	1601 – 1606	64.2	68.1	50.4	80.5	Ambient and maximum noise levels due to road traffic on White Moss Road.
	1658 - 1703	62.7	66.4	48.4	78.2	

TABLE B3 – Measured Night-Time Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L _{Aeq}	L _{A90}	L _{Amax, F}	
A	2300 – 2315	68.7	60.1	81.0	Ambient and maximum noise levels due to road traffic on Rochdale Road.
	0000 - 0015	68.2	57.7	83.0	
B	2317 – 2332	60.0	45.6	82.0	Ambient and maximum noise levels due to road traffic on Rochdale Road and White Moss Road.
	0016 - 0031	57.0	45.0	74.7	