



87 Rochdale Road

Noise Impact Assessment Report

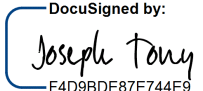
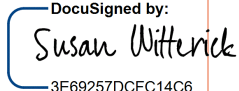
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Contents

Introduction.....	3
Basis of Noise Assessment.....	4
Site Description	10
Environmental Noise Survey	12
Environmental Noise Survey Results.....	14
Noise Model	17
Building Envelope Sound Insulation	21
External Amenity Areas	25
Separation Between Commercial/Ancillary Units and Apartments	26
Building Services Noise Emissions	33
Activity Noise - External	34
Conclusions.....	37
Appendix A – Glossary of Acoustic Terminology.....	38
Appendix B – Time History Graph of Monitored Noise Levels - Location D39	

Revision History

Revision	Date	Revision Details	Author	Checked
R01	15/07/2021	Original Issue	Joseph Tony BTech MIOA	Susan Witterick BSc MIOA
R01A	19/08/2021	Updated to address client comments	Joseph Tony BTech MIOA	Susan Witterick BSc MIOA
R01B	25/08/2021	Updated to address client comments	DocuSigned by:  F4D9BDE87E744E9... Joseph Tony BTech MIOA	DocuSigned by:  3E69257DCFC14C6... Susan Witterick BSc MIOA

Introduction

dBx Acoustics Ltd has been appointed by Portwood Developments Ltd. to carry out a noise survey and noise impact assessment for the proposed residential development at 87 Rochdale Road, Manchester.

The intent of the report is to present the results of noise survey undertaken at and around the site, to detail the subsequent acoustic modelling exercise, and to provide outline guidance on appropriate acoustic requirements for façade and glazing build ups to control noise intrusion in line with the requirements of Manchester City Council (MCC).

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 intrusion to residential units from external noise sources; and
- 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} .

The above limits relate to anonymous noise sources, such as road traffic. As there are proposed commercial units on ground floor of the proposed development, MCC's requirements for music noise may become applicable (e.g. for a bar/restaurant use). These are detailed in the guidance document as reproduced below:

"...a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be:

'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively'".

There are no specific noise limits relating to the use of gyms, however, it is assumed that as for music noise, low frequency noise levels must be appropriately controlled.

MCC also requires that externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB $L_{A_{r,Tr}}$ below the typical background L_{A90} level at the nearest noise sensitive location.

The National Planning Policy Framework (NPPF)

The NPPF was introduced in 2012, and updated in 2018, 2019 and 2021. The NPPF is the overarching planning policy document that applies to all new developments in England. The guidance and assessment criteria given (or referred to) in this document can therefore be applied to all other standards in terms of assessing the suitability of granting Planning Permission with respect to noise impact.

The NPPF states that planning policies and decisions should aim to:

- *Avoid noise from 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;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

With specific reference to noise impact, the NPPF document refers to the Noise Policy Statement for England (NPSE).

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.

Outdoor Noise Level Limits

BS 8233: 2014 and the World Health Organisation (WHO) document “Guidelines for Community Noise: 1999” presents guidance for external noise levels within outdoor amenity areas of residential properties to be within $55dB L_{Aeq,16h}$.

It is, however, noted that compliance with these levels may not always be practical, and that the benefits of a development in other areas may take precedence over achieving external amenity noise levels.

It can be seen that the MCC guidance presented above is in line with the recommendations presented in BS 8233 and the WHO document.

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.

MCC requires that externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB $L_{A_{r,Tr}}$ below the typical background L_{A90} level at the nearest noise sensitive location.

The Rating Level ($dB_{L_{A_{r,Tr}}}$) 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:

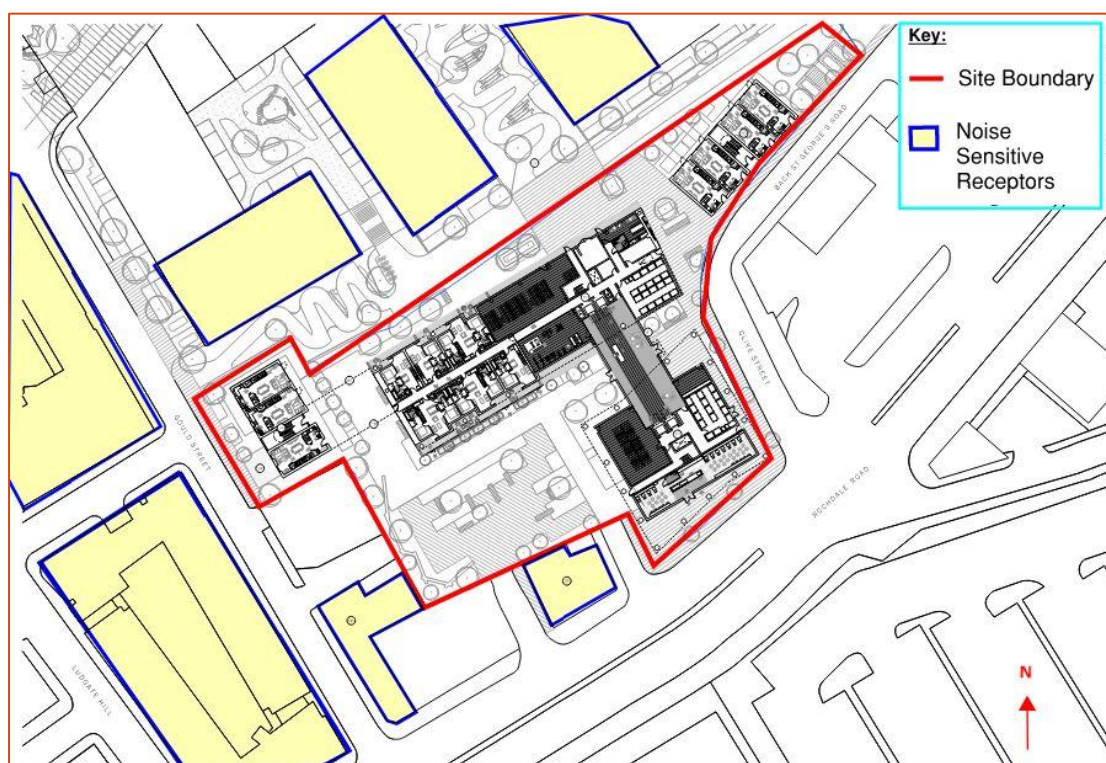
- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, 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 87 Rochdale Road, Manchester. A site location plan is provided as Figure 1, below, which illustrates the location of the Site, the surrounding area, and the nearest noise sensitive premises.

