Azymuth Acoustics UK

Professional Acoustic Services

Approved by: Matthew Gibson
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Environmental Noise Report
Ref: AA0208

Proposed Residential Apartment Development

18-20 Rochdale Road
Manchester
M4 4HT

For

Gonshaw Associates
The Studio
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Gatley
Cheshire
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1.0 Introduction

Azymuth Acoustics UK is appointed by Gonshaw Associates to provide a Noise Impact Assessment of a proposed residential development at 18-20 Rochdale, Manchester.

The development site is bounded by Rochdale Road and Sudell Street. Rochdale Road / A664 is one of the main arterial roads into Manchester city centre from the north and east of the city.

The development includes the conversion of the existing 4 storey building into 2 apartments.

This report is intended to provide information relating to potential noise levels affecting the site as required by Manchester City Council to support the detailed planning application. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken at the proposed development site.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- An assessment of the appropriate level of protection against noise that should be provided as part of the development, including 1st floor between commercial units and apartments.
- Guide noise limits for any external mechanical plant installed as part of the development.

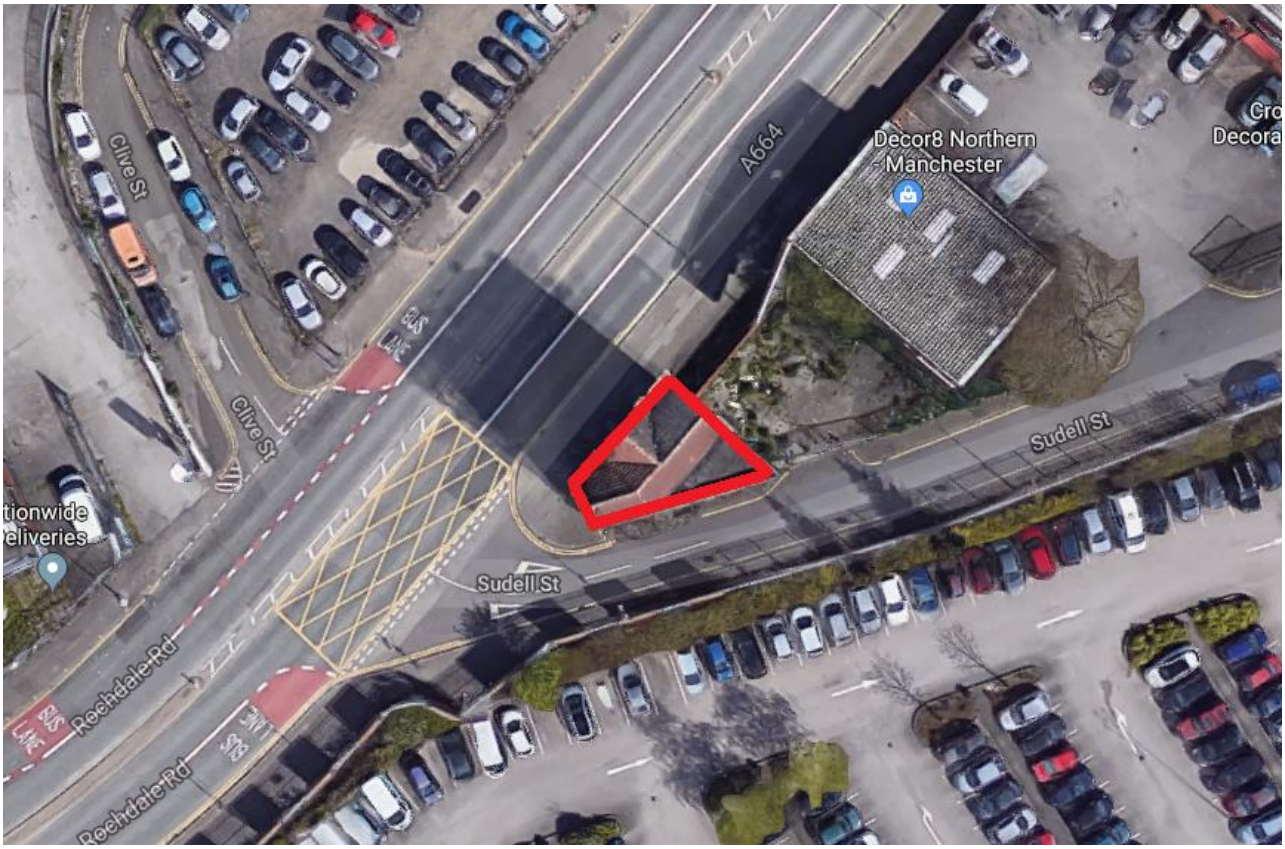


Figure 1: Aerial photograph indicating site boundary (marked in red)