Figure 1– Site Location Plan



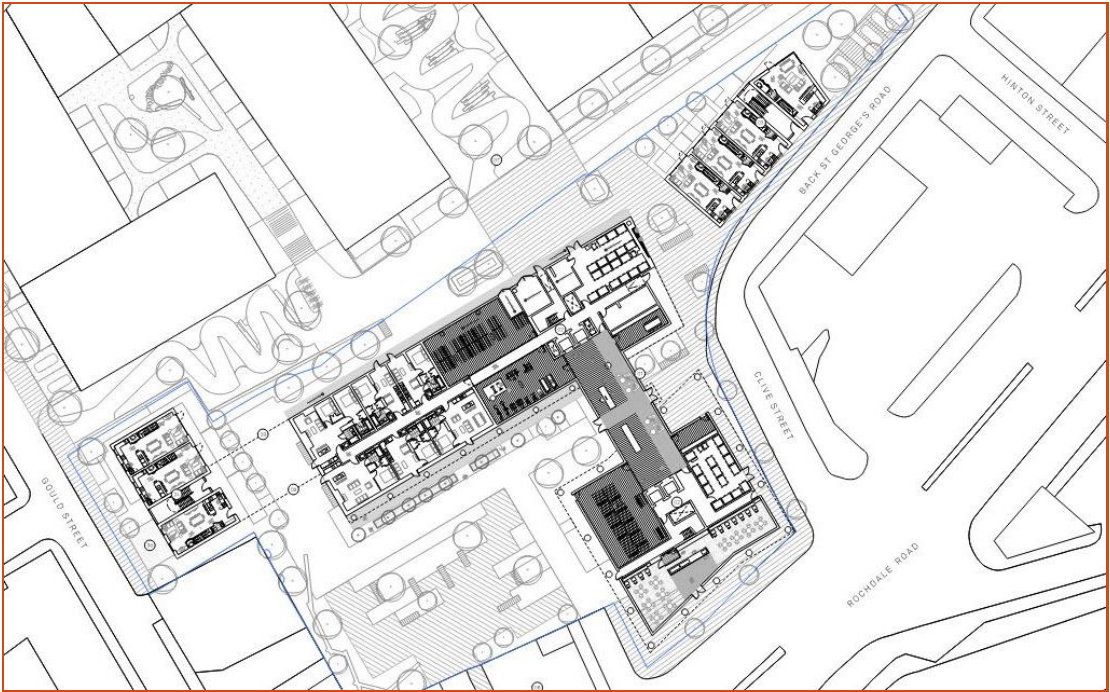
The site lies within a mixed-use area adjacent to the A67 Rochdale Road, which is a major route into Manchester City Centre. The north of the site is bordered by a car park, this land is currently subject to a planning application (reference 128248/FO/2020) for residential and commercial development, indicated as potential noise sensitive receptors in Figure 1. The eastern boundary of the site is bordered by Clive Street and Back St George's Road, beyond which is land currently used for car parking but likely to be redeveloped for residential use. The site's southern boundary is bordered by commercial premises with residential use on upper floors (the Marble Arch pub and a shop at 85 Rochdale Road) and the A67 Rochdale Road itself. To the west of the site are residential apartments along Gould Street.

The rail lines serving Manchester Victoria are approximately 200m to the north of the site boundary.

Proposed Development

The proposed development comprises redevelopment of the Site to provide multi-storey residential tower blocks, forming 223 apartments, along with commercial space at the ground floor. The proposed development also includes 14 duplexes at Gould Street and Back St. George’s Road.

Figure 2– Proposed GA Plan



Noise Sources

The dominant noise source at this site is road traffic on Rochdale Road. Contributions from road traffic on surrounding road networks and the train/tram movements to and from Victoria train station were also observed.

Nearby Noise Sensitive Receptors

The closest noise sensitive receptors (NSRs) are listed in Table 3 and illustrated on the site plan at Figure 1.

Table 3– Noise Sensitive Receptors

Noise Sensitive Receptors (NSRs)	Approximate Distance from the Site Boundary(m)
Proposed New Residential properties on land off Gould Street	3m to the North
Residential and Commercial properties overlooking Rochdale Road	3m to the South
Residential Apartments along Gould Street	7m to the West

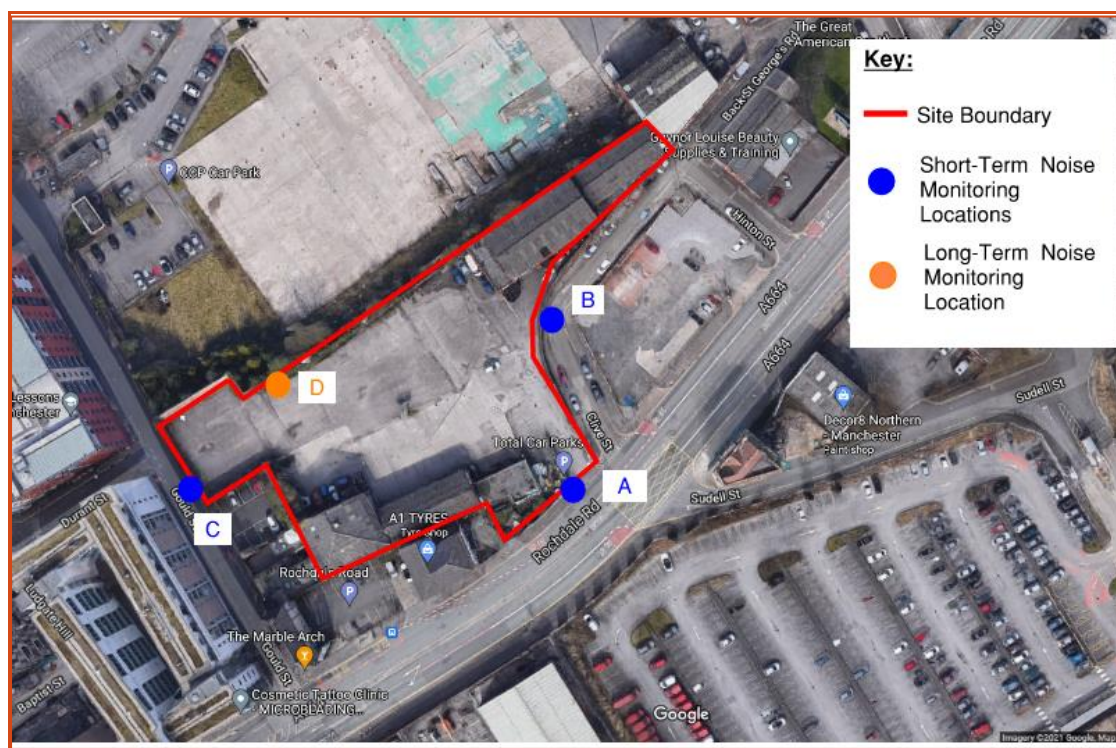
Environmental Noise Survey

Methodology

dBx Acoustics has undertaken noise measurements at the site to establish the existing ambient and background noise levels affecting the site and its surroundings.

An unattended environmental noise survey was undertaken between Thursday 1st July 2021 and Monday 4th July 2021, at Location D indicated on Figure 3, below. Additional short term attended measurements were undertaken at three locations on Tuesday 18th May 2021 and Thursday 20th May 2021, indicated as Locations A-C on Figure 3, below.

Figure 3– Noise Monitoring Locations



Measurements were made during the day, evening and night-time periods (including rush hour periods) in order to establish the worst case for noise impact upon the site.

The measurement locations were selected to establish the existing noise climate around the site and also to allow accurate calibration of the noise model.

All measurements were undertaken in accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*, with microphones located at approximately 1.3 metres above the local ground level and at least 3.5 metres away from reflective surfaces other than the ground which can be considered as in free field conditions.

Weather Conditions

Weather conditions during the measurement period at short-term noise monitoring locations were generally cool and cloudy, with scattered clouds.

At long-term noise monitoring Location D, based on the historical weather data, it is understood that it rained between 02:00-03:00 hours on Saturday 3rd July 2021. The noise levels measured during this period are excluded from the assessment. At the beginning and end of the survey, there was noted to be no rainfall, with a minimally cloudy sky.

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 4, below.

Table 4– Equipment Used in the Environmental Noise Survey

Measurement Locations (Figure 3)	Equipment	Manufacturer & Part No.	Serial Number
Locations A, B, and C	Sound Level Meter	Norsonic Nor140	1405619
	Microphone	Norsonic 1225	168247
	Calibrator	Norsonic 1251	33827
Location D	Sound Level Meter	Casella C633C	3921025
	Microphone	CEL 251	000847
	Calibrator	CEL 120/1	2045151

The sound level meters were 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 calibrators, which had been calibrated not more than one year prior to the survey.

Environmental Noise Survey Results

Attended Noise Survey - Daytime Noise Levels

A summary of the daytime noise levels measured at the short-term noise monitoring positions is presented in Table 5, below. Measurements were taken over 15-minute periods, in 3 consecutive hours between 10:00h and 17:00h, in accordance with the shortened measurement procedure in Calculation of Road Traffic Noise (CRTN). Additional noise level measurements were undertaken during the rush hour period between 17:00h and 18:26h.

Table 5: Summary of Noise Survey results at Short-term Noise Monitoring Positions

Location (Figure 3)	Start Date and Time (hh:mm)	Duration (hh:mm)	L _{Aeq} (dB)	L _{A10} (dB)	L _{A90} (dB)
A	18/05/2021 14:07	00:15	69	73	56
	18/05/2021 15:06		70	74	55
	18/05/2021 16:07		72	75	57
	18/05/2021 17:00		72	76	56
	18/05/2021 17:52		72	76	57
	18/05/2021 18:43		71	75	50
B	18/05/2021 14:24		56	58	48
	18/05/2021 15:24		55	58	46
	18/05/2021 16:24		58	61	48
	18/05/2021 17:16		58	61	48
	18/05/2021 18:08		58	62	48
C	18/05/2021 14:42		60	62	47
	18/05/2021 15:42		66	68	48
	18/05/2021 16:42		61	62	48
	18/05/2021 17:35		63	63	48
	18/05/2021 18:26		61	62	49

All figures rounded to the nearest whole decibel.

All measurements were free-field.

Based on the CRTN methodology, the data shown in Table 5, above, can be used to determine the 16-hour daytime ambient noise level.

The logarithmic average of the dB_{LA10} values provides the 3-hour average, $dB_{LA10,3hour}$. This is converted to the 18-hour $dB_{LA10,18hour}$ value by subtracting 1dB. This is then converted to the 16-hour ambient noise level, $dB_{LAeq,16hour}$, by subtracting a further 2dB. The results of these calculations are presented in Table 6, below, compared with the logarithmic average of the ambient noise levels measured during 10:00h-18:26h (including during the rush hour period).

The higher value of the two has been used in the assessment.

Table 6– Comparison of Ambient Noise Levels (Daytime)

Location (Figure 3)	Average Ambient Noise Level, dBL _{Aeq,T}	CRTN Ambient Noise Level, dBL _{Aeq,16hour}	Value Used in Assessment, dBL _{Aeq,16hour}
A	71	71	71
B	57	56	57
C	62	61	62

Attended Noise Survey - Night-Time Noise Levels

A summary of the night-time noise levels measured is presented in Table 7, below. The measurements were carried out between 05:00h 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 for noise intrusion to residential properties.

Table 7: Summary of Night-time Measured Noise Levels at Short-term Noise Monitoring Positions

Location (Figure 3)	Start Time (hh:mm)	Duration (hh:mm)	dB, L _{Aeq,T}	dB, L _{A10,T}	dB, L _{A90,T}	dB, L _{Amax,F}
A	20/05/2021 05:00	00:15	65	69	49	81
	20/05/2021 05:53		69	73	54	85
	20/05/2021 06:45		71	74	58	86
B	20/05/2021 05:16		57	62	47	69
	20/05/2021 06:10		58	62	48	69
C	20/05/2021 05:34		51	54	43	71
	20/05/2021 06:29		60	61	45	83

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

Unattended Noise Levels

The daytime and night-time averaged ambient noise levels are shown in Table 8 below, alongside the representative daytime and night-time background noise levels, for the unattended measurement location. The complete results of the environmental noise survey are available on request.

Appendix B of this report presents a time history graph showing the ambient, background and maximum noise levels measured at the unattended measurement Location D, throughout the noise survey.

Table 8: Summary of Noise Survey Results at Long-term Noise Monitoring Position

Measurement Location (Figure 3)	Daytime Levels (T = 0700 – 2300h), dB		Night-time Levels (T = 2300 – 0700h), dB		
	L _{Aeq,16hour} ¹	L _{A90,15min} ²	L _{Aeq,8hour} ¹	L _{A90,15min} ²	L _{AFMax} ³
D	52	45	48	40	62

Notes: ¹ Logarithmic average over the day / night survey periods; ² Lowest modal value presented and considered representative over the day / night survey periods. ³ L_{Fmax} noise levels selected based on 10-15 occurrences per night-time (23:00 – 07:00 hours). All figures rounded to the nearest whole decibel.

Noise Model

Acoustic Modelling Exercise

The results of the environmental noise survey have been used to produce a noise model of the site using the noise modelling software package SoundPLAN 8.2. The model uses data from the Ordnance Survey Master Map to ensure that site terrain, including the elevation of the roads and rail, as well as the location and height of surrounding buildings, is accurately represented within the model.

The model of the undeveloped site has been calibrated against the noise data captured during the noise survey and summarised in Table 6, Table 7 and Table 8, above.

The model has then been populated with the proposed development in order to predict and help illustrate the levels of noise that are likely to be experienced at the different building façades and external amenity areas of the development. The massing for the proposed residential scheme to north of the site has also been included in the model.

The following figures present screenshots extracted from the acoustic modelling software for the proposed building arrangement.