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the environmental noise survey consisted of a SvanTek 959 Type 1 precision sound level meter and 01dB calibrator. The meter was calibrated before and after the noise measurements. The sound level meter records A-weighted (fast response) noise levels as well as octave band data for all measurements recorded.

The daytime survey was undertaken between 12:40 – 14:00 on 15th August and 16:45 – 18:00 (evening rush hour) on 27th August 2019. The night-time survey was undertaken between 22:50 to 00:50 on 12th August 2019.

The ambient noise measurements were undertaken using the sound level meter microphone at the locations shown in Figure 2 below.

The sound level meter was positioned at the following measurement locations on the site:

- Position 1: Rochdale Road at 1.5m from kerb edge in a generally free-field position
- Position 2: Sudell Street at 1m from pavement edge
- Position 3: Close to façade of narrow elevation, corner of Rochdale Rd / Sudell Steet ~ 2.5m from kerb

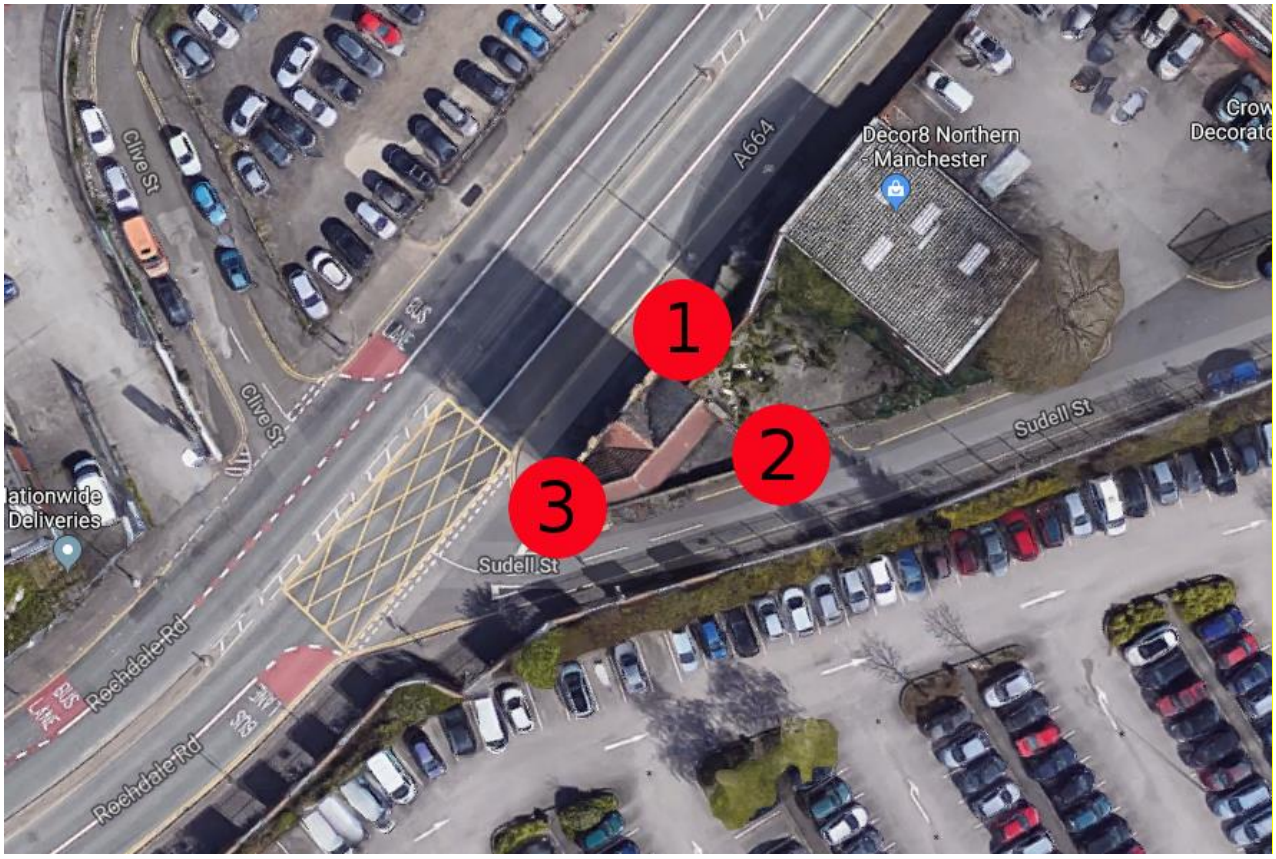


Figure 2: Aerial photograph with noise measurement positions marked in red

2.2 Results of Noise Measurements

Full results of the noise levels recorded during the survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) statistical noise levels.

Location	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
1. Rochdale Road	Day	82.7	71.1	78.6	74.6	68.8	57.6
	Night	82.2	66.2	76.1	70.9	57.8	45.9
2. Sudell Street	Day	75.5	63.7	70.6	66.6	61.8	54.5
	Night	70.6	58.4	67.8	63.0	52.1	46.6
3. Junction corner of Rochdale Rd / Sudell Street	Day	84.0	71.3	79.4	74.7	69.0	60.1
	Night	79.9	65.6	75.9	70.5	59.0	47.1

Table 1: Results of Azymuth Acoustics UK noise measurements, August 2019

A statistical analysis of external maximum values would suggest a typical worst-case L_{Amax} value of approx. 82dB (night) would be appropriate for acoustic design purposes. This would generally correlate with average L_{A1} values recorded in the survey. Based on the measured statistics, maximum levels above 82dB would be unlikely to occur >15 times during typical 8hr night time periods.

2.3 Description of Noise Climate

The noise climate in the area is dominated by road traffic using Rochdale Road and surrounding streets. Rochdale Road is a busy thoroughfare serving the city centre and as such is busy during day and early night time periods. Weekend night time levels would be influenced by taxis, passers-by etc., which gradually reduce over the course of the night.