Figure 4 : Acoustic Model

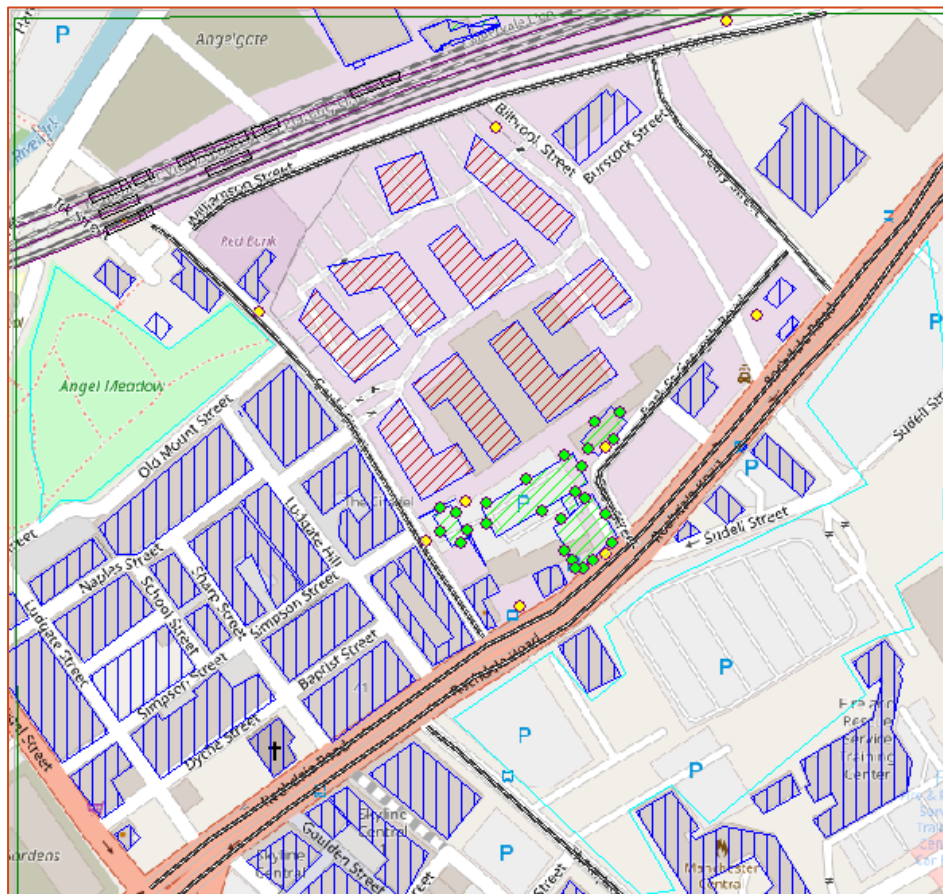
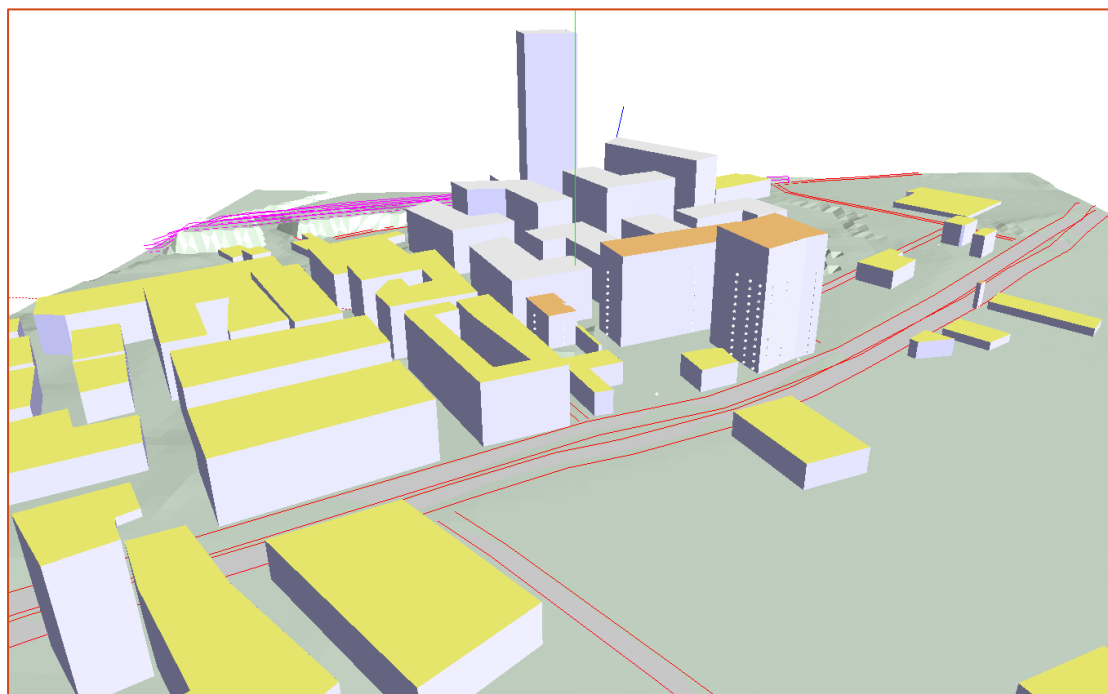


Figure 5: Acoustic Model (3D)

Noise Modelling Results

The noise maps presented below are derived from the results of the environmental noise survey, illustrating how noise propagates in the local area and affects the proposed development site.

Modelled noise contour plots showing the predicted daytime (07:00-23:00) and night-time (23:00-07:00) ambient (L_{Aeq}) noise levels across the site at ground floor level are presented as Figure 6 and Figure 7. The different coloured noise contours correspond to different levels of noise exposure.

Figure 6: Daytime Ambient Noise Map (1.5m above ground) - Site and Surroundings

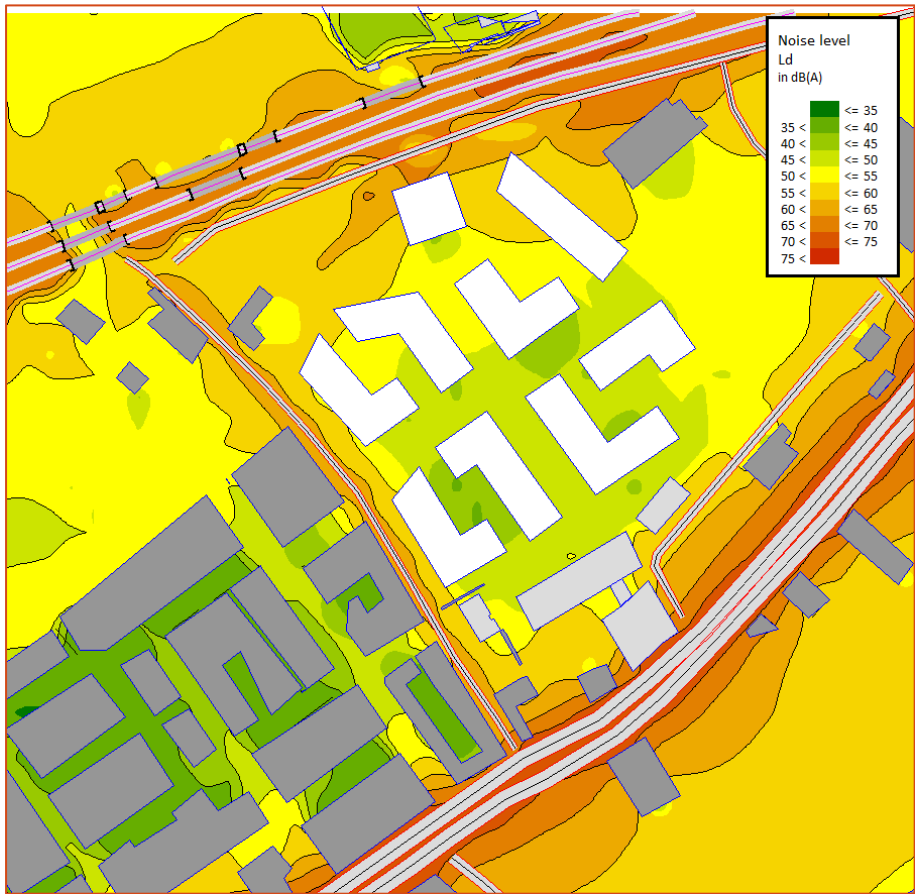
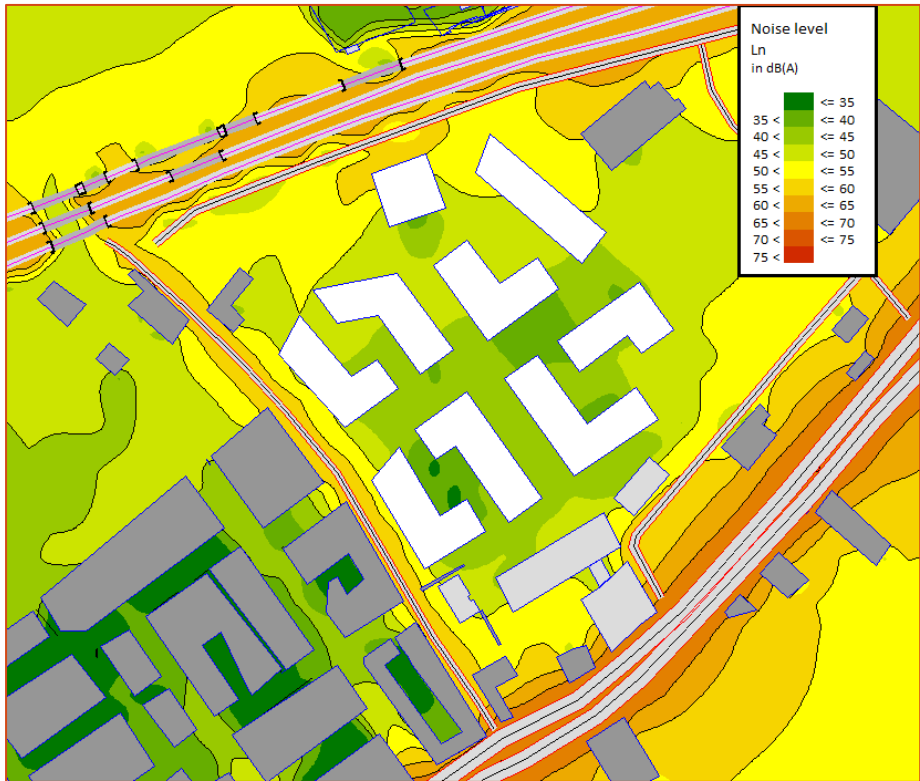
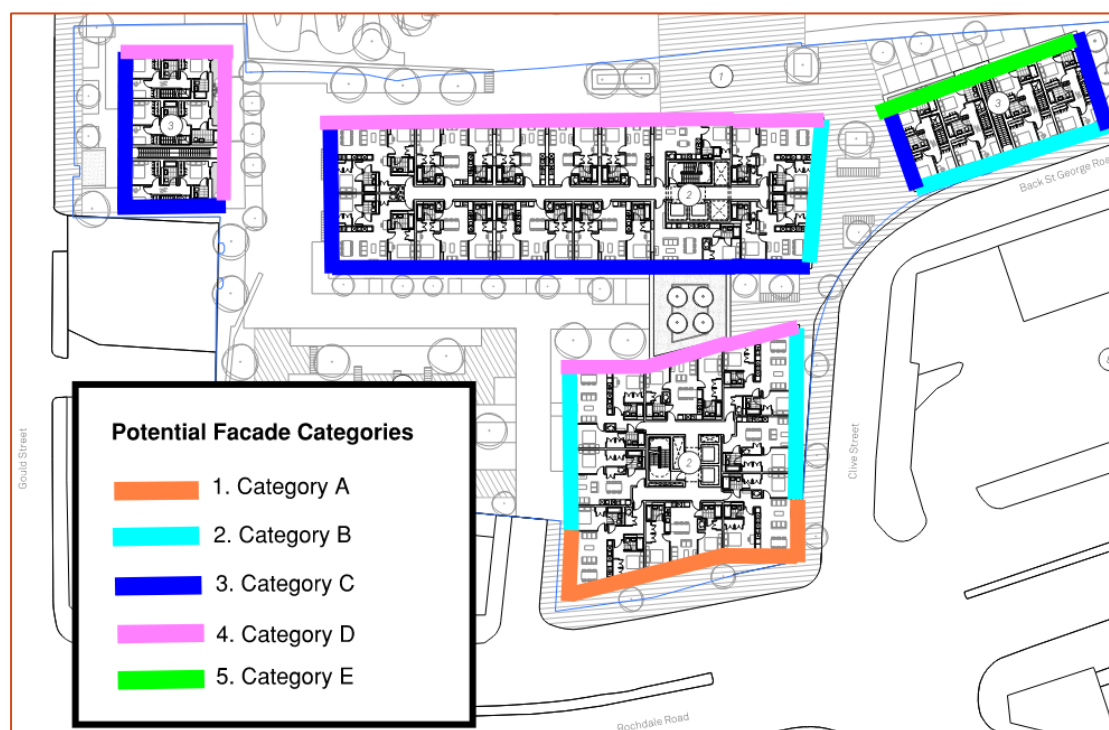


Figure 7: Night-time Ambient Noise Map (1.5m above ground) - Site and Surroundings



The results of the acoustic modelling have been used to categorize the facades of the proposed residential dwellings in terms of their noise exposure as identified in Figure 8.

Figure 8: Indicative Façade Categories



The model indicates that the that noise levels only vary by 1-3dB between ground floor level and the top floor level of the proposed buildings. This is not a significant enough change to affect the envelope requirements, and hence the worst-case noise level has been used for the assessment of each façade.

Table 9 below presents the predicted typical worst-case daytime and night-time noise levels used for the noise ingress assessments.

Table 9: Predicted Typical Worst-case External Noise Levels at Facades

Façade	Predicted Daytime Ambient Noise Level (dB $L_{Aeq,16\text{ hours}}$)	Predicted Night-time Ambient Noise Level (dB $L_{Aeq,8\text{ hours}}$)	Predicted Night-time Maximum Noise Level (dB $L_{AFMax,8\text{ hours}}$)
Category A	73	71	84
Category B	67	65	78
Category C	62	59	72
Category D	55	52	67
Category E	47	43	57

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 10, below. Achieving these limits will also ensure compliance with Manchester City Council’s requirements.

Table 10– 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 and bedrooms in the day, and 45dB_{L_{Aeq,T}} and 60dB_{L_{Amax,F}} outside bedrooms at night.

With reference to the predicted levels at the building facades presented in Table 9, and the allowable external noise levels detailed above, it can be seen that the required internal ambient noise levels can only be achieved with closed windows for living rooms and bedrooms in Façade Categories A-D (Figure 8). Background ventilation will therefore need to be provided via alternative means; it is understood that mechanical ventilation (likely MVHR) is currently under consideration. Windows can be openable for purge ventilation but must be well sealed when closed. It is important to ensure that the alternative source of ventilation does not compromise the overall performance of the façade system or the internal noise level design criteria to be met within habitable room spaces.

With reference to Table 9, above, it can be seen that natural ventilation is generally likely to be appropriate for living rooms and bedrooms in Façade Category E (Figure 8).

The assessment has been based on the proposed external wall area, glazing areas, volume of the bedrooms/living rooms. The following drawings have been used in the assessment:

- 136-JMA-MP-XX-P-A-001005, dated 06.07.21 (Proposed GF site plan)
- 136-JMA-MP-XX-P-A-022201, dated 18.06.21 (Proposed 1st – 6th Floor plan)
- 136-JMA-MP-XX-P-A-022207, dated 18.06.21 (Proposed 7 - 8th Floor plan)
- 136-JMA-MP-XX-P-A-022209, dated 18.06.21 (Proposed 9th Floor plan)
- 136-JMA-MP-XX-P-A-022210, dated 18.06.21 (Proposed 10th Floor plan)
- 136-JMA-MP-XX-P-A-022211, dated 18.06.21 (Proposed 11th Floor plan)
- 136-JMA-MP-XX-P-A-022212, dated 18.06.21 (Proposed 12th Floor plan)
- 136-JMA-MP-AA-S-A-052200, dated 18.06.21 (Proposed Section)

Based on the predicted noise levels on each elevation, the requirements for the glazing required to achieve the internal ambient and maximum noise level limits have been calculated, as detailed in Table 11, below.

Table 11– Glazing Sound Insulation Requirements

Façade Category	Room	Glazing Sound Insulation Performance ¹ , dBR _w (Ctr)	Example Glazing Construction ² , mm
A	Living Rooms	43 (-6)	6.5A/TC/8.5A
	Bedrooms	46 (-7)	6.5A/TC/13A
B	Living Rooms	40 (-6)	10/TC/6.4PVB
	Bedrooms	44 (-7)	8.5A/TC/12
C	Living Rooms	38 (-6)	10/TC/6
	Bedrooms	38 (-6)	10/TC/6
D	Living Rooms	31 (-6)	4/TC/4
	Bedrooms	31 (-6)	4/TC/4

Notes: ¹ Sound reduction performance must be achieved by the glazing unit as a whole, including frames, seals, opening lights etc, as opposed to the glass panels alone; ² A- Acoustic Laminated glass; TC = Thermal Cavity; PVB- Polyvinyl Butyral

It should be noted that the above requirements are for living rooms and bedrooms not suitable for openable windows. There are no specific sound insulation requirements for glazing elements within living rooms and bedrooms suitable for openable windows (Category E).