Noise levels on the Rochdale Road elevation are typically in the range 70-72 L_{Aeq} during the day and typically 66-69 dB L_{Aeq} during early night-time periods.

Levels on Sudell Street and other locations screened from Rochdale Road are typically 62 - 66 dB L_{Aeq} and 57 - 60 dB L_{Aeq} during the measured night-time survey.

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- ProPG: Professional Practice Guidance on Planning and Noise (New residential development)
- National Planning Policy Framework (NPPF) 2018
- British Standard 8233: 2014
- World Health Organisation Guidelines on Community Noise
- British Standard 4142: 2014

3.1 ProPG: Planning and Noise - May 2017

This Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

The Professional Practice Guidance on Planning and Noise States 'The recommended approach is intended to give the developer, noise practitioner, and decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perceptive and the extent of acoustic issues that would be faced'. It is important that acoustic design is reviewed at an early stage of the development process.

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 45dB $L_{Amax,F}$ 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.

3.2 National Planning Policy Framework (NPPF) 2018

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 180 of the National Planning Policy Framework (NPPF) states that planning polices and decisions should aim to:

- Avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development;
- 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

The National Planning Policy Framework states that the planning system should 'prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.

3.3 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq,\,T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living rooms	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 2: Noise Limits for Residential Properties Suggested in BS 8233

3.4 W.H.O. Guidelines on Community Noise

In 1980 the World Health Organisation proposed environmental health criteria for community noise including consideration of noise levels at which sleep disturbance may take place. These guidelines were amended by the World Health Organisation in 1999. The guidance suggests that an internal L_{Aeq} below 30dB is required to preserve the restorative process of sleep. This is equivalent to a free-field level of around 42 to 45dB L_{Aeq} or a façade level of 45 to 48dB L_{Aeq}, assuming open windows.

3.5 British Standard 4142: 2014

The test that is generally applied to assess the potential for noise from industrial and commercial installations to give rise to community response is contained in British Standard BS 4142: 2014. This standard predicts the likelihood of complaint due to noise from a new or modified source.

BS 4142 describes a method for determining the specific source and background noise levels outside residential buildings and for assessing whether the noise is likely to give rise to complaints from the occupants. The specific noise level from the commercial source is rated based on any tonal or intermittent characteristics of the sound. BS 4142 assessment methodology involves comparing the existing background level with the predicted noise from the new development. This predicted level is adjusted to allow for any tonal or impulsive characteristics and is called the Rating Level. The difference between the two levels can be used to indicate the likelihood of complaints arising, e.g. a predicted level of 10dB greater than the background level indicates a significant adverse impact; an increase of around 5dB indicates an adverse impact and where the rating level does not exceed the background sound level (BSL) this is an indication of the source having a low impact.

In the context of proposed new noise sensitive receptors in the vicinity of industrial sources, the document states that ‘where a new noise-sensitive receptor is introduced and there is extant industrial and / or commercial sound, it ought to be recognized that the industrial and / or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation’.

3.6 Manchester City Council Policy Document GD03

The GD03 guidance document provides developers with information related to Manchester City Council policy on discharging planning conditions imposed by the City Wide Environmental and Public Protection Team. The document has specific sections covering policy on noise from fixed plant and stipulates the following criterion:

'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'.

3.7 Recommended Noise Assessment Criteria

Based on the guidance above it is recommended that the following criteria would be reasonable with the aim of minimising the impact of the environmental noise on the proposed new residential accommodation:

- Daytime noise levels not to exceed 35dB $L_{Aeq,\ 16\ hr}$ in living rooms / bedrooms
- Daytime noise levels not to exceed 40dB $L_{Aeq,\ 16\ hr}$ in dining room / kitchen
- Noise levels in bedrooms not to exceed 35dB $L_{Aeq,\ 16\ hr}$ for daytime periods
- Night-time noise levels in bedrooms not to exceed 30dB $L_{Aeq,\ 8\ hr}$
- Night-time individual noise events in bedrooms shall not normally exceed 45dB $L_{Amax,F}$ more than 15 times

Table 4, Note 5 of BS 8233:2014 states: 'If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.'

It would be recommended that any new fixed plant associated with the scheme should comply with MCC noise limit criteria as detailed in Section 3.6 above.

4.0 Assessment of Noise Levels

4.1 Noise Risk Assessment (ProPG)

The risk assessment is based on survey data and incorporates a worst-case approach to potential night time adverse effects.

Adverse effect risk levels affecting the site are summarised in Table 3 below.

Façade Location	Noise Level Range (free field) dBA		Risk of Adverse Effect
	DAY	NIGHT (worst case)	
Rochdale Road (Zone A)	71	66	High
Sudell Street corner near Rochdale Road (Zone A)	71	66	High
Sudell Street rear areas (Zone B)	64	58	Medium

Table 3: Potential adverse risk effects, various locations on Rochdale Road site

The façade facing Rochdale Road would represent the most significant risk in terms of potential adverse impact. Incorporation of standard glazing and openable windows would likely result in significant adverse impact to new residents.

Other elevations of the building would present a lower risk of adverse impact and as such standard glazing may be incorporated; in some cases natural ventilation may be acceptable.

4.2 Road Traffic Noise Assessment

Daytime noise levels along Rochdale Road would indicate a high risk in terms of potential adverse effect in new dwellings. This risk may be reduced by following a good acoustic design process.

It should be noted that traffic noise levels gradually reduce during late night periods; as such, the risk of adverse effect (ProPG) would be assessed as medium – high for a typical 8 hour night time average.

On the basis of the measured noise levels it is estimated that an overall noise reduction of 33-36 dB would be required through the façade in order to achieve satisfactory conditions inside habitable rooms near Rochdale Road.