Acoustic requirements for trickle ventilators are not provided on the understanding that ventilation will be provided by mechanical means.

The external wall should achieve a sound insulation performance at least 10dB greater than the glazing. The details of the external façade (non-glazed elements) will be reviewed during subsequent design stages to ensure compliance with the overall sound insulation requirements of the scheme.

Overheating

At this stage, an overheating assessment has not been completed. This initial guidance is therefore presented on the basis that an overheating condition may arise, but will be reviewed as the scheme progresses.

Guidance is provided in the Association of Noise Consultants' document '*Acoustics, Ventilation and Overheating Guide*' (2020) (AVO). This guidance is not definitive.

Primarily, a Stage 1 assessment is undertaken by considering the external noise levels. External daytime noise levels of $50\text{dB}_{\text{LAeq,T}}$ are considered 'negligible risk', while a noise level of $65\text{dB}_{\text{LAeq,T}}$ is considered 'high risk'. At night, these limits are reduced to $45\text{--}55\text{dB}_{\text{LAeq,T}}$.

As can be seen from Table 9, facades in all categories other than Category E would be considered to be within the 'risk' criteria.

On this basis, a Level 2 assessment should be undertaken.

For the Level 2 assessment, again, there are no definitive criteria proposed, only a sliding scale of '*Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night*'. However, internal noise level limits of $50\text{dB}_{\text{LAeq,16hour}}$ in the day, and $42\text{dB}_{\text{LAeq,8hour}}$ and $65\text{dB}_{\text{LAmax,F}}$ at night are the limits at which '*Noise causes a material change in behavior e.g. having to keep windows closed most of the time....Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep.*' These limits would therefore appear to be a worst-case upper limit. Furthermore, any adverse effects relating to noise are affected by both the noise level itself, and the duration (how long overheating occurs) and frequency (how many times per year/month) the overheating condition occurs.

The AVO guide also states that the reduction in external noise levels via a partially opened window is 13dB, slightly more cautious than the WHO guidance of 15dB. This therefore relates to worst case allowable external noise levels of $63\text{dB}_{\text{LAeq,16hour}}$ in the day, and $55\text{dB}_{\text{LAeq,8hour}}$ and $78\text{dB}_{\text{LAmax,F}}$ at night.

With reference to Table 9, above, therefore, it can be seen that these noise levels are exceeded in Categories A and B at all times, and Category C at night. These facades are therefore likely to require some form of attenuated ventilation, or mechanical ventilation, to control noise ingress during the overheating condition.

It should be noted that the overheating condition is not formal guidance, and hence there are no strict requirements to be met. The implications of the noise levels under overheating conditions will need to be discussed and agreed with the design team and the Local Authority once full details of the mechanical services review are known.

Noise from Mechanical Ventilation Units

It is understood that ventilation will be provided by mechanical means (MVHR). It should be noted the cumulative noise levels from the mechanical units and external noise ingress should meet the internal ambient noise level criteria (IANL) presented in Table 2. Based on this, Table 12 below presents target IANL criteria for mechanical systems serving internal areas.

Table 12: Internal Mechanical Services Noise Criteria

Room Type	Design Target IANL dB, LAeq T
Bedrooms	27 dB LAeq,8h
Living Rooms	32 dB LAeq,16h

These criteria are cumulative for all mechanical noise sources within each space.

External Amenity Areas

Based on MCC's requirements and BS8233:2014 guidance, daytime noise levels of 55 dB L_{Aeq} (16 hour) are to be targeted in the proposed outdoor amenity areas.

Based on the architectural layouts it is understood that external balconies are proposed on the apartment buildings overlooking Rochdale Road, Gould Street, Clive Street and Back St Georges Road. Based on the noise modelling exercise undertaken, we anticipate that the daytime L_{Aeq} (16 hour) noise levels on these balconies would be in the order of 57-73 dB L_{Aeq} (16 hour) and would therefore exceed the outdoor amenity noise criteria targeted by MCC.

British Standard 8233 gives the following guidance in relation to achieving the desired 55dB $L_{Aeq,T}$ noise levels in amenity spaces.

"...these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted.

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

The Planning Policy Guidance² (Published on 6 March 2014 and last updated 22 July 2019) states that a noise impact may be partially off-set if the residents have access to:

"A relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;

A relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance.)"

Residents can access 'St Michael's Flags & Angel Meadow Park', which is within a 5-minute walking distance from the proposed development.

²Paragraph: 011 Reference ID:30-011-20190722 <https://www.gov.uk/guidance/noise--2>

Separation Between Commercial/Ancillary Units and Apartments

Separation Between Gymnasium and Residential Units

The ground floor of the proposed apartment blocks will contain a gym. It is understood that the gym will not be of a commercial nature and will be open only to residents. An assessment has been undertaken to assess the potential noise impact from the gym to the vertically and horizontally adjacent residential units.

Our assessment assumes that the gymnasium will not be occupied between 23:00h – 07:00h and that there will be no amplified music in this area.

Calculations have been undertaken using gym activity source sound pressure levels previously measured by dBx Acoustics, detailed in Table 13, below. The assessments undertaken at this stage are indicative and detailed assessment will be undertaken during subsequent design stages. These noise levels should be applied as limits. Should the operator wish to allow higher noise levels, then noise calculations and subsequent specifications may need to be revisited.

Table 13– Gym Source Level Data

	Noise Level in Octave Band Centre Frequency							dBA
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Typical Gym NO Music, dBL _{eq}	57	66	66	65	65	59	54	68
Dropped Weights, dBL _{max}	85	68	50	35	30	20	20	60

The noise levels detailed above were measured in a residential gym, with no amplified music or speech (i.e. no instruction or classes). The above sound pressure levels include noise levels from footfall on treadmills. As can be seen, the noise arising from dropped weights (measured data) is greater at low frequencies than the noise levels from typical gym activity.

Design Criteria

As noted above, although MCC present low frequency noise criteria for residential premises which are structurally adjoined to entertainment premises (i.e. where the noise source is music), no such guidance is presented for residential units which are structurally adjoined to gyms. At this stage, therefore, our assessment is based on the following;

Typical activity noise transfer ($L_{eq,T}$) to be in accordance with MCC requirements for entertainment noise, i.e. no more than 30 dB L_{Aeq} in bedrooms, no more than 47dB L_{Aeq} at 63Hz and no more than 41 dB L_{Aeq} at 125Hz.



We recommend that maximum noise levels within bedrooms should not exceed the BS8233 criteria for sleep disturbance of $45\text{dBL}_{\text{AF,max}}$. For control of low frequency noise, the NR25 criterion curve should not be exceeded, i.e. 55dB at 63Hz and 44dB at 125Hz. It should be noted that this would not guarantee inaudibility within the residential apartments, and that gym equipment should be specified wherever possible to include appropriate bumper plates and isolation.

Noise to Apartments Above - Airborne Sound Transfer Via Floor

The proposed separating floor construction between the ground floor and first floor residential properties is understood to be a 300mm concrete slab. Our calculations assume normal weight concrete of around $2,350\text{kg/m}^3$.

Our assessments indicate that further mitigation will be required in order that the design criteria proposed above for noise transfer between the gym and residential units are met for both typical and maximum noise levels.