5.0 Recommendations for Noise Mitigation

This section sets out the recommended minimum noise mitigation measures required to ensure satisfactory acoustic conditions inside habitable rooms throughout the scheme.

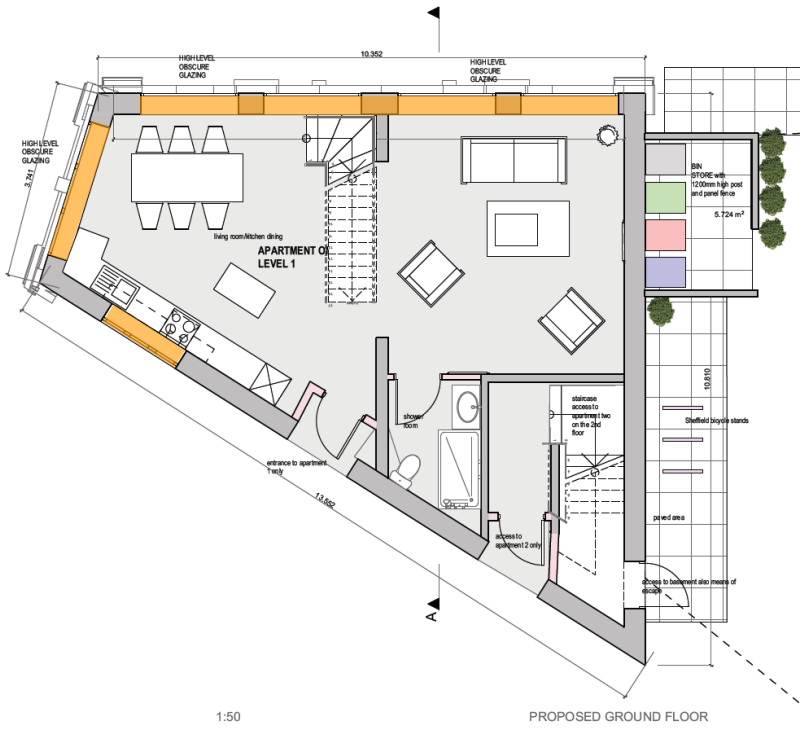
5.1 Glazing Specifications

The appropriate glazing specifications for the new dwellings based on the current proposed layout are summarised in Table 4 and Figures 3-5 below.

Location (Bedrooms, Living Rooms, Dining Rooms)	Glazing Specifications	Appropriate Glazing Types
Zone A (ORANGE): Rochdale Road and end elevation	Airborne sound insulation min. R_W 38dB and R_W+C_{tr} 34dB	Acoustically rated double glazing (e.g. Pilkington Optiphon 6mm glass /16mm argon filled cavity / 6.8mm Optiphon glass)
Zone B (BLUE): Sudell Street elevation only	Airborne sound insulation min. R_W 31dB and R_W+C_{tr} 26dB	Acoustically rated double glazing (e.g. 6mm float glass /16mm cavity / 6mm float glass)

Table 4: Recommended glazing specifications for new apartments, Rochdale Road site

Figure 3: Ground floor Glazing Zones at Rochdale Road site



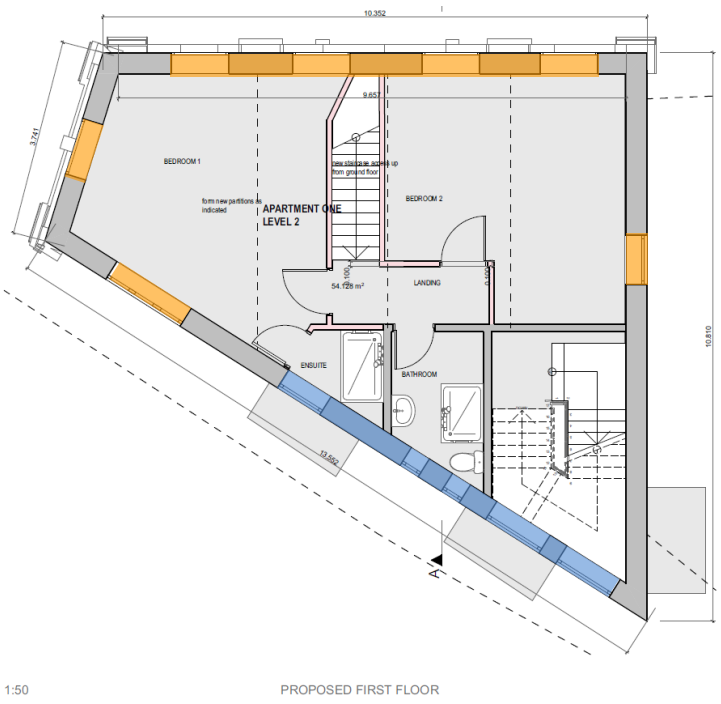


Figure 4: 1st to 3rd floor Glazing Zones at Rochdale Road site

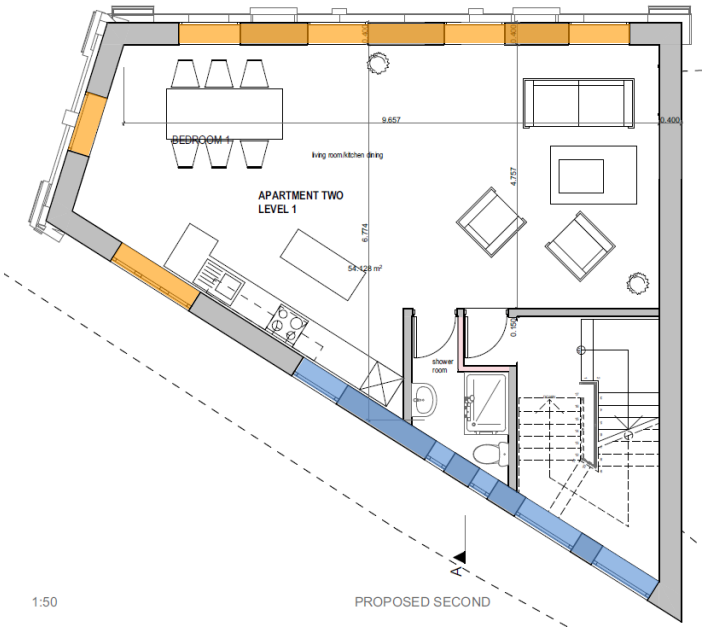
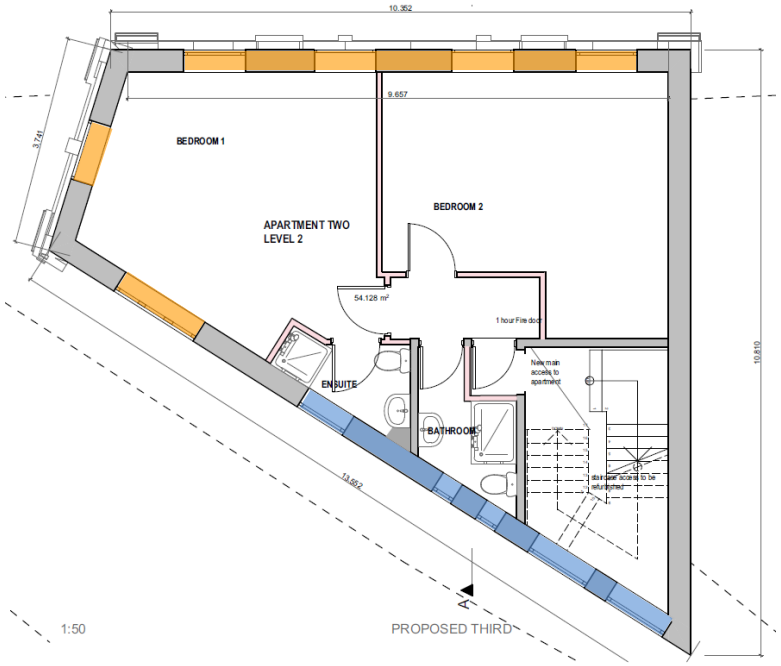


Figure 5: 4th floor Glazing Zones at Rochdale Road site



5.2 Ventilation Specifications

The recommended ventilation strategy based on the current proposed layout are summarised in Table 5 below.