Calculations indicate that providing a ceiling comprising two layers of two layers of 12.5mm high density plasterboard on a light steel grid, forming a cavity of at least 50 mm to the slab above with 50mm thick mineral wool insulation the cavity, would increase the sound insulation performance of the floor to meet the proposed design criteria, as shown in Calculation 1 and Calculation 2, below.

Calculation 1 – Noise Transfer, Base Floor Slab and Ceiling ($L_{\max}$ Dropped weights)

Room to Room

Date: 15-Jul-21
 Job No: 21043
 Project: 67 Rochdale Road Gym
 Title: Noise to FF

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room L_p	85	68	50	35	30	20	20	20	59.9	63
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Floor SRI	41	54	64	72	80	87	92	92		

Receive room dimensions; height: 2.70 m
 width: 3.30 m
 length: 3.00 m

Interface dimensions; height: 3.30 m
 width: 3.00 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room L_p	45	15	-13	-36	-49	-66	-71	-71	19	12
Recommended Maximum ($L_{\max}$)	55	44								25

Calculation 2 – Noise Transfer, Base Floor Slab and Ceiling (L_{Aeq} , typical activity noise)

Room to Room

Date: 15-Jul-21
 Job No: 21043
 Project: 67 Rochdale Road Gym
 Title: Noise to FF

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room L_p	57	66	66	65	65	59	54	54	68.4	65
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Floor SRI	41	54	64	72	80	87	92	92		

Receive room dimensions; height: 2.70 m
 width: 3.30 m
 length: 3.00 m

Interface dimensions; height: 3.30 m
 width: 3.00 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room L_p	17	13	3	-6	-14	-27	-37	-37	0	-10
MCC Maximum	47	41								30

Noise to Apartments Adjacent- Airborne Sound Transfer Via Wall

The proposed separating wall construction between the ground floor apartments and gym is unknown at this design stage. An indicative assessment has therefore been undertaken to determine the required sound insulation performance of the separating wall to ensure gym activities will have no adverse impact on residential amenity in adjacent apartments.

Calculations are based on the gym activity source sound pressure levels detailed in Table 13, above and the proposed design criteria presented within this report.

The assessment indicates that if a lightweight framed construction is proposed, this would need to be substantial; the calculation below presents an assessment based on two layers of 15mm high-density plasterboard each side of staggered steel stud, forming a cavity of at least 200 mm with 100mm thick insulation (22kg/m³), with a sound insulation performance of 61dB R_w+C_{tr}. This is just capable of meeting the suggested requirements for noise transfer at 63Hz, as presented in Calculation 3 and Calculation 4, below.

Calculation 3 – Noise Transfer, Base Floor Slab and Ceiling (L_{max} Dropped weights)

Room to Room

Date: 15-Jul-21
Job No: 21043
Project: 67 Rochdale Road Gym
Title: Wall to apartment adjacent

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room Lp	85	68	50	35	30	20	20	20	59.9	63
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Wall SRI	30	47	59	66	71	65	68	68		

Receive room dimensions; height: 2.70 m
width: 2.80 m
length: 2.70 m

Interface dimensions; height: 2.70 m
width: 2.70 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room Lp	55	21	-9	-31	-41	-45	-48	-48	29	25
Recommended Maximum (L _{max})	55	44								25



Calculation 4 – Noise Transfer, Base Floor Slab and Ceiling L_{Aeq} , (typical activity noise)

Room to Room										
Date: 15-Jul-21										
Job No: 21043										
Project: 67 Rochdale Road Gym										
Title: Wall to apartment adjacent										
Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room L_p	57	66	66	65	65	59	54	20	68.2	65
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Wall SRI	30	47	59	66	71	65	68	68		
Receive room dimensions; height: 2.70 m										
width: 2.80 m										
length: 2.70 m										
Interface dimensions; height: 2.70 m										
width: 2.70 m										
Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room L_p	27	19	7	-1	-6	-6	-14	-48	7	-2
MCC Maximum	47	41							30	

Structure-borne Sound Transfer

As the gym is located on the ground floor, structure-borne noise transfer is less onerous than when located above noise sensitive spaces. However, it will be necessary to minimise energy transmitted via the structure itself.

The floor build-up in the Gymnasium unit is unknown at this design stage. dBx Acoustics has spoken with a specialist gym floor supplier, who has indicated that, for example, a floor comprising two or more layers of 9mm or thicker plywood, crosslaid, supported on a resilient layer (e.g. Pliteq GenieMat FF layer), with a top finish of rubber gym floor finish (e.g. Pliteq GenieMat FIT) may be appropriate help reduce noise in the adjacent apartments due to dropped weights to NR25 L_{max} or lower (assuming flanking is adequately controlled).

A similar construction, but without the rubber floor finish, would be appropriate for beneath any running machines/cycling machines, provided that these are fitted with resilient feet to minimise vibration transfer into the floor.

In all cases, the resilient layer would need to be turned up at the perimeter of the room to ensure that the floor remains fully isolated from the surrounding partitions.

The above proposed mitigation measures are indicative for planning purposes, a detailed assessment will be undertaken during subsequent design stage to ensure that noise transfer from the gym can be appropriately controlled.

Floors Between Commercial and Residential Units

The ground floor of the proposed apartment blocks will contain commercial units. An assessment has been undertaken to assess the potential noise impact from the commercial units to the vertically adjacent residential units.

Typical activity noise transfer ($L_{eq,T}$) to be in accordance with MCC requirements for entertainment noise, i.e. no more than 30 dB L_{Aeq} in bedrooms, no more than 47dB L_{eq} at 63Hz and no more than 41 dB L_{eq} at 125Hz.

We recommend that maximum noise levels within bedrooms should not exceed the BS8233 criteria for sleep disturbance of 45dB $L_{AF,max}$. For control of low frequency noise, the NR25 criterion curve should not be exceeded, i.e. 55dB at 63Hz and 44dB at 125Hz

The use of the ground floor commercial units is currently unknown. For the purposes of this assessment, a typical office/retail/coffee shop type usage has been assumed.

At this stage, it is considered that a coffee shop would likely be the noisiest usage. Noise levels measured by dBx Acoustics in a busy city centre coffee shop, with around 50 customers and amplified background music, were up to 73dB $L_{Aeq,T}$ and 83dB $L_{Amax,F}$.

The proposed separating floor construction between the ground floor and first floor residential properties is understood to be a 300mm concrete slab. Our calculations assume normal weight concrete of around 2,350kg/m³. This floor build up is anticipated to achieve a sound insulation performance of around 65 dB R_w .

Assessments have been undertaken to predict the noise levels in apartments vertically above the commercial units, based on the above sound insulation performance and the measured coffee shop noise levels (octave band data).

Calculation 5 and 6 indicate that the separating slab is appropriate to control noise transfer from a busy coffee shop noise to the apartments to around 13dB $L_{Aeq,T}$ and 23dB $L_{Amax,F}$. This is significantly below the criteria set for residential amenity within BS8233 and as such would be barely perceptible or inaudible in typical conditions. Should a noisier usage of the commercial units be proposed, however, it is likely that additional mitigation measures will be required. This would need to be reviewed on a case by case basis, and it is anticipated that where appropriate enhanced sound insulation will be part of the tenancy agreement for future commercial tenants.