Location (Bedrooms, Living Rooms, Dining Rooms)	Ventilation Specifications	Window slot vent trickle ventilation (where applicable)
All floor levels, all apartments (assumes all apartments have aspects onto 3 elevations)	System 4 MVHR mechanical (windows can be opened but MVHR has purge ventilation)	No Trickle Vents MVHR

Table 5: Recommended ventilation strategy for the Rochdale Road site

5.3 Other Elements of Building Envelope

Other elements of the building envelope should have the following minimum sound insulation performance:

- External Walls: minimum sound insulation R_W 52dB. This minimum is likely to be significantly exceeded by a normal brickwork façade. Where alternative external wall types are proposed on habitable areas it will be appropriate to check compliance with the R_W 52dB target.
- Roof: minimum sound insulation R_W 42dB. This could be achieved with a suitable composite flat roof or pitched roof build-up (NB a minimum 200mm roof void and 100m mineral wool insulation would be recommended over and above any rigid insulation required to provide the required levels of thermal insulation).

5.4 Noise limits for externally mounted plant / atmosphere connections

The exact location(s) or quantity / type of fixed external plant is understood to be undefined at time of writing. Table 5 below lists noise limits for externally mounted plant at various potential locations. Assuming plant items could be running during both day and night-time periods, internal noise levels in next door or adjacent rooms should not exceed 30dB $L_{Aeq,\ 5min}$ (NR25) or regularly exceed 45dB L_{Amax} for any period.

Location	Period	Indicative Noise limit $L_{Aeq,T}$
Any plant fixed to or discharging from an outside wall or elevation @ 1m from any single item or group of items (cumulative)	All	51 dBA & 5dB below BSL @ NNSR
Roof level (above line of sight from proposed apartments), any location @ 1m from any atmosphere connection	All	56 dBA /& 5dB below BSL @ NNSR

*Nearest noise sensitive receptor

Table 5: Plant noise limits at various distances (dBA)

The guide noise levels set out above have been developed so as to ensure that noise from any plant associated with the development does not have a significant effect on ambient noise level within habitable rooms in the development and the wider environment beyond the site perimeter.

The general plant noise levels limits indicated above would be subject to review at the detailed design stage of the project when more information is available. This would be required in order to ensure compliance with MCC external noise limit criteria detailed in Section 3.6 above.

6.0 Conclusions

Azymuth Acoustics UK has undertaken a noise impact assessment of the proposed residential development situated at 18-20 Rochdale Road, Manchester. The noise climate in the area is dominated by road traffic using Rochdale Road and other local routes.

The ventilation system recommended for the scheme would be to allow for sufficient background ventilation without the specific need to open windows at night.

The recommended glazing specifications for elevations facing Rochdale Road have been designed taking into consideration the potential for low frequency sound from the road traffic. The glazing has also been specified with the aim of compliance with criteria detailed in Section 3.7 above, including sufficient mitigation of individual noise events (L_{Amax}) inside bedrooms.

The residential development should be protected by noise mitigation measures including:

- Acoustic double glazing to rooms on all elevations exposed to traffic noise along or within 10m of Rochdale Road.
- Mechanical ventilation with heat recovery for the habitable areas within the scheme.
- Noise limits applicable to any externally mounted plant or atmosphere connections proposed as part of the submission in line with MCC noise control requirements.

Appendix A – Glossary of Terms

Decibel (dB)
this is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)
This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level
The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}
this is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

SRI = L1 - L2 + 10 log (S/A)

Where: L1 = Noise level in the source room

L2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)
this is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.
Appendix B – Graphical Results of Sound Insulation Tests

Appendix B – Full Tabulation of Noise Survey Results

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
Night time 11th -12th August 2019								
22:50	1	5min	78.8	67.5	76.9	72.0	61.2	46.3
22:55	1	5min	81.1	64.7	74.7	68.9	56.4	44.4
23:00	1	5min	80.9	68.6	78.7	73.4	60.3	45.3
23:05	1	5min	80.9	66.3	76.3	70.3	60.1	50.0
23:10	1	5min	83.0	66.0	75.9	71.2	54.9	45.6
23:15	1	5min	78.2	66.7	75.6	71.5	59.3	45.2
23:20	1	5min	86.1	67.3	77.6	72.1	56.4	47.9
23:25	1	5min	77.1	65.7	75.1	71.4	54.4	44.7
23:35	2	5min	69.7	59.2	68.3	63.8	54.2	46.3
23:40	2	5min	71.2	60.2	69.4	65.0	54.5	46.6
23:45	2	5min	69.5	57.0	67.4	61.5	50.0	47.1
23:50	2	5min	71.3	59.4	69.3	63.7	54.4	47.1
23:57	3	5min	81.8	67.9	77.9	72.7	60.8	46.3
00:02	3	5min	77.6	65.1	75.0	69.9	57.4	46.7
00:07	3	5min	77.9	65.0	74.9	70.1	55.9	46.2
00:12	3	5min	78.8	65.2	75.7	70.1	57.5	47.5
00:17	3	5min	77.1	66.6	76.1	69.9	63.6	48.8
00:25	1	5min	78.5	66.1	76.5	70.5	58.2	44.4
00:30	1	5min	79.4	65.9	77.2	69.7	56.0	43.1
00:35	1	5min	73.9	64.3	72.5	69.2	58.7	48.5
00:41	2	5min	70.3	57.1	66.1	61.7	51.7	46.4
00:46	2	5min	69.9	57.2	67.1	61.7	49.9	46.5
00:51	2	5min	68.3	58.3	67.1	63.4	50.0	46.2

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
Daytime 15th August 2019								
12:37	3	5min	85.7	71	80.5	75.1	68.1	60.4
12:43	3	5min	83.3	71.5	79.5	75	69.7	59.5
12:50	3	5min	78.4	69.7	76	73.6	67.4	58.4
12:56	3	5min	90.5	71.7	79.6	74.4	68.6	58.9
13:01	3	5min	80.6	71.1	79	74.7	69.9	61.4
13:07	1	5min	81.4	70.3	77.4	73.7	68.9	60.3
13:13	1	5min	91.6	73.9	83.8	76.6	70.4	58.5
13:18	1	5min	81.7	70.2	78.8	74.5	66	57.8
13:23	1	5min	81.9	72.3	78.9	75.9	70.7	59.3
13:28	1	5min	78.7	70.8	76.9	74.3	69.3	61.1
13:30	2	5min	85.5	65	73	67.4	63	56
13:35	2	5min	76.8	66.2	74.3	69.7	64.1	56.9
13:40	2	5min	77.9	65	74.8	68.2	62.5	54
13:45	2	5min	72.3	63.8	70.8	67	62.6	54.9
13:50	2	5min	75.8	63.7	71.2	67.2	61.6	56.4
13:55	2	5min	75.1	63.7	71	67.2	62.1	54.1
14:00	2	5min	73.7	63.8	71.2	67.5	61.5	54.3
Daytime 27th August 2019								
16:48	2	5min	77.1	61.5	66.9	64.3	61.0	54.2
16:53	2	5min	74.4	61.1	66.7	64.0	60.5	52.8
16:58	2	5min	70.1	61.6	68.4	65.2	60.2	52.8
17:03	2	5min	72.3	61.8	67.9	65.0	60.6	53.4
17:09	3	5min	82.1	71.4	78.5	75.2	69.4	62.2
17:14	3	5min	83.1	70.1	78.0	73.6	68.1	59.4
17:19	3	5min	87.9	71.9	81.8	74.9	69.0	60.0
17:24	3	5min	84.4	72.3	81.7	75.5	70.4	60.5
17:31	1	5min	85.2	71.0	78.9	74.4	68.9	58.8
17:36	1	5min	80.2	70.0	77.7	73.7	68.1	55.6
17:41	1	5min	82.7	71.0	77.6	74.7	69.3	54.9
17:46	1	5min	81.3	69.9	78.0	74.1	68.1	52.8
17:51	1	5min	85.9	71.2	79.2	74.4	69.3	58.4
17:56	1	5min	79.6	69.9	77.2	74.0	68.3	56.0