Calculation 5 – Noise Transfer, Base Floor Slab and Ceiling ($L_{\max}$ Coffee Shop)

Room to Room

Date: 15-Jul-21
 Job No: 21043
 Project: 67 Rochdale Road Commercial Unit
 Title: Noise to FF

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source Room L_p	79	79	81	79	79	75	69	63	83	79
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Floor SRI	48	47	54	61	67	71	76	76		

Receive room dimensions; height: 2.70 m
 width: 3.00 m
 length: 3.30 m

Interface dimensions; height: 3.00 m
 width: 3.30 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room L_p	32	33	28	19	13	5	-6	-12	23	17
Recommended Maximum ($L_{\max}$)	55	44								25

Calculation 6 – Noise Transfer, Base Floor Slab and Ceiling L_{Aeq} (L_{Aeq} typical activity noise)

Room to Room

Date: 15-Jul-21
 Job No: 21043
 Project: 67 Rochdale Road Commercial Unit
 Title: Noise to FF

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source Room L_p	69	69	71	69	69	65	59	53	73	69
Receive room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Floor SRI	48	47	54	61	67	71	76	76		

Receive room dimensions; height: 2.70 m
 width: 3.00 m
 length: 3.30 m

Interface dimensions; height: 3.00 m
 width: 3.30 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room L_p	22	23	18	9	3	-5	-16	-22	13	6
MCC Maximum	47	41							30	

Building Services Noise Emissions

Plant Noise Emission Limits

Any items of fixed plant associated with the operation of the proposed development would have the potential to generate noise. Consequently, suitable limits to which the cumulative noise level plant should adhere have been set and are presented in Table 14.

Manchester City Council require that the rated plant noise levels are controlled to 5dB below the background noise level during the periods in which the plant operates.

Table 14–Proposed Building Service External Noise Limits

Noise Sensitive Receptors	External Building Services Plant Noise Limit	
	(L _{Ar,Tr}) dB	
	Daytime 07:00 – 23:00 hours (T = 1 hour)	Night-time 23:00 – 07:00 hours (T = 15 minutes)
Nearest Noise Sensitive Properties	40 dB	35 dB

Emergency Generation and Life Safety Plant

It is understood that MCC have no specific external plant noise limit requirements for life safety plant (e.g. smoke extracts) and emergency generation plant (e.g. standby generators). It is considered appropriate to allow a relaxation of the limiting noise criteria applied to base building services plant due to their infrequent use and to prevent inferior products being used in emergency situations. Accordingly, it is recommended that noise emitted from this plant should be designed to not exceed 10dB above the typical background noise level (L_{A90}), one metre outside any noise sensitive premises. Testing of emergency plant should only be carried out for up to one hour in a calendar month and only during the more noise tolerant daytime period of 09:00 and 17:00 hours Monday to Friday and not at all on weekends or public holidays.

Activity Noise - External

Noise Breakout from Gymnasium

The nearest anticipated noise sensitive receptor (Figure 1) to the proposed gymnasium is a proposed residential building on the adjacent site, at a distance of approximately 12 m to the northern side of the apartment blocks.

An assessment has been undertaken to assess the potential noise impact from the gymnasium to the nearest noise sensitive receptor. Calculations have been undertaken, using the previously measured gym activity source sound pressure levels detailed in Table 13, above.

Based on MCC requirements, a noise target arising at the receptor of 10dB below the typical background noise level in each octave band is appropriate.

Our assessment assumes that the gymnasium will not be occupied between 23:00h – 07:00h and that there will be no amplified music in this area. It has been assumed that the external doors of the gymnasium would be closed at all times.

Calculations indicate that to achieve the above noise criteria at the nearest sensitive receptors, the sound insulation performance of external façade elements should be no lower than those shown in Table 15, below. At the present time, no external glazing is indicated to this elevation.

Table 15 – Proposed Sound Insulation Requirements for External Façade Elements of Gymnasium

Façade Element	Sound Insulation (dB) at Octave Band Centre Frequency (Hz)						Overall, dB
	125	250	500	1k	2k	4k	
External Wall	17	34	47	56	57	49	R _w 41
Door	19	22	26	24	23	20	R _w 25

On the basis of the above proposed specifications, noise level at the nearest noise sensitive receptor is predicted to be 10dB below the typical background sound level measured in each octave band, and there would therefore be no adverse impact from activities within the gymnasium at the nearest noise sensitive receptors.

Noise Breakout from Use of Commercial Units

The ground floor of the proposed apartment blocks contains commercial units overlooking Rochdale Road. The nearest noise sensitive receptor to the proposed commercial units is at a distance of approximately 7 m from the south-eastern side of the apartment block.

An assessment has been undertaken to assess the potential noise impact from the commercial units to the nearest noise sensitive receptor based on noise levels measured in a busy coffee shop with amplified background music as detailed above.

Noise from the commercial units may include sound sources such as amplified music and voices, and hence a noise target arising at the receptor of 10dB below the typical background noise level in each octave band is appropriate, in accordance with MCC requirements.

Based on the results of previous measurements undertaken at a busy city centre coffee shop (Starbucks), typical activity noise levels were found to be up to around 73 dBL_{Aeq,T}. These (octave band) noise levels have been used in the noise-breakout assessment. It has been assumed that the windows of the commercial units would be closed at all times.

Calculations indicate that to achieve the above proposed noise criteria at the nearest sensitive receptors, the sound insulation performances of external façade elements of commercial should be no lower than those shown in Table 16, below.

Table 16–Proposed Sound Insulation Requirements for External Façade Elements of Commercial Units

Façade Element	Sound Insulation (dB) at Octave Band Centre Frequency (Hz)						Overall, dB
	125	250	500	1k	2k	4k	
External Wall	27	39	46	46	40	40	R _w 46
Glazed Door	22	17	24	37	41	38	R _w 29

The calculations are based on standard thermal glazing (4/TC/4), but other alternatives may be acoustically appropriate provided that the minimum dBR_w value specified is achieved. This can be reviewed during detailed design.

On the basis of the above proposed specifications, noise level at the nearest noise sensitive receptor is predicted to be at least 10dB below the typical background sound level measured in each octave band, and there would therefore be no adverse impact from activities within the commercial units. The requirements of MCC with regard to noise emissions would be met.

Should potentially noisier tenants (such as pubs, nightclubs etc) occupy the commercial units, the sound insulation performance of the external façade elements (Table 16) would be required to be further upgraded to meet the recommended noise criteria at the NSRs. This would require assessment on a case by case basis.

Conclusions

dBx Acoustics Ltd has been appointed by Portwood Developments Ltd. to carry out a noise survey and noise impact assessment for the proposed residential development at 87 Rochdale Road, Manchester.

To establish the existing noise climate at the site, unattended environmental noise survey was undertaken between Thursday 1st July 2021 and Monday 4th July 2021. Additional short term attended measurements were undertaken on Tuesday 18th May 2021 and Thursday 20th May 2021.

Using the measured noise levels, calculations have been undertaken to determine the requirements for glazing 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 majority of the site; however, windows may be openable at residents' discretion for purge ventilation. Initial guidance on acoustic conditions during overheating is also presented. It is understood that mechanical ventilation using MVHR units is currently under consideration. Minimum sound insulation requirements for glazing have been provided.

The majority of external amenity areas will not be compliant with WHO recommendations for daytime noise levels; however, residents would have access to "*St Michael's Flags & Angel Meadow Park*" public park. As such, given the urban nature of this site and its proximity to the strategic transport network, planning permission should not be refused on this basis.

An assessment of the sound insulation performance requirements of the floor separating the ground floor commercial units from the apartments has been undertaken. It is anticipated that for typical uses (coffee shop, retail) the requirements of MCC can be met.

An assessment of the sound insulation performance requirements of the wall and floor separating the ground floor gymnasium from the apartments has been undertaken, and recommendations have been provided to control the activity noise from the gymnasium.

Noise break-out assessments indicate that the noise generated from the commercial units will have no adverse impact on the nearby noise sensitive receptors.

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 for this development.

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.

Appendix B – Time History Graph of Monitored Noise Levels - Location D